good plan; also, to remember that 10 per cent. profit on material and labor represents on a job of from $200 to $1,000 simply the shop expenses, allowing nothing for the master's expenses and time, and no plumber known to the writer ever made any money and kept it and stayed in business without getting from 25 per cent. upwards on contract work, including profits on extras of course.

Another thing, don't worry if some patent-leather plumber seems to be getting all the contract work in sight at cost or near it. He may dazzle your eyes with his new wagon and gilt sign; the travelling men may tell you that Skinner is a hustler; that he runs thirty-six men; that he has the Skylight flats and sixteen tenements in a row; don't let that sort of talk move you a peg. Do what little job work you can get, make your customers your friends, and make it a rule that if you cannot get the cost of work with your living added, to let that job go and try another job. Discount your bills and remember the railroad rule in taking contract work: In all cases of doubt take the safe side. Don't contract a job if you have any doubt whatever about getting your money. Don't imagine the mechanics' lien law will get you your money; it is little more than a bluff. A slippery lawyer and a slight technicality will put you in the position of the fellow that drove the hearse: He was not in it. Finally, the writer invariably goes over his work when it is finished to find out what the job did actually cost him. I believe that plumbers get tangled up, and into the clutches of the sheriff, for the reason that they get half way through a lot of work they are losing money on, and get a lot more at the same price, without knowing, they are meeting their Waterloo when settlements become due.

HEATING BY HOT WATER.

WHEN the quantity of air to be heated per minute has been ascertained, says a writer in the *Plumber and Decorator*, the quantity of pipe that will be necessary to heat the room may be found by the following:

Multiply the excess of temperature of the flow-pipe above that of surrounding air by the difference between the temperature at which the room is purposed to be kept, when at its maximum, and the temperature of the external air, and divide this product by the difference between the temperature of the pipes and the purposed temperature of the room; then, the quotient thus obtained when multiplied by the number of cubic feet of air to be warmed per minute, and this divided by 222 (the number of cubic feet of air raised 1 deg. per minute by 1 ft. of 4 in. pipe) will give the number of feet in length of pipe 4 in. diameter, which will produce the desired effect.

When 3 in. pipes are used, the quantity of pipe required to produce the same effect will, of course, be different. To obtain it, the number of feet of 4 in. pipe obtained by the above rule must be multiplied by 1·33. If 2 in. pipe be used, the quantity of 4 in. pipe must be multiplied by two.

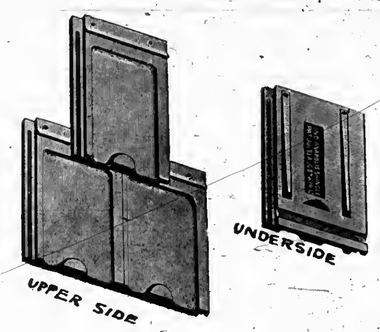
A well known company who make the manufacture of steam and hot water heaters a specialty, now advocate a different method of figuring greenhouses to the one heretofore employed, namely, by exposure; that is, counting in the entire exterior surface, glass, sides and ends. The old method was simply a consideration of the "glass surface" alone, and was liable to error through varying differences in the construction and location of the sides and ends. A table which is conservative and based on a large number of actual trials, shows the amount of square feet of pipe necessary to heat any given number of square feet of exposure to a maximum night temperature of 50 degrees, and also what will be necessary to heat the same amount of exposure to a higher temperature of 60 degrees; this latter being the highest that florists generally want. In computing the total exposure of the greenhouse, one-third of the square feet of the ends and exposed outside wall surface is added to the actual square feet of glass. After finding the number of square feet of piping that will be necessary to heat the house to the given temperature, then it is easy to transfer the square feet of pipe into linear feet of whatever size of pipe may be chosen. —*Master Steam Fitter.*

Mr. Harry G. Powell has opened an office as architect at Stratford, Ont.

MANUFACTURES AND MATERIALS

CLAY FOR SHINGLES.

WE reproduce from the *Clay Worker* cuts of a new shingle tile or "clay shingle" as it is called, which seems to be a great improvement upon the ordinary form in use here. Its general upper surface is depressed, leaving a raised rim wider on one side and grooved to receive a lip on the adjoining tile. The underside of the tile has two ribs, giving strength with lightness, and a groove near the botton edge forming a drip. It is claimed that these tiles so securely lock that the heaviest winds cannot lift them. The size is 7 x 10 inches, with an exposure of 6 x 8



inches. We would be glad to have an expression of opinion from our subscribers who are in the roofing business, or other practical men, as to the merits or otherwise of this tile.

There is little doubt but that a snow and waterproof tile of light weight and great strength would fill a long felt want. Slates are utterly unreliable as a protection against fire, even a moderate heat cracking them and exposing the wooden roof beneath, while wooden shingles are not durable enough for a first-class building, and unless laid on a bed of good mortar more dangerous in case of fire than slates.

ASPHALTE VERSUS TAR AND GRAVEL PAVEMENTS.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—Asphalte pavements are in danger of falling into disrepute, not because asphalte has been found wanting in any property necessary to the making of a good and durable pavement, but owing to a pernicious habit, either the outgrowth of ignorance or carelessness. I refer to the misleading statements to be met with daily in the columns of our newspapers, as furnished to them by corporate bodies and others to the effect "That an asphalte pavement is to be laid on such and such a street," when in reality the pavement is to be constructed of tar and gravel. It is not my intention to go into the respective merits of asphalte versus tar and gravel, as I think it would be an insult to the common sense of your readers to attempt to draw such a comparison, but simply to point out the injustice done to asphalte in general by having such inferior materials as tar and sand dignified by its name.

There are many brands of asphalte on the market, some of them I am sorry to say of an inferior quality; therefore I consider that it is quite sufficient for the genuine article to have to answer for the sins of these brands without being compelled to adopt those of such a primitive and out of date mixture as "tar and gravel."

Yours truly,

JUSTICE.

JOINTS FOR CAST-IRON PIPES.

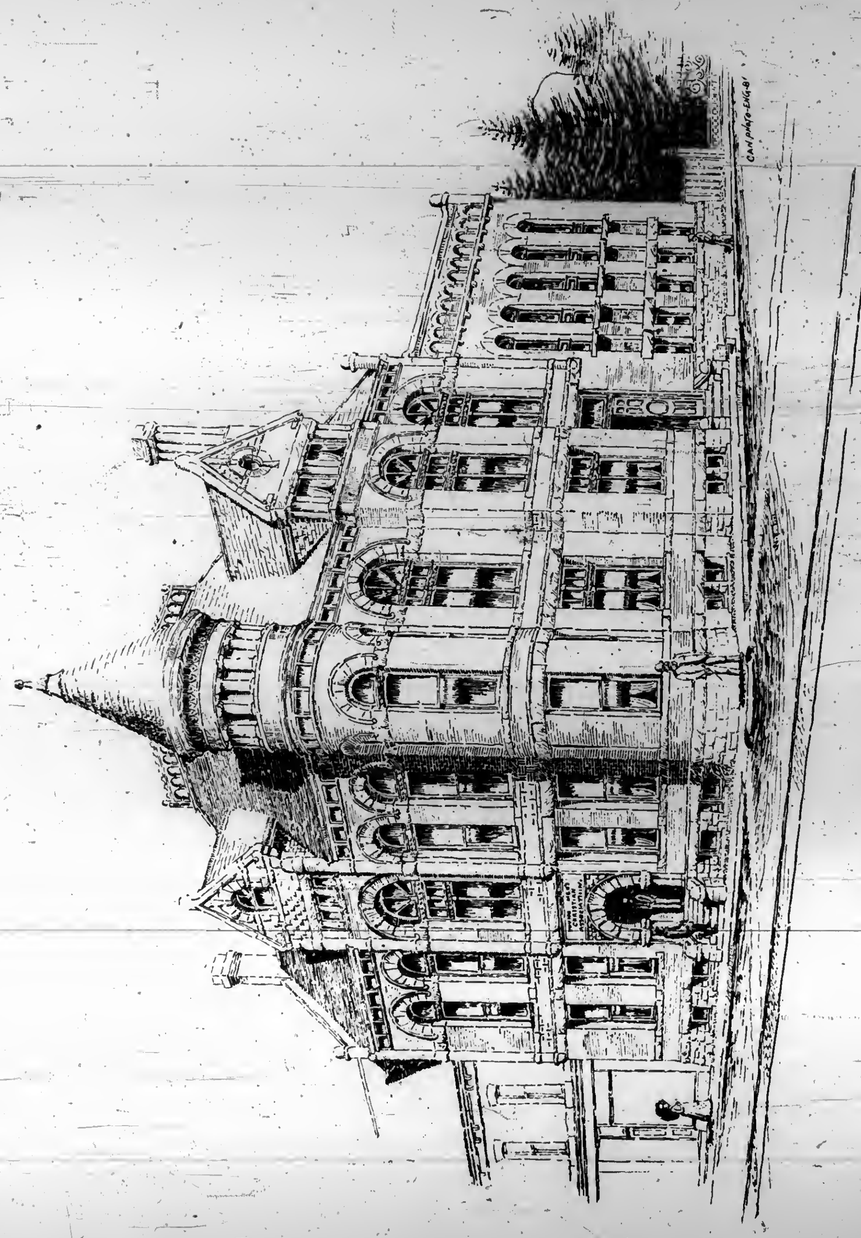
THE ordinary method in this country for putting cast-iron water or waste pipes together is by a lead-caulked joint. This answers very well when the pipes lie quietly in the ground. But pipes do not lie quietly in all cases. And in houses where hot and cold water is alternately passing through the pipes, expansion and contraction come into play, and the result to the joints is anything but satisfactory. If a steam drip enters one of these pipes, the lead ring forming the packing of the joint will work out upon the pipe within a few months.

Pipes underground are liable to disturbance from a variety of causes. Leakage usually results from any movement of the pipe; with water-pipes these leakages are annoying and costly. If a cast-iron pipe happens to be carrying gas instead of water, the leakage at once becomes costly and dangerous.

The lead-caulked joint is costly, and at the same time difficult to make well in confined locations. In plumbing work it is no uncommon thing to

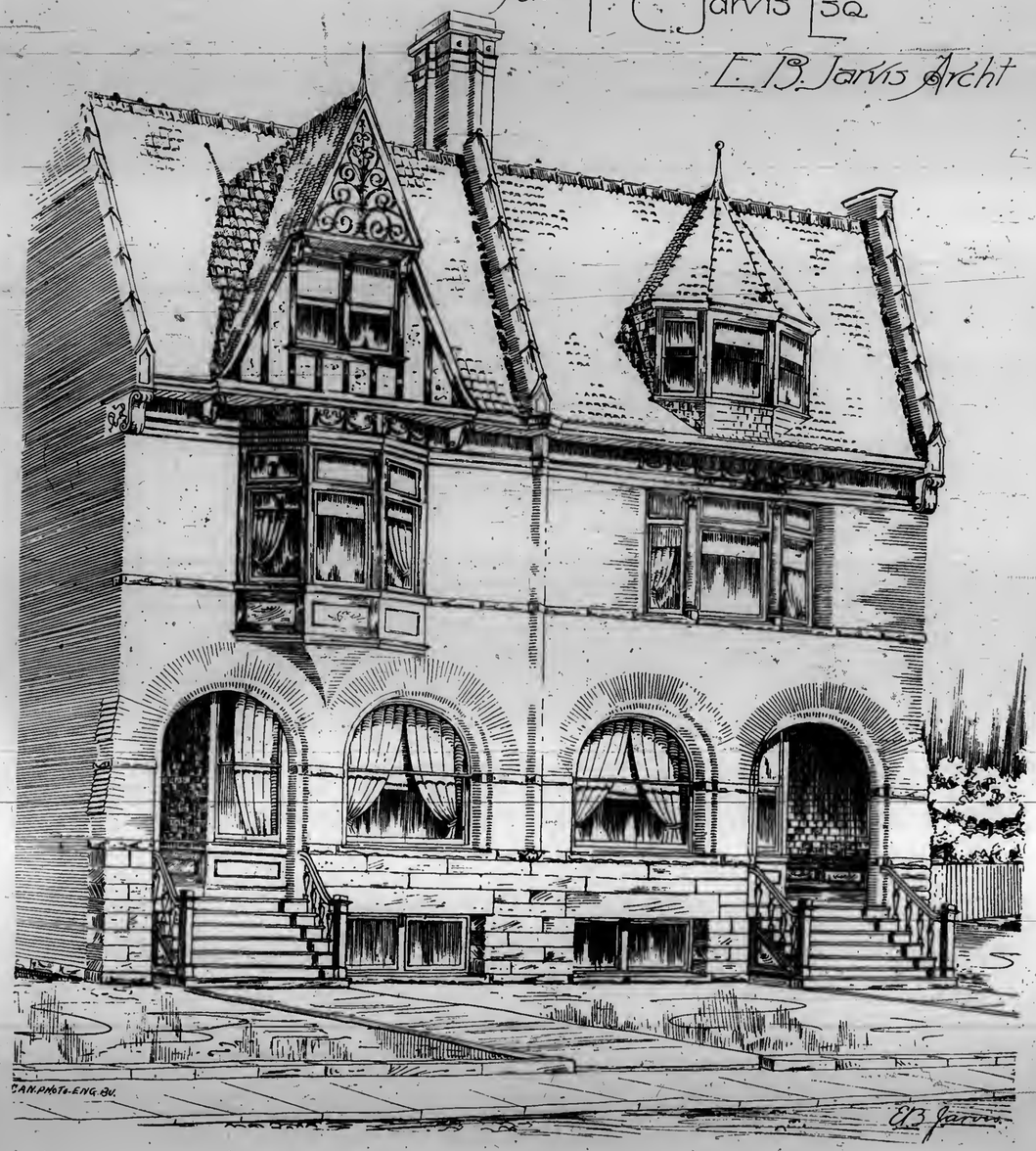
Vol. IV] The Canadian Architect and Builder. [No. 8.

ENTRANCE TO RESIDENCE OF MR. GEO. G. BOOTH, TRUMBULL AVE., DETROIT, MICH.



Proposed Y. M. C. A. Building, Kingston, Ont.
J. J. B. Reid and Arthur Ellis, Architects, Kingston.

Houses on Brunswick Ave.
for F. C. Jarvis Esq
E. B. Jarvis Archt



SKETCH FOR AGED WOMEN'S HOME IN BELMONT STREET, TORONTO, ONT.

W. R. Gregg, Architect, Toronto.

t
and Builder

CANADIAN ARCHITECT AND BUILDER.

VOL. IV.—No. IX. TORONTO AND MONTREAL, CANADA, SEPTEMBER, 1891. { PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

14 King Street West, TORONTO, CANADA.

64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1891.

PRESIDENT	W. G. STORM, R.C.A., Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton.
TREASURER	D. B. DICK, Toronto.

COUNCIL:

W. A. EDWARDS	Hamilton.
EDMUND BURKE	Toronto.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
DAVID EWART	Ottawa.

REGISTRAR:

W. A. LANGTON	Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1891.

PRESIDENT	F. X. BERLINQUET, Quebec.
1ST VICE-PRESIDENT	VICTOR ROY, Montreal.
2ND VICE-PRESIDENT	J. NELSON, A.R.C.A.
SECRETARY	C. CLIFT, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. C. HUTCHISON, R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
ALPH. RAZA	Montreal.
J. F. PEACHY	Quebec.

THE Parks and Gardens Committee of the Toronto City Council has succeeded in a period of five or six years in transforming the eastern half of Toronto Island into a delightful park. The sweepings from the city streets, and soil from excavations for new buildings, etc., have been carried to the island on scows and there used to fill up the lagoons. On the land thus "made," young trees have been abundantly planted, and have already attained sufficient growth to afford a certain amount of shade, in addition to what may be obtained beneath the trees of larger growth on the older part of this section of the Island. This Island Park will go far to make good the loss which the citizens have sustained through the short-sightedness of the past, which has left them almost entirely without central parks and squares in the city proper. Island Park is so near at hand, so easily accessible, and so delightfully situated, that its value to the citizens of this and future generations would indeed be difficult to estimate. We presume it is the intention of the Park Commissioner to transplant some of the trees, as at present they stand much too close together. It may also be remarked that full advantage will not be taken of the park until the ferries are compelled to lower their rates.

ARCHITECTS in England have many advantages which their confreres on this side of the water have not. Their annual excursions to historic localities are always full of interest, but this year the Society of Architects has carried out the more ambitious project of an excursion to Belgium. Some forty-one members availed themselves of the trip, and the first excitement consisted in being presented to the King at his palace at Ostend. This was on a Saturday. Sunday and Monday were spent in Bruge—being brim-full of interest. Tuesday was spent in Ghent, Wednesday in Antwerp, Thursday in Malines, or, as it is sometimes called, Mechlin, and thence to Brussels—Friday and Saturday in Brussels, with a hurried run to Louvain. On the Monday, a portion of the party being unable to remain longer, left for home, while the remainder proceeded to Mons. Tuesday was spent in Tournai, Wednesday at Andenarde, Courtrai, on Thursday, and the last day, Friday, at Ypes, leaving in the afternoon for Ostend and thence to England on Saturday. Many of the party spent considerable time in sketching, the results being seen in the architectural journals. The effect of such a trip and in such congenial company, must have been truly inspiring, and cannot but result in great good to those participating.

WE publish elsewhere the proceedings of the first annual meeting of the Province of Quebec Association of Architects. Some 34 out of a membership of about 70 attended, being a very much larger percentage than that recorded of many similar organizations. As will be seen, the whole of the officers were re-elected, with the exception of Mr. Hopkins, who positively declined, when the 1st vice-president, Mr. Berlinquet, was elected to the position. The annual report indicates a most commendable activity on the part of the Council, 21 meetings having been held, with the result that incorporation has been secured, examinations instituted and a scheme for the regulation of competitions formulated. The Association has thus evinced an *esprit du corps* and a vitality worthy of emulation, and if its progress continues at the same ratio, the resultant advance of the profession will be most marked. The reading of professional papers and discussions thereon, which proved of so much interest at the Ontario gatherings, were conspicuous by their absence. We presume, however, that when the Association gathers a little more strength, and now that the weightier matters have been put into shape, the members will have time to prepare papers for future meetings. The remarks of Mr. Berlinquet at the banquet in the evening, in proposing the toast of the Quebec Association, and of the other gentlemen who spoke, should be pondered over by the members of both Associations. The toast of the sister Association in Ontario was happily introduced by Mr. Roy, who gave it due praise as the pioneer organization. Mr. Doran, in responding, expressed the hope that the time was not far distant when a Dominion Association should be formed, with the provincial Associations in affiliation.

OUR ILLUSTRATIONS.

ST. PAUL'S EPISCOPAL CHURCH, GUILD ROOM AND RECTORY, MUSKEGON, MICH.—POST & HOLMES, ARCHITECTS, TORONTO.

The drawings which we illustrate were placed first in a limited competition, the following firms being invited to submit sketches: Post & Holmes, Toronto; Patton & Fisher, Chicago; J. K. Cody, Chicago, and F. S. Allan, Joliette. The buildings are to be built of brown stone, laid in random ashlar work, the upper storey of rectory being in half timbered work. The roofs of church and guild room will be "open timbered." The church will accommodate 600, and the guild room 300. The estimated cost, exclusive of heating and furniture, &c., is $40,000.

HOUSES ON CRAWFORD STREET, TORONTO.—DENISON & KING, ARCHITECTS.

RESIDENCE OF MR. W. E. PRICE, DORCHESTER ST., MONTREAL.—A. F. DUNLOP, ARCHITECT.

RESIDENCE FOR MR. THOMAS OLIVER, HAMILTON, ONT.—W. A. EDWARDS, ARCHITECT.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE first annual meeting of the above Association took place in the city of Quebec, on Thursday, the 10th inst. There were present: J. W. Hopkins, of Montreal, President, in the chair; F. X. Berlinquet, Quebec, 1st Vice-President; V. Roy, Montreal, 2nd Vice-President; A. C. Hutchison, A. F. Dunlop, A. Raza, A. T. Taylor, M. Perrault, Montreal; J. F. Peachy, Quebec, Councillors; W. E. Doran, Montreal, Treasurer; C. Clift, Montreal, Secretary; H. Staveley, A. H. Larochelle, D. Ouelette, L. C. E. Page, I. G. Bussieres, I. B. Bertrand, Thos. Raymond, G. E. Tanguay, A. J. Pageau, Chas. Baillairgé, E. Dusscault (student associate), R. Le May (student associate), Quebec; R. Findlay, W. H. Hodson, J. Z. Resther, Jos. Haynes, G. De G. Languedoc, E. Z. Gauthier, J. Esinhart, A. H. Lapierre, Theo. Daoust, Jas. Wright, A. Gendron, Montreal.

The minutes of the annual meeting before incorporation and last general meeting were read and confirmed.

The following report from the Council was read:—

ANNUAL REPORT OF THE COUNCIL.

GENTLEMEN,—At our annual meeting of October 10th, 1890, your Council was instructed to procure an Act of Incorporation, also to deal with matters in relation to competitions. On the 30th of December last we succeeded in procuring an Act of Incorporation, a copy of which has been sent to every member of the Association. The Act stipulated that the Council meet within one month and re-organize, forming necessary by-laws, to be ratified at the next annual meeting.

On the 15th and 16th of January your Council met, organized, under the Act, and elected the officers that were elected at the last general meeting. They framed the by-laws and adopted them as sent to each member, and which are now open for amendment and ratification at this meeting.

Since the organization under the Act in regard to matters of competitions, your Council after interviewing the Building Committee of Montreal Board of Trade, succeeded in having a few minor admendments made to the conditions prepared by the Building Committee; nevertheless, as the Building Committee did not accede to the more important items your Council found objectionable, they deemed it desirable to ask the members to refrain from engaging in the competition, and with that view prepared a petition which was signed by about 20 members, a copy of which was sent the Building Committee of Board of Trade. Your Council have prepared a guide for competitions which will be submitted later on at this meeting.

The Act sets forth that a tariff had to be prepared by the Council and sent down to the Lieutenant-Governor. The tariff as prepared will be read to you later. It has been sent to the Lieutenant-Governor, and now awaits his sanction.

The Board of Examiners elected at the meeting of January last consists of Messrs. Berlinquet and Baillarge, of Quebec, and Roy, Thomas and Taylor, of Montreal. They have framed programme of subjects for examinations, which have been printed. Examinations were held by the Board of Examiners last 30th and 31st of July. Two students went up for matriculation and one for the final examinations. Those for matriculation succeeded in passing; the one for registration was not equally successful. The officiating members of the Board were Messrs. Thomas, Roy and Taylor.

The Council has held 21 meetings. The attendence has been as follows:—J. W. Hopkins, 18; V. Roy, 17; A. Hutchison, 17; A. F. Dunlop, 19; M. Perrault, 4; A. Raza, 14; A. F. Taylor, 18; W. E. Doran, 13; C. Clift, 20. Quebec members—F. X. Berlinquet, 15; J. F. Peachy, 2.

The Council have engaged rooms for the use of the members of the Association, one large room about 35' x 160", and a room for the Council adjoining. There is a large fire-proof vault and store room and all the necessary conveniences. The rooms are situated on the second floor at 186 St. James St., Montreal, and have been furnished with tables, chairs, etc. The lease is for three years from May next, but we have the option of leaving next May, provided the Council give the required three months notice. The rental is $200; the proprietor paying for cleaning, water, and all ordinary taxes. The rooms were formally opened on August 4th last. The Council have not yet succeeded in furnishing a library, but hope this will soon be accomplished, as also the delivering of lectures and the forming of classes for the students.

There are seventy members on the roll and 41 students. There has been paid into the Association by its members and students the sum of $2,280; and there is still the sum of $400 owing by the members and students. Your Council last January when they organized, found it necessary to raise the registration fee to enable them to meet the obligations incurred in procuring the Act, and yet later at the general meeting of the Association last May, it was again found necessary to assess each member the sum of $5.00 additional, thus making the registration fee $25.00. We are thankful to say that the members acceded to the request with alacrity, whereby your Council were enabled to meet all obligations, leaving a good balance in the Treasurer's hands. The Council take this opportunity of thanking the members for the handsome manner in which they have responded to all calls made upon them. All respectfully submitted on behalf of the Council.

J. W. HOPKINS, President.
CHRS. CLIFT, Secretary.

TREASURER'S REPORT.

Receipts.

Monies received by members fees, etc.,	$2,287.83

Expenditure.

Paid out for Act of Incorporation, printing, furnishing of rooms, expenses of delegations to Quebec, rental, etc.,	$1,814.49
By balance in bank	473.34
	$2,287.83

Auditors { J. NELSON, CHAS. BAILLARGE. (Sgd.) W. E. DORAN, Treasurer.

It was moved by Mr. Staveley, and seconded by Mr. J. Z. Resther, that the report of the Council with the audited Treasurer's report be received and adopted, and that they be printed and a copy sent to each member. Carried.

The Secretary was instructed to notify each member in arrears according to the Act and by-laws.

The by-laws were then read, and after being slightly amended, it was moved by Mr. Clift and seconded by Mr. Raza, that as now amended they be finally adopted, translated by the committee already appointed, then printed in proper form with the Act and a list of the members and students belonging to the Association, a copy sent to each member and student associate.

The Secretary then read the suggestions for the conduct of architectural competitions as adopted by the Council, which were unanimously adopted, and the Secretary was instructed to have it translated and printed and a copy sent to each member.

The election of officers, etc., was then proceeded with.

The Chairman appointed Mr. H. Staveley and Mr. J. Z. Resther to act as scrutineers.

The whole of the officers and Council were then elected by ballot, the scrutineers reporting the following officers duly elected to fill their respective offices for the ensuing year:

President, F. X. Berlinquet, Quebec; 1st Vice-President, V. Roy, Montreal; 2nd Vice-President, J. Nelson, Montreal; Treasurer, W. E. Doran, Montreal; Secretary, C. Clift, Montreal; Six members of Council: A. C. Hutchison, Montreal; A. F. Dunlop, Montreal; A. T. Taylor, Montreal; A. Raza, Montreal; M. Perrault, Montreal; J. F. Peachy, Quebec; Auditors, J. W. Hopkins, Montreal; Chas. Baillargé, Quebec.

Mr. Hopkins was asked by a large number of members to stand as President for another year, but he begged the members not to vote for him as he could not accept the honor for another year, and sincerely hoped they would elect the 1st Vice-President to the presidency, whereupon Mr. Berlinquet was elected by an unanimous vote.

A vote of thanks was tendered to the scrutineers.

It was moved by Mr. V. Roy, and seconded by Mr. Berlinquet, that Mr. Hopkins be tendered the most heartfelt thanks of the members of this Association for the able and efficient manner in which he had filled the position of President since the formation of our Association. Unanimously carried.

It was moved by Mr. J. Z. Resther, and seconded by Mr. Page, that the thanks of the members be tendered Mr. Clift for the services rendered this Association since its formation, also that it be accompanied with a cheque for $150 as a present. Unanimously carried.

It was moved by Mr. Ouelette, and seconded by Mr. J. Z. Resther, that a vote of thanks be given the Council for their efficient services. Unanimously carried.

At this stage Mr. Hopkins conducted the newly elected President to the chair.

It was decided to advertise in a Quebec paper when matters affecting the Quebec members and students came up.

It was moved by Mr. Doran, and seconded by Mr. Raza, that the next annual meeting be held in Montreal on date according to the by-laws. Carried.

It was decided that the Council prepare a form of agreement and conditions of contract for the use of all members.

There being no further business, the meeting closed.

THE BANQUET.

In the evening the members of the Association assembled at a banquet in the Florence Hotel, at which, as will be observed from the annexed report of the proceedings, a most enjoyable and profitable time was spent.

The following gentlemen sent letters expressing regret at their inability to attend the banquet: Messrs. Arnoldi, Ottawa, W. A. Langton, Toronto, Edmund Burke, Toronto, E. E. Taché, Assistant Commissioner of Crown Lands, Quebec, and Messrs. Charest, Trudel and St. Michel, Quebec.

The toast of the Queen was proposed by the President, Mr. Berlinquet, and received with enthusiasm, all present joining in singing "God Save the Queen."

In proposing the second toast, that of the Province of Quebec Association of Architects, Mr. Berlinquet said:

GENTLEMEN,—I have now to propose the toast of the Association of Architects of the Province of Quebec. This toast will, I have no doubt, be drunk with pleasure by all present. This Association has in view an object of which we are all well aware, and one which should commend itself to everybody. It has for object the strengthening of the profession, and the rendering of its members more capable in the performance of their duties. Union is strength. Each member of this Association of Architects may be compared to a stone forming part of a structure; and as in a structure each stone has its allotted place and object, and all the stones being put together with harmony form something grand and imposing, so each member of this Association

"CANADIAN ARCHITECT AND BUILDER" STUDENTS' COMPETITION.

WITH the object of promoting a feeling of friendly emulation on the part of students in the offices of members of the Province of Quebec and Ontario Associations of Architects which should result in improving the skill of the young men thus engaged, the publisher of the CANADIAN ARCHITECT AND BUILDER invites competitive designs for a suburban cottage to be occupied by a young man doing business daily in the city, owning the lot, possessing $2,000 in cash and having an income of $1,400 per annum.

The cottage is to be erected on an inside town lot having a frontage of 75 feet, a depth of 150 feet, and situated on the west side of the street.

There is required in the way of accommodation a parlor, small library, dining room and kitchen; cellar, suitable for heating apparatus and storage of fruit and vegetables.

On the first floor there are to be four bedrooms and bathroom.

The attic is to contain a servant's bedroom and store room.

The materials to be used shall be brick on a stone foundation.

There is no sewerage or water supply systems in the town, and the owner will have to dispose of all waste in the most sanitary manner, avoiding contamination of the soil from which he has to draw his supply of water.

Competitors are required to submit plans of the various floors, two elevations, unless accompanied by a perspective, when one will do

Drawings must be made on sheets of heavy white paper or bristol board, 14 x 20 inches in size, and must be drawn sufficiently coarse to allow of their being reduced to one-half the above size. Drawings must be made in *firm, strong lines*, with *pen* and *black* ink. No color or brush work will be allowed. Each drawing must be marked with the *nom de plume* of its author, and the author's name, *nom de plume* and full address must accompany each drawing sent in. Competitors must also give the names of the architects in whose offices they are employed.

Drawings must reach the office of the CANADIAN ARCHITECT AND BUILDER, 14 King St. west, Toronto, not later than the 5th day of November next.

The right is reserved of publishing any design sent in. All drawings will be returned to the authors within a reasonable time after the competition is decided.

The first premium will be $15; second, $5; third, one year's subscription to the CANADIAN ARCHITECT AND BUILDER. A premium of $5 will be given for the best perspective sent in. The decision as to the respective merits of the designs submitted will be made by Mr. Thos. Fuller, chief architect, Department of Public Works, Ottawa, which decision will be final.

This competition is confined to students practising in the offices of members of the Province of Quebec and Ontario Associations of Architects.

GLAZING COLORS.

GLAZING is a term which has probably been borrowed from the potter's art of coating the ware with a transparent vitreous substance.

The house-painter uses the word glaze in speaking of the setting of window-panes, and the word is used also by other trades when speaking of a finish that adds luster.

Glassy, transparent, is the correct meaning, therefore glazing colors are those possessing but little body, or covering power, and which are employed when richness and brilliancy are desired.

Body colors may be rendered transparent or partially so by using but little color to a large proportion of vehicle; but such glazing is of no value except to landscape painters, and not much to them.

There is no difficulty in producing a perfect glazing coat, when the painter knows how to prepare the foundation colors.

The self-taught painter, supposing that all colors are used the same, may worry over his carmine or yellow lake and wonder why they will not cover, and he may give up in despair; but the regular vehicle painter, knowing what is demanded, proceeds with a glaze with as little concern as he would for a body color.

Any body color which is to be used as the color proper should be fine, clean, and laid on perfectly smooth. This being the practice in good shops, glazing is merely the extra work of laying two or more coats of transparent color.

The glaze may be put on thin and but one coat given, which is practiced when it is desired to impart brilliancy to the under coat. Brilliant vermillion is produced by a thin glaze of carmine over vermillion, and the same method may be adopted with the yellow and green lakes.

The common practice is to prepare the ground color so that it will closely match the tone of glazing color as it appears when mixed or "wet up," for every color is slightly deeper in tone when wet or mixed in oil or varnish; but the glazing colors are capable of a wider application, for they may be painted over grounds wholly opposite in color. Thus carmine may be glazed over lead color, black, and also over white, yellow, pale green, verdigris, blue, purple, violet and yellow lake; verdigris and ultramarine blue may be glazed over about the same range of colors, but when so used they are better adapted to narrow spaces, striping ornamental and pictorial work.

THE TORONTO ARCHITECTURAL SKETCH CLUB.

MR. Frank Darling has offered a prize of books to the value of $10, for the best set of measured working drawings of the front porch of the Canada Co. Building, corner of King and Frederick streets.

The following drawings are to be submitted: Elevation, section and plan, inch scale; sections of mouldings, full size; elevation, section and plan of caps, showing front and diagonal views of volutes, full size. All drawings to be made in black ink on white paper, no brush work being allowed. Neatness and general arrangement of the drawings will be taken into consideration.

Drawings to be submitted under *nom de plume*, the author of the work enclosing his real name in a sealed envelope. Members of the Sketch Club only are permitted to compete.

The drawings to be delivered to Mr. Frank Darling, *Mail* Building, not later than Monday, Nov. 2nd.

STAINING OAK BROWN.

A correspondent asks for a receipe for staining oak so as to match old brown oak. Wood is stained by the application of the ordinary liquid dyes employed for wool or cotton. They sink deeper into the wood when they are applied hot. A decoction of oak bark produces brown of various shades, according to the quantity employed; so does an infusion or decoction of walnut peels. The above information is from Cooley's Practical Cyclopædia of Practical Receipts. We have been told that Condy's Fluid, more or less diluted with water, will stain wood brown. If a very dark brown is required, it may be necessary to introduce a little black. In the supplement to the *Scientific American*, the following instructions are given for dyeing oak black, so as to resemble ebony; and, of course, lighter shades of black can be produced at will by employing more water than is prescribed: Immerse the wood for 48 hours in a hot saturated solution of alum; and then brush it over with a logwood decoction as follows:—Boil one part of the best logwood with ten parts of water, filter through linen, and evaporate at a gentle heat until the volume is reduced one-half. To every quart of this add from 10 to 15 drops of a saturated solution of indigo. After applying this dye to the wood, rub the latter with a saturated and filtered solution of verdegris in hot concentrated acetic acid, and repeat the operation until a black of the desired intensity is obtained.

PERSONAL.

Mr. D. W. Ouellet, architect, will leave Quebec on the 20th inst., for a visit of three months to the principal cities of Europe.

The senior partner of the firm of Langley & Burke, architects, Toronto, has just returned from a visit to the Canadian northwest.

Mr. J. B. Reid, architect, Kingston, Ont., has been visiting Europe. Mr. Arthur Ellis has been in charge of his practice during his absence.

Mr. F. X. Berlinquet, architect, Quebec, has just returned from an extended tour in Europe, and in consequence is looking and feeling greatly improved in health.

Mr. W. E. Doran, of Montreal, after attending the Convention of the Province of Quebec Association of Architects at Quebec, returned home via Boston and St. John, N. B.

Mr. C. H. Bishop, Superintendent of Public School Buildings, Toronto, accompanied by Mrs. Bishop, sails from New York to-day (the 19th inst.), for Europe, where he will spend some five or six weeks in visiting points of interest in England, Scotland and France. He will doubtless bring back with him much information which may be utilized to advantage in the construction of school buildings in the future.

PROCESS OF MAKING SLAG BRICKS AT KOENIGSHUETTE, IN SILESIA.

THE slag is run into a large ladle containing fine coke dust, about one and one-half inches thick. The ladle is then run upon wheels to where the bricks are to be made. The slag and coke dust are then mixed together with a curved iron or rabble. The gas generated by the coke is worked up with the liquid slag the product being a doughy sponge-like substance, full of holes, exceedingly light and possessing sufficient elasticity in the walls of the cells to meet the contraction and thus prevent fracture. This material when pressed into a brick does not require annealing. The bricks possess great strength with very little weight, and are capital non-conductors of heat and sound.

has his special duties to perform in connection therewith, and all united together cannot but make a strong and enduring Association which must be productive of good results in the future. The art of architecture is based on Nature, and the grandest and most perfect specimens of her handiwork are man and woman; and when men are united together for any good object, the strength begotten of their union enables them to build up works of beauty and endurance. I do not hesitate to say that such a result awaits our combined efforts. I now propose the toast of the "Province of Quebec Association of Architects."

Mr. Hopkins, of Montreal, in response to this toast, said:

Mr. President and Gentlemen,—I feel very diffident in rising to return thanks to the Association. Of course, having been the first president, I ought to know something of the progress of this society, and I presume I do. When we last met to-day I said a few words. As you know, I am not a man of many words, but I expressed to you how happy I was to be connected with the Association, and how gratified I was to find that during the first year so much progress had been made. I have not the slightest doubt that the new president and officers, most of whom have been re-elected, and therefore, metaphorically speaking, "know the ropes"—I have not the slightest doubt that they will be able, with the aid of a good rudder, which I am confident they will secure in some way or other, to steer the ship of our Association in its proper course for another year. Possibly, it having been our first year, the machinery may at one time have run a little loose and at another, a little stiff; but with the experience already gained, and with the hearty co-operation which, I feel assured, the members outside of the Council will give to it, another year will find us in a more prosperous condition than we are at present. I must avail myself of this opportunity to thank you in the most sincere manner for the honor which you intended to bestow upon me to-day; and I only regret that it was not in my power to accept it. I am sure my successor will prove an improvement—the second edition being always better than the first, and the latest edition containing the most news—he is younger in years and has had experience both in this city and in Montreal, both of which cities will participate in the advantages to be derived from the meetings of the Association alternately (applause).

Mr. A. F. Dunlop, in reply, said:

Mr. President and Gentlemen:—It gives me great pleasure to be among so many of my honoured confreres this evening—the second annual meeting of our Association. Two years ago I had not thought it possible to form this Association. Public opinion was against us; in fact, most of the present members felt how hopeless such an undertaking would be. But this meeting proves that nothing is too great to accomplish, as we have not only formed the Association, but its future prosperity is also assured. There is, however, one vital and all important point, on which I wish to say a few words. The general public are not thoroughly well informed as to the object of our Association. They have an idea that we are formed into a close profession for the purpose of preventing anyone else from being an architect, and that we intend to raise the standard of our charges. Gentlemen, this is a base slander on our good intentions. We are formed into this Association for the advancement of architecture, for the better serving of our clients, and for the better education of our students; also for the establishment of schools and classes of architecture, and for the purpose of making every architect of the future a competent one, and one whom the public may employ with confidence. Would you employ a doctor who had simply been a druggist for a few months to attend your sick child or parent? Would you employ a notary or a lawyer who had only been in a bailiff's office for a limited period to draft your deeds? Then why employ a man who calls himself an architect—a man without training, and one who would put in 12" timber where it requires 24", and *vice versa*. Is it not a fact that the proper construction of a building is as important to life and safety as the employment of a proper doctor? You jeopardize a life with a poor doctor, and you jeopardize a hundred lives with a poor architect.—It is the architect on whom the public must rely for the proper construction of their buildings. Should not the architect be thoroughly practical, and know how to use material with economy? Should he not know the exact requirements of the art of architecture in all its branches to enable him to satisfy the wants of the public? and as for sanitary requirements, the architect has far more to do with the health and long life of the world's great family than the physician, and is in a great degree answerable for the ailments and early deaths of many. How can all this knowledge be acquired unless we join together and establish schools, classes of architecture, libraries in our colleges for our students? Why should not every architect of the present and future be on the same footing, as regards qualification, as a doctor, lawyer, notary, or druggist; and why should not the public be guaranteed that he is so? I claim that an architect has as great a mission to perform, and without training and education our public and private buildings must be at best fire traps, badly constructed, badly ventilated, badly designed, and a disgrace to our country, while on the other hand, our educated and trained students would make architects of whom the world would be proud, and it would be an honour to belong to such a profession. An architect would then be looked up to with respect and confidence, and not as now, in many cases be regarded with suspicion and doubt. Our ranks would be filled with qualified men who would say with Shakespeare:—

> "When we mean to build,
> We first survey the plat, then draw the model;
> And, when we see the figure of the house,
> Then must we rate the course of erection
> Which, if we find outweighs ability,
> What do we then but draw anew the model
> In fewer offices; or at least, desist
> To build at all? Much more in this great work
> (Which is almost to pluck a kingdom down,
> And set up another), should we survey
> The plat, of situation, and the model;
> Consent upon a sure foundation,
> Question surveyors, and know our own estate
> How able such a work to undergo;
> To weigh against his opposite; or else
> We fortify on paper and in figures.
> Using the names of men instead of men:
> Like one that draws the model of a house
> Beyond his power to build it; who, half through
> Gives o'er, and leaves his part created cost
> A naked subject to the weeping clouds
> And waste for chirlish winter's tyranny."

Mr. Hutchison being called upon, said:

I am of course glad to take part in the first annual meeting of our Association. During the past year we have tried to lay the foundations of our Association like good architects; and while the foundation that we have in the Act is not, perhaps, the very best we could have had, like good builders, we must make the best of it. A great part of the work of the past year has been, and probably the work for two or three years to come will be, merely laying the foundations of our Association. The older members of the profession, like myself, who have borne the brunt and heat of the day in times past, will, perhaps, get no further than laying the foundations. We all know, however, that the most important part of a building is the foundation; and while it is lost to sight, and there is nothing beautiful about it, still on the excellence of the workmanship depends the firmness of the building; and I hope that we will be able to lay a foundation so broad and deep that this will be a lasting Association. (Applause.) I hope, Mr. President, to see a superstructure raised upon the foundation which we are now laying; and I have great hopes in that superstructure being something good, from the fact of the steps we have taken to bring a proper class of persons into the profession. I am very much pleased with the late examinations for matriculation held in Montreal, I am pleased to see that so high a standard is required to enter the profession; and to the faithful performance of the duties of the board of examiners I attach great importance in the making of our Association a success. I trust that they will be very strict in the examinations for entry into the profession. It is, I think the only means of raising our profession to a high level; and I hope the Board of Examiners will ever bear that in mind. I am beginning to feel that I am getting old, and I will in a few years perhaps be out of active service. It is my earnest wish that the young men rising up will be an honor to the profession. I am looking forward with a great deal of hope to be able to see during this coming winter and succeeding winters something done towards that end by the formation of classes or the delivery of lectures to help our young men on in their studies. Of course, you are all aware that heretofore the study of architecture in any of our offices has been somewhat of a farce. I do not think there is an office in the Province of Quebec where there has been a systematic teaching of architecture. For my own part I have always refused to take young men, because I knew I had no time to devote to teaching them. Now, I hope that our Association, having secured a home of its own, will establish during this winter and succeeding winters, classes in which a proper course of training will be carried out. I think feelingly on this subject, Mr. President, from the fact that all my own studies had to be carried out under very great difficulties. I am sure I studied for months at some subjects, when perhaps a lecture or two would have made them clear to me and saved me very great trouble. By putting facilities in the way of our young men we ought to raise up a better class of men than the old ones; and in this direction I trust that our Association will attain great success. (Applause.)

The toast of the sister Association of the Province of Ontario was proposed in a very neat speech by the Vice-President, Mr. Roy, who, in the course of his remarks, said: I would like to propose the toast of the sister Association of the Province of Ontario. This toast will no doubt be drunk heartily for several reasons. The Association of the Architects of the Province of Ontario is the first Association organized in Canada. We are the second; but we have had their work before us as an example to follow. Seeing the success which they had with their Association, we in the Province of Quebec failed to see why the same success should not await our efforts in the same direction. I am happy to see that even they have recognized the great success which we have had in Parliament and elsewhere in the short time which has elapsed since we set about our self-appointed task. The realization of their hopes was longer deferred than ours, and it took them more time to reach the point which we have attained to-day than has been necessary with us. The Association of Ontario has done a great deal for the advancement of the art of architecture; and thus have they not only

benefitted the Association but also the public at large. The public in Ontario feel it. The public feel that when they take an architect belonging to the Association, they have an architect possessed of the ability requisite for the proper carrying out of the work which he undertakes. Gentlemen, I drink this toast with the greatest pleasure, and I know that you do likewise.

Mr. Doran was called upon to respond to this toast, and said:

Mr. President and Gentlemen,—I suppose I must for the moment imagine that I am a foreigner—at least foreign to this province. I must at the outset express my regret that there is no genuine native born Ontario man here to speak for them, but I suppose I must become naturalized and for the time being consider myself as an Ontario member. When I was first asked to respond to this toast the question arose why I should be selected, instead of any other member of the Association, to denationalize myself from the Province of Quebec and become, for the time being, the representative of the sister Association of the Province of Ontario, and that question I have not been able to solve. Well, to proceed, on the part of the Ontario Association I return the most sincere thanks for the manner in which this toast has been received; and as art really knows no nationality, much more it may be said that art in Canada, particularly that of architecture, should know no nationality, that it should be one broad Canadian work. We hope the time is not far distant when it will be the Association of Architects of the Dominion of Canada (Applause), and when the Provincial Associations will be small branches (the same as to-day we have the local branches of Montreal and Quebec of the Provincial Association) of that greater Association of the Dominion. In this manner the prosperity and growth of the Dominion may be advanced, because there is no surer way, no more eloquent way, of telling in the most silent manner possible of the greatness of a country than by pointing to its architectural monuments. When the songs of the poet will be forgotten, the monuments of stone raised by a people shall pass down to future ages and testify to the grandeur and greatness of their country, as do those majestic monuments of ancient Greece to-day. The magnitude of examples of architecture should testify to the greatness of our country, and the stamp of originality which we hope will be placed on our buildings, and which we hope our Association will tend to foster, may prove that Canada is a nation, that it is a country fair and free, a country of which we may all be proud. (Applause.) It is to be hoped, gentlemen, that the Association of the broad Dominion will soon take the place of the Provincial Associations, and carry onward and forward the good work which has been begun by the Provincial Associations. Mr. Hutchison spoke of us as building the foundations. Let us hope then that the foundations which we are building may be the foundations of a vast arch which will spring over all this country, and unite not in bands of iron but in bands of stone, if I may use the expression, the whole country. (Applause.) Gentlemen, I think I cannot do better before resuming my seat, than to propose the toast of "Canada, Our Country,"—the country of which we may justly feel proud; and I will call upon our friend Mr. Baillargé to respond to this toast in the fitting terms which he so well knows how to use.

Mr. Baillargé responded briefly to this toast, saying: I must say that you have made a very poor selection in calling upon me to respond to this toast. Of course we are all proud of Canada, though it would appear just now that our American cousins are doubtful of the propriety of annexing us, for fear they should be led into bad ways. I am glad to see that in our by-laws we have taken good care to exclude all kinds of boodling, still it is so difficult to make a dollar, that perhaps you would like to know the way the miller advised his sons to manage when they could not make a dollar honestly, and with your permission I will give you "The Miller."

Mr. Baillargé then entertained the banqueters with the rendering of a humorous song entitled "The Miller."

The toast of the "Press" was proposed by Mr. Clift in a few well chosen words, and responded to by Mr. J. B. Mortimer, who was followed by Mr. Haynes.

The toast to the retiring President, Mr. Hopkins, proposed by Mr. Roy, was received enthusiastically, all joining in the chorus, "For he's a Jolly Good Fellow."

Mr. Hopkins, responding, said: Mr. President and Gentlemen:—I thought you would have got pretty near tired of hearing my speeches, which amount to noise and nothing else. My old friend Mr. Roy, I know, spoke feelingly in proposing my health, because we have been friends for many years; and I assure you that I feel very grateful and very much indebted to you all for the manner in which you have accepted this toast. I hope that at any time that my assistance can be of the slighest value you will not fail to call upon me. You have almost overpowered me with the enthusiasm of your demonstration; and I can only hope that those who succeed me will obtain—I know they will merit it—the same kind expression of feeling which you have shown towards me.

The toast of "The Retiring Council," proposed by Mr. Larochelle, was responded to by Mr. Piché, who said:

Mr. President,—Mr. Larochelle has proposed the health of the Council which guided the affairs of our Association during the past year. I must say that I have not participated in the carrying out of their work as much as I should like to have done. I cannot but say that the work which has been done, particularly in Montreal, merits high praise; and if the Association stands on a sure and solid footing to-day, it is owing in large part to the gentlemen belonging to Montreal. We have started out well, and let us continue to go forward with a firm step, confident that we are doing good conscientious work, which will have its effect not only among ourselves but also among the public, who well know how to appreciate it. (Applause.)

Mr. Ouellet followed with a few brief remarks expressive of his gratification at the thorough appreciation by the members in general of the efforts put forth by the Council of last year for the advancement of the interests of the Association.

Mr. Clift called for a toast to the newly elected President, Mr. Berlinquet, saying that he felt confident that Mr. Berlinquet would be an honor and an ornament to the Association, and would do full justice to the position which he was called upon to fill.

Mr. Berlinquet, replying, said that it was but right and fitting to compliment those who had acquitted themselves of their duties in a praiseworthy manner; but it was rather premature to bestow praise upon one whose work was not really commenced. He assured the Association that he would do his utmost, and was prepared to make any sacrifice, to fulfill the duties which should devolve upon him in the onerous position to which they had raised him.

The health of "The Ladies" was then drank with gusto, and Mr. Gauthier answered for them in a most happy manner.

In the course of the evening the banquetters were entertained by the rendering of several fine songs by Messrs. Gendron, Roy and Pageau.

The newly elected Council held its first meeting at the Florence Hotel on the 12th inst., and after having disposed of some routine business, accepted the invitation of the President, Mr. Berlinquet, and Mr. Peachy, to enjoy a drive about the city.

EXAMINATION PAPERS, ONTARIO AND QUEBEC ASSOCIATIONS OF ARCHITECTS.

ONTARIO ASSOCIATION PRELIMINARY EXAMINATION.

CANDIDATES, except such as have matriculated in arts in any university in Her Majesty's dominions, or in the Ontario School of Practical Science, must have passed the examination of the second form of a High School or Collegiate Institute; or, as an alternative, must have passed the entrance examination to a High School or Collegiate Institute, and submit to an examination in Mathematics, and either French or German equivalent to that of the second form of a High School or Collegiate Institute.

The first time of sending in his name as a candidate for examination, the student shall send also a certificate of his status with reference to the Preliminary Examination.

ONTARIO ASSOCIATION FIRST INTERMEDIATE EXAMINATION.

Every candidate must, at least one month prior to the date fixed for the examination, send to the Registrar the following drawings, which must be certified by his principal to be his own work:

Four sheets of drawings, one of each of the four orders of Greek architecture; One sheet of the mouldings and ornaments of the orders, drawn to a larger scale; (Each sheet to be of the size of a half sheet of Whatman's Double Elephant paper, *i. e.*, 20 in. by 26 in.)

The subjects for examination will be:—

ELEMENTS OF CONSTRUCTION.—Text Book: Mitchell's Building Construction, Part I.

MATHEMATICS.—Euclid; Books I., II. and III.; Plane Trigonometry: Including the solution of plane triangles; Algebra: Including quadratic equations.

TECHNICAL TERMS.—A knowledge of the terms necessary to understand the descriptions of a monumental building and its parts.

HISTORY OF ARCHITECTURE.—An outline only will be required, such as may be learned from reading such works as Rosengarten's Architectural Styles.

ONTARIO ASSOCIATION SECOND INTERMEDIATE EXAMINATION.

Every candidate must at least one month prior to the date fixed for the examination, send to the Registrar the following drawings, which must be certified by his principal to be his own work:—

One sheet of Romanesque architecture; Two sheets of Gothic architecture; One sheet of drawings measured from existing examples; One sheet of constructional details. (Each sheet to be of the size of a half sheet of Whatman's Double Elephant paper, *i. e.*, 20 in. by 26 in.)

The subjects for examination will be:—

STATICS, GRAPHICAL AND ANALYTICAL.

STRENGTH OF MATERIALS.—Text book for both the above heads: Lessons in Applied Mechanics, by Cotterill & Slade; Part II.

STRUCTURAL IRON WORK.—The candidate will be required to draw details of the forms of iron construction in use in ordinary practice, viz., the construction of columns and girders, and the framing of beams and trusses.

HISTORY OF ARCHITECTURE.—The candidate will be expected to have a knowledge of the development of architecture and the characteristics of the different styles; Text book: Fergusson's History of Architecture; Handbooks recommended: Parker's Introduction to Gothic Architecture; Bloxam's Gothic Architecture; Rickman's Gothic Architecture.

ONTARIO ASSOCIATION FINAL EXAMINATION.

Every candidate must, at least one month prior to the date fixed for the examination, send to the Registrar a perspective drawing which must be

certified to be his own work. Drawing to be on a sheet of paper, 20 in. by 27 in., and not mounted on cardboard.

The subjects for the final examination will be :—

HISTORY OF ARCHITECTURE.—The leading characteristics, including mouldings, features and ornaments of all styles; and special characteristics, with mouldings, features and ornaments in detail, of any one style or period the candidate may select.

DESIGN.—As illustrated by drawings for a building of moderate dimensions, from particulars given, with details of construction and ornament and with specifications.

NATURE AND PROPERTIES OF MATERIALS.—Limes, cements, stones, bricks, timber.

FOUNDATIONS.—Text book: Foundations, by Geo. T. Powell.

ARCHITECTURAL JURISPRUDENCE.—Text book: The Law Relating to Civil Engineers, Architects and Contractors, by Macassey & Strahan.

PRACTICAL KNOWLEDGE OF BUILDING TRADES.—Sufficient for the purposes of ordinary building

STRENGTH OF MATERIALS.—Designing structures of an ordinary kind from data, with computation of the strains involved.

HEATING AND VENTILATION.—Text book: Ventilation and Heating, by John S. Billings.

SANITARY SCIENCE.—Text books: Gerhard's House Drainage; Bayles' House Drainage and Water Supply.

QUEBEC ASSOCIATION PROGRAMME OF MATRICULATION EXAMINATION FOR PUPILS.

1. English or French Composition. (A subject to be chosen at the time.)
2. Arithmetic, up to and including fractions.
3. Mensuration of Surfaces and Solids.
4. Algebra.—Simple Equations.
5. Elements of Geometry and 1st and 2nd Books of Euclid.
6. Freehand Drawing (copy to be given.)
7. Linear Drawing—geometrical (Do.)

QUEBEC ASSOCIATION PROGRAMME OF EXAMINATION FOR REGISTRATION AS ARCHITECT.

LISTS OF SUBJECTS, &C.—Preliminary drawings to be sent in previously, and prepared during pupilage, or otherwise, and to be entirely the work of the candidates.

(*a*) Measured drawings of an existing building, for example the chapter house of Christ Church Cathedral, Montreal, or the newly erected side chapel of the Basilica at Quebec to ½" scale with mouldings and ornament ¼ full size.

(*b*) An original design of a detached private residence, with complete plans, sections, elevations and details, colored to show materials, and one perspective view drawn by rule, together with complete specifications for the several works and materials required for the carrying out of said design, and a detailed estimate of cost, which must not be less than $15,000; scale to be not less than ⅛th inch to 1 ft.

(*c*) An essay on the history and characteristics of any one style of architecture to be selected by the candidate, giving fullest particulars, illustrated by sketches, and to contain at least 1,000 words.

WRITTEN, GRAPHIC AND ORAL EXAMINATION.

ART SECTION.—(*a*) The orders of Greek and Roman Architecture, their origin, development and application; with sketches.

(*b*) The several varieties of classic ornament.

(*c*) The development of the different periods of French or English Gothic, commencing with the Norman.

(*d*) The characteristic mouldings and ornament of each period.

SCIENCE SECTION.—(*a*) The nature, qualities and defects of ordinary building materials, such as stone, brick, timber metals, etc.

(*b*) The nature of soils and foundations.

(*c*) The calculation of strengths of materials and resistances from data and formulæ given.

(*d*) The elementary principles of construction.

(*e*) Hygene, drainage, and sanitation of buildings.

(*f*) Architectural jurisprudence.

(*g*) Heating, ventilation and acoustics.

BOOKS RECOMMENDED.

ART SECTION.—Fergusson's History of Architecture; Fergusson's Handbook of Architecture; Viollet-le-Duc Dictionaire d'Architecture, Stuart & Revett's Antiquities of Athens; Sir William Chambers' Civil Architecture; Gwilt's Encyclopædia of Architecture, (1888 edition); Gailhabaud's l'Arch tecture du V. au XVII. Siècle; Parker's Introduction to Gothic Architecture; Rickman's Gothic Architecture, Brandon's Analysis of Gothic Architecture.

SCIENCE SECTION.—Notes on Building Construction—South Kensington series; Dobson's Rudiments of the Art of Building; Dobson's Foundation and Concrete Works; Tredgold's Elementary Principles of Carpentry; Baillairge's Stereometricon; Rankin's Manual of Applied Mechanics and Civil Engineering; Park's Manual of Hygiene, and Works by Latham, Putnum, Bailey-Denton, Hellyer, &c.; Civil Code of the Province of Quebec; Gwilt's Encyclopædia of Architecture (1888 edition), etc., etc.

The announcement is made in the advertisement of the Toronto Pressed Brick Co. that the Company's office and show rooms have been removed from Adelaide street east to No. 139 Yonge street. It is gratifying to be told that the necessity for enlarged space consequent upon the growth of the business has rendered this removal to larger premises necessary.

MANUFACTURES AND MATERIALS

COLORING AND ENAMELING FACING BRICKS.

WHEN *coloring white burning clay*, for 100 parts of material are required, according to the behavior of the basis material :—

COLOR DESIRED.	OXIDE USED.	PER CENT. OF OXIDE USED.
For dark green	Chromic oxide	0.010 to 1.50 per cent.
" pale green	Chromic oxide	0.008 " 0.25 "
" bluish green	Chromic and cobaltic oxide	0.006 " 0.25 "
" deeper blue green	Chromic and cobaltic oxide	0.25 " 0.50 "
" olive green	Cobaltic and nickel oxide	1.200
" pale blue	Cobaltic oxide	0.005 " 0.50
" dark blue	Cobaltic oxide	0.05 " 0.900
" medium to deep yellow	Nickel oxide	0.200 " 0.900
" brown	Antimony oxide or uranic oxide	0.500 " 0.730
" brown	Ferric oxide	0.150 " 6.17
" black brown	Chromic ferric and cobaltic oxides, or manganese with or without uranium.	up to

For *glaze coloring*, 1.5 to 20 per cent. more of coloring matter will be required in proportion to the depth of the respective tone and the developing capacity the of coloring power of the respective oxides, as well as the height of the burning temperature. The many-sidedness of the subject is shown by the following compilation, there being considerable variation in the coloration, especially according to the more oxidizing or more reducing nature of the flame.

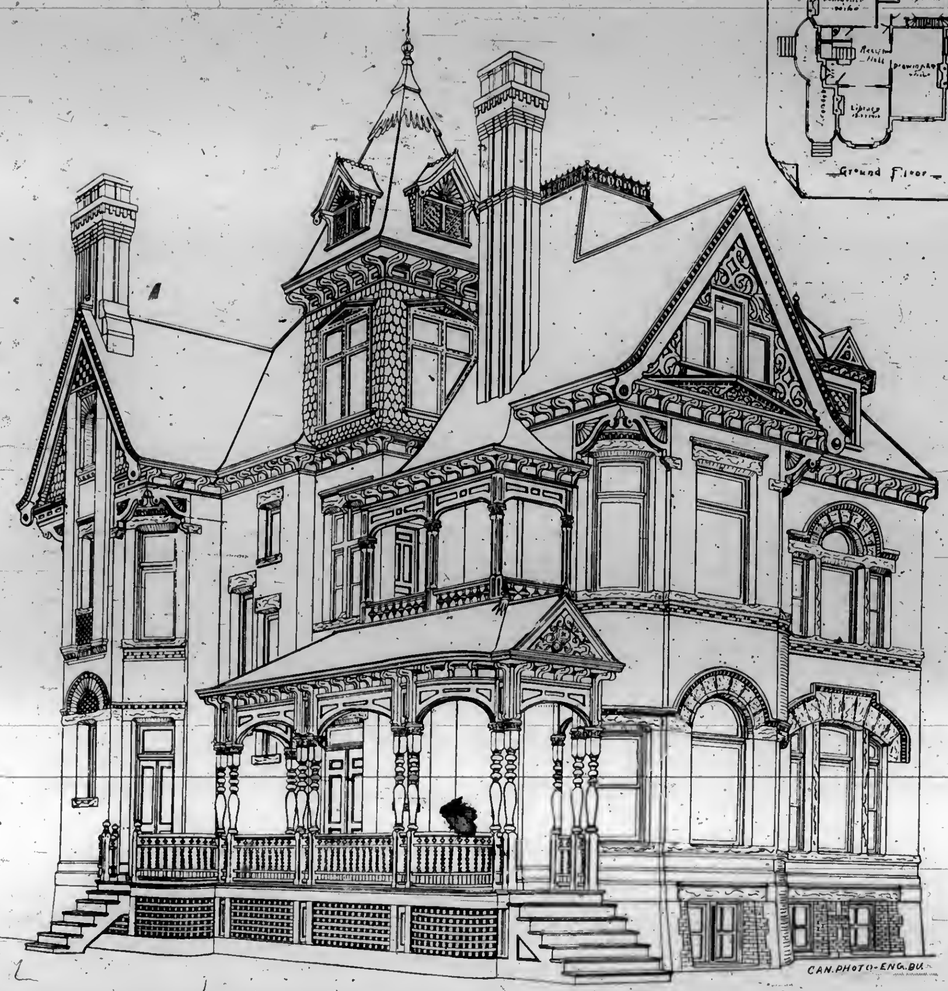
	May also turn out.	Should yield according to the quantity used.
Ferric oxide	Yellow, brownish, medium brown-red-brown, orange-red, blood-red, violet brown-red.	Yellow or brown.
Cobaltic oxide	Bluish, water-blue, sky-blue, fiery-blue, black-blue.	Blue
Chromic oxide	Pure yellow, medium deep, inclining yellow, to copper-brown with yellow reflection, greenish, pale green, sap green.	Yellow or green.
Cupric oxide	Greenish blue, perceptibly green blue, azure blue.	Blue or green
Antimony oxide	Yellowish, yellow, brown-yellow.	Yellow
Uranic oxide	Sulphur-yellow, brownish, straw-color, greenish to green.	Yellow
Magnetic oxide	Medium brown, dark brown to blackish.	Brown or violet
Nickel	Earth color, medium brown, red-brown, sap brown greenish brown.	Brown

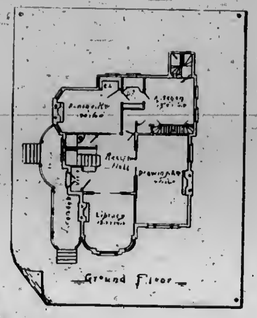
The Brickmaker.

TO PRESERVE WOODWORK.—Enquiries are being made in *Indian Engineering* as to whether coal tar or Burmese "earth oil" forms the best preservative for woodwork. Having tried both, observes *Invention*, we may state that when wood is exposed to air only, the earth oil is the cheapest and less offensive. For wood wholly or partially buried in the ground, or inserted in brickwork, the coal tar is much superior.

Residence of W. E. Price Esq.
Dorchester St. A. F. DUNLOP Archt. MONTREAL

Boat
and builder



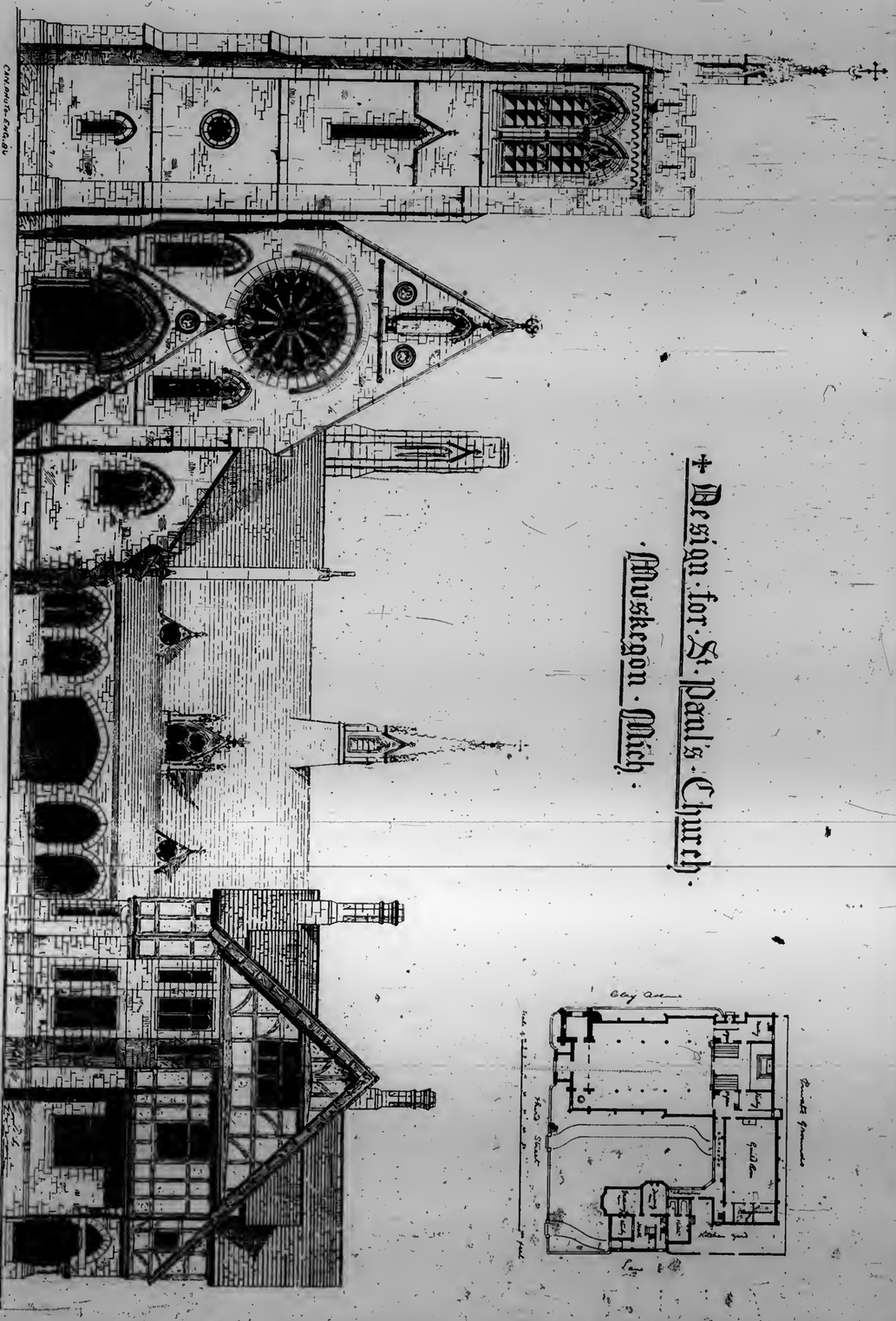


New Dwelling for Thos. Olive Esq.
McNab St South
W. A. Edwards Architect Hamilton Ont

CAN. PHOTO-ENG. CO.

Design for St. Paul's Church.
Muskegon Mich.

Elevation on Third Street.



POST & HOLMES, ARCHITECTS, TORONTO.

Houses on Crawford by Denison & King Architects Toronto Ont.
1890

builder

CANADIAN ARCHITECT AND BUILDER.

VOL. IV.—No. X. TORONTO AND MONTREAL, CANADA, OCTOBER, 1891. { PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods,
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
14 King Street West, - TORONTO, CANADA.
64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1891.

PRESIDENT	W. G. STORM, R.C.A., Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton.
TREASURER	D. B. DICK, Toronto.

COUNCIL.

W. A. EDWARDS	Hamilton.
EDMUND BURKE	Toronto.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
DAVID EWART	Ottawa.

REGISTRAR:

W. A. LANGTON	Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1891.

PRESIDENT	F. X. BERLINQUET, Quebec.
1ST VICE-PRESIDENT	VICTOR ROY, Montreal.
2ND VICE-PRESIDENT	J. NELSON, A.R.C.A.
SECRETARY	C. CLIFT, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. C. HUTCHISON, R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
ALPH. RAZA	Montreal.
J. F. PEACHY	Quebec.

THE Ontario Association of Architects have had two competitions with the object of securing a suitable design for an Association seal. The results in both cases have been unsatisfactory. Here was the opportunity for some of the younger men in the profession to distinguish themselves. It is to be regretted that no one with the necessary ambition and ability could be found to take advantage of it.

THE American Institute of Architects will hold its twenty-fifth annual convention in the city of Boston on the 28th, 29th and 30th of the present month. It is announced that a number of valuable papers have been prepared for the occasion. There will also be an interesting exhibition of architectural drawings under the direction of the Boston Chapter. The occasion will in all probability be marked by a large attendance.

IT has been found for the present impossible to complete the tests of Canadian building stones recently undertaken at the School of Practical Science, Toronto, by the Ontario Association of Architects, owing to the incapacity of the testing machine. The authorities of the School have under construction a machine with double the capacity of the one at present in use. This machine, which will have a crushing capacity of 200 tons, is expected to be available within a month, when the series of tests will be completed, and the results in detail published.

ATTENTION is again directed to the CANADIAN ARCHITECT AND BUILDER'S competition for students of the Ontario and Province of Quebec Associations of Architects, which was announced in the September issue of this paper. It is earnestly hoped that a large number of students in the offices of members of both Associations will feel called upon to enter this competition and do their utmost to uphold the credit of their respective provinces. If this is done, the result will no doubt prove of much interest and value, and sufficiently encouraging to induce the holding of other competitions with a similar object.

A PERUSAL of the competitive advertisement columns of some of our contemporaries is occasionally refreshing (or depressing?). Here are two samples which are a little out of the ordinary type. Designs for a county jail in Wisconsin are wanted and the authorities "promise and agree to pay a *reasonable* price for plans and specifications which the committee may adopt." Possibly the ideas in regard to a reasonable price as entertained by the aforesaid committee will be very far from those of the poor deluded architects who may submit designs. A California school board offers a premium of $100 for plans and specifications of a $2,500 building. Truly, if a premium of 4 per cent. is offered for this amount of work the place must be an Eldorado for architects. But we hope no young Canadian will be tempted to go west on the strength of the offer.

THE City Improvement Board of Sydney, New South Wales, are of the opinion that "it should be compulsory for designs of buildings to be submitted to some competent body for approval, not only for æsthetic reasons and to secure some general harmony of character and design in contiguous edifices, but also to regulate the nature and class of buildings that should be permitted in particular localities." There is need for something to be done in this direction, not only in South Wales, but also in Canada. The practicability of carrying the proposal into effect may, however, be doubted. It would be difficult to secure

judges of design whose ability and fairness would not constantly be called in question, and equally difficult if such authorities did exist, to obtain their consent to occupy a position which would subject them to the ill-will of fellow citizens.

THE *Inland Architect* is of the opinion that "the enforcement of safe building can only be done by making owners, architects, and contractors criminally liable for accidents which result from a violation of the principles of sound construction broadly laid down in a general building act. A few prosecutions of this nature vigorously carried out would do more for safe building than any number of inspectors it would be possible to employ, and would besides create a most healthy public sentiment on the subject." More than this, it would prove a strong incentive to architects and builders to possess themselves of the knowledge required to enable them to know when they were building safely. It is to be feared that under present conditions, guesswork too frequently takes the place of exact knowledge, and so long as no responsibility attaches to the results of ignorance, there will always be those who will refuse to take the trouble to gain the information which would fit them to properly fulfil their duties. The Ontario and Quebec Architects' Acts provide for the proper education of architectural students in future, but in the case of the builder, no such standard of proficiency seems likely to be required.

WITHOUT reflecting upon the faithfulness to duty of the Inspector of Buildings for the city of Toronto, it should be declared that the inspection is a farce. Under present conditions it could be nothing else. During the present year the building restrictions which formerly applied only to the central districts, have been extended so as to cover the whole city. Notwithstanding that the area covered by the by-law has thus been doubled, the Building Inspector is still expected single-handed to see that its provisions are complied with. Not only so, but he is saddled with other duties as well. The proper inspection of buildings in a large and rapidly growing city like Toronto, is in itself beyond the ability of a single individual to properly perform. As a result, the building by-law is being violated in all directions. There is great need for the placing of this important branch of the civic service on a more satisfactory footing. Owing to the resignation of the City Engineer, the organization scheme which it was that gentleman's intention shortly to submit for the consideration of the Board of Works will not be likely to see the light. It is desirable, however, that a substitute for it should be formulated before the opening of the building season of 1892.

THE architects of Toronto should take a firm and united stand in favor of an improvement in the quality of the brick manufactured for use in that city. The brick at present supplied is to a large extent lacking in hardness and evenness of quality. For work of any importance the brick must be selected, and some one detailed by the architect to examine every load as it is delivered to see that the standard is being maintained. In instances where this precaution was not observed, it was discovered that there had been sandwiched in between every two or three loads of brick of the required quality, a load of the soft variety. This lack of uniformity in quality is due to the fact that the brick are burned in temporary kilns, through the uncemented joints of which much of the heat evaporates. In New York, where the brick is uniformly hard, manufacturers erect permanent kilns, such as are used in this country by the makers of pressed brick. This method should be adopted by large manufacturers in the vicinity of Canadian cities. Their claim that they cannot afford the expense involved in the erection of permanent kilns is not well founded. The extra price they would receive for first-class material added to the expense of erecting and pulling down temporary kilns two or three times each season, would in a short time recoup them for the required outlay. It is not likely, however, that any improvement will be effected until architects absolutely refuse to accept any but the best material.

THE Department of Architecture in connection with the School of Practical Science, Toronto, under the direction of Prof. C. H. Wright, is entering under favorable auspices upon the work of the second year of its existence. There are nine students in attendance as compared with five last year. Five of these are entering upon their course, three are in their second year, and Mr. C. E. Langley, of Toronto, having qualified himself by extra study, has passed into his third year. The results of the first year's work are regarded as being satisfactory, and the increased attendance gives encouragement for the future. The vacation work of the students bears evidence to the satisfactory character of the instruction imparted to them during their first year of study in this department. Mr. H. F. Ballantyne won the first year prize, presented by Mr. D. B. Dick for general proficiency in the first year in the Architectural Department. There are three good drawing rooms, capable of accommodating sixty students, and another is shortly to be added, together with private rooms for the professor, carpenter shop, model room, photographic studio and cement testing room. The lecture room will accommodate one hundred students. There is an excellent library containing many of the standard works on architecture, the sketches of the Boston Sketching Club, several useful volumes, remnants from the library of the Board of Architecture and Manufactures of Upper Canada, and the leading professional papers of Europe and America. The sum of $500 was spent on the purchase of architectural books last year. The intention this year is to exceed this sum by some $200. In addition to the library there is a department containing some 1,600 architectural photographs, ranging from ancient Egyptian to modern Gothic and ecclesiastical work. It is the intention by the aid of a stereoptican to enable the students to study these examples to the best advantage. The members of the architectural profession will watch the progress of the work in this department with the deepest interest and a desire to see its administration marked by the wisdom and liberality which will insure its continued prosperity, as well as the proper education of the succeeding generation of architects.

THE system of constructing public works by day labor instead of by contract, introduced in Toronto about two years ago, caught the popular fancy. The daily press strongly supported the new departure, and congratulated the citizens upon their escape from the power of unscrupulous contractors to rob them of their hard-earned contributions to the civic treasury. The opinion was expressed in these columns that the system would not prove as satisfactory as its advocates anticipated. Letters were obtained and published from the city engineers of leading American cities showing that in all of them the system of constructing public works under contract prevailed, and was regarded as being most satisfactory. An experience of two years has demonstrated the correctness of this position. One of the daily papers which most strongly supported the day labor method when first introduced, remarked the other day: "It is not clear that the city gets better work, and it is certain that the day labor method is more expensive than the contract system. The work is now being submitted to the test of a financial comparison with the results of the contract system, and reports indicate that for material and workmanship, sewers and roadways constructed by day labor do not compare too favorably with works done by contract under strict supervision." In support of this view a jury a few days since awarded damages to the amount of $1,800 to a workman who brought suit against the corporation for compensation for injuries sustained while in the city's employ owing to the attempt to do work too cheaply by omitting to provide necessary safeguards for the lives of workmen. While admitting that many contractors are not what they should be in the matter of honest dealing, it is unfair to include all, or even a majority of them, in this category, and a proper system of inspection should be sufficient in all cases to guarantee the fulfilment of the contract in accordance with the specifications. There can be no doubt that the experience gained by contractors who have been engaged for years on public works, coupled with the personal interests they have at stake, will enable them to perform such works at a minimum of cost which it is impossible for the city by the day labor method to achieve.

IT is to be regretted that a conflict of authority should have arisen between the City Council of Toronto and Mr. W. T. Jennings, City Engineer, resulting in the latter's resignation. It is admitted on all sides that Mr. Jennings has given the city good service. The point in dispute was whether the Council,

in the by-law under which Mr. Jennings assumed office, delegated to him the authority to control the salaries of the officials of his department. By-law No. 2534 fixing the duties and powers of the engineer provides that he shall have power to appoint such officers and clerks as he may from time to time consider necessary for the proper and efficient working of his department, and that he shall have power to suspend, dismiss and reinstate any officer, servant and employé of his department, and from time to time to prescribe their respective duties in lieu of or in addition to any duties prescribed by any statute or by-law. Sub-section 5 of the 26th clause gives him power "to appoint such foremen and inspectors and employ such labourers as in his opinion may be necessary to efficiently carry out any work under his control; and all such inspectors and foremen shall be paid such wages as shall be determined upon by him, subject to the approval of the Committee on Works." This clause is the only one in the by-law which gives the engineer authority to determine the salaries of his assistants, and this authority applies only to inspectors and foremen, and is to be exercised subject to the approval of the Committee on Works. Mr. Jennings seems therefore to have proceeded on a false assumption in claiming that the right to control salaries was conferred upon him at his appointment. On the other hand, the fact that the by-law does not confer upon him this authority, rendered unnecessary the passing by the Council of the amending by-law. It is unfortunate that Mr. Jennings should have written the letter he did to the Council, as it served to accentuate the difficulty. Had a friendly conference taken the place of that letter, no doubt the matter could have been satisfactorily adjusted. As it was, arrangements were proceeding satisfactorily for an amicable settlement when the Board of Trade held an indignation meeting on Mr. Jennings' behalf, which could have had no other effect than to confirm the attitude of those who had placed themselves in opposition to the stand which that gentleman had taken. One of the aldermen, who was also a member of the Board of Trade, was refused a courteous hearing when he essayed to make an explanation at that meeting of his course of action in the Council. In the light of these circumstances it cannot be surprising that the Council should have resented the action of the Board of Trade by voting down all proposals for a reconsideration of the matter. There was force in the remark of one of the aldermen, that while the members of the Board of Trade decline to serve the city in the capacity of aldermen, they have shown their willingness to dictate what the conduct should be of those whom the citizens elected to represent them. If the Board is not prepared to do more than find fault, it will best serve the public interest by confining its attention solely to commercial affairs. The important duty now devolves upon the Council of appointing a successor to Mr. Jennings. Matters of great moment require attention, and forbid that the appointment should be delayed longer than is absolutely necessary. On the other hand, the very importance of the matters to be entrusted to his hands demands that the person to be appointed should be possessed of the character, education and experience which are necessary to enable him to exercise wise administration. Prior to entering upon office, a clear and definite understanding should be arrived at touching his duties, authority and relations to the Council, such as will prevent the recurrence of misunderstandings like the present one.

TORONTO ARCHITECTURAL SKETCH CLUB.

ON Monday evening, October 5th, was held the annual meeting of this club in its new rooms, cor. Yonge and Gerrard streets. There was a fairly large attendance and much enthusiasm.

After the minutes of the last annual meeting had been read and confirmed, the treasurer, Mr. A. C. Barrett, presented his report, showing that the columns of the cash book were like two forces in equilibrium—pretty evenly balanced. This is very satisfactory, considering the many expenses the Club has had during the year.

The retiring President, Mr. S. G. Curry, made a few remarks, giving a short description of the work accomplished, and urging the necessity of the members putting forth a renewed energy. He drew attention to the fact that if members expected architects and others to continue preparing for them papers, they must make a point of keeping up the attendance, as it could not be expected that busy men would give up valuable time if it were not appreciated.

After several proposed changes in the constitution had been adopted, the nomination and election of officers was proceeded with, the following being elected:—President, Mr. J. A. Pearson; Vice-President, A. C. Barrett; Secretary, C. H. Acton-Bond; Assistant Secretary, Murray A. White; Treasurer, T. R. Johnson; Directors, C. J. Gibson and E. B. Jarvis.

The Club has now very comfortable quarters, which, with a little judicious decorating, will be a credit to so artistic a body. Visitors will at all times be welcome, a hearty invitation being extended to all who are interested in the aims and objects of the Club.

OUR ILLUSTRATIONS.

PHOTOGRAVURE PLATE—ST. PAUL'S CHURCH, BLOOR STREET EAST, TORONTO.—MESSRS. EDWARD AND GEO. K. RADFORD, ARCHITECTS.

This church was erected about the year 1856. The Building Committee, which was composed of Messrs. W. A. Baldwin, J. O. Brown, Rev. Saltern Gibbons and Thos. Henry Ince, invited competitive designs from the local architects. In response to the invitation, four or five designs were submitted. The one now published, by Messrs. Edward and Geo. K. Radford, was accepted, and the building erected in accordance therewith. The Messrs. Radford, who came from England, resided but a short time in Toronto, and carried out no other work of importance in this country.

BROCK MEMORIAL CHURCH OF ST. SAVIOUR, QUEENSTON, ONT.—S. H. TOWNSEND, ARCHITECT, TORONTO.

ALTERATIONS TO WAREHOUSE ON ADELAIDE STREET WEST, TORONTO.—DENISON & KING, ARCHITECTS, TORONTO.

DETAILS OF CHOIR STALLS, SOUTH SIDE ST. PAUL'S CATHEDRAL, LONDON.

These details were drawn by Charles Wm. Baker, and were awarded the silver medal of the Royal Academy.

CHURCH ARCHITECTURE.

MR. JOHN WILLS, F. S. Sc., architect, of Derby, Eng., who is a delegate to the Methodist Ecumenical Conference at Washington, D. C., addressed a meeting of Methodist ministers in Toronto recently on the subject of "Methodist Church Architecture." He also exhibited a number of his own drawings from which churches have been erected in different parts of England. Mr. Wills recommends that there should be at least four means of egress for all large churches. He thinks the Gothic, properly and carefully adapted to modern forms of worship, the most appropriate style of church architecture. He is of the opinion that the situation of the organ and choir should be either behind the minister or in the same end in one of the transepts. Concerning methods of heating, his preference is for the hot water low pressure system.

PUBLICATIONS.

The Adamant Manufacturing Co., Toronto, have issued a neatly printed pamphlet explaining the nature and advantages of their new plastering material.

We are indebted to Mr. William Mueller, bookseller and importer of works of Art, 695 Broadway, New York, for a copy of "Academy Architecture and Annual Architectural Review," for 1891, edited by Alex. Koch, architect, and containing a selection of the most prominent architectural drawings hung at the Royal Academy Exhibition, and a review of interesting architectural subjects carried out or designed during the last few years in England and abroad.

In the November number, the *Cosmopolitan* will publish a series of letters written by Gen. W. T. Sherman to one of his young daughters, between the years 1859 and 1865 and covering most of the events of the war of secession. These letters present graphic pictures of a great soldier amid some of the stirring scenes in which he was a giant figure, and in them the patriotic spirit of the Federal general is seen to have been most attractively tempered by a strong affection for the Southern people.

PERSONAL.

On behalf of a Canadian syndicate invited by the government of Russia to tender for the construction of the eastern part of the Siberian railway, Mr. Geo. A. Keefer, the well known civil engineer of Ottawa, lately set out for the land of Russian exile. Mr. Keefer's experience in connection with the construction of the C.P.R. through the Rocky Mountains, well qualifies him to serve the interests of his present employers.

PROF. BOVEY.

PROF. Henry Taylor Bovey was educated at a private school in England, and at Cambridge University. On entering the University he competed for and obtained an open scholarship. On graduation he took a high place in the mathematical tripos, and shortly after was made a fellow of Queen's College. Having decided to adopt the profession of engineering, he joined the staff of the Mersey Docks and Harbour Works. He was shortly appointed one of the assistant engineeers on this work, and in this capacity had charge of some of the important works then in progress.

In 1877 he was appointed Professor of Civil Engineering and Applied Mechanics in McGill University, Montreal. The engineering courses in the University were at that time managed as a department of the Faculty of Arts, and were without buildings or equipment. In 1878, however, a department of Applied Science was constituted, and Prof. Bovey was elected its Dean. The magnificent endowment of the late Mr. Thomas Workman and Mr. W. C. McDonald have afforded Dean Bovey an opportunity for the display of his great executive ability and untiring energy.

Much of the success of the Canadian Society of Civil Engineers is without doubt due to Prof. Bovey's labours as its Secretary, which position he occupied continuously from the foundation of the Society until within the past few months, when increasing college duties compelled him to resign the office. Prof. Bovey is a Fellow of the Royal Society of Canada, a member of the Institution of Civil Engineers, as well as of several other engineering societies.

PROF. BOVEY.

PASSING EVENTS.

"IT is a singular fact," said a well-known Toronto plumber to me the other day, "that not one builder in twenty appears to know what the proper dimensions are for stationary wash tubs. It is still more singular that they are continually applying to me for the information. One would suppose a carpenter would know more about the matter than a plumber. In order to be in a position to answer my numerous enquirers on this subject, however, I have jotted the information down in my note book, and here it is: 'Inside measurements—15 inches across bottom, 23 inches across top, 15½ in. deep and 25 in. in length for each compartment.'" Thinking that possibly the information might be of service to many readers of the ARCHITECT AND BUILDER, I give it for publication, trusting also that by doing so I shall assist my friend, the plumber, to save a portion of his valuable time.

* * *

Builders and others intent upon disregarding the law which compels a permit to be obtained previous to the erection of any new buildings, occasionally get an opportunity to laugh at the expense of the Building Inspector. Such an individual made application at the Inspector's office the other day for a permit to erect a dwelling, and having obtained it, turned round and cooly informed the official that he had just completed the house and moved his family into it.

* * *

I wonder how many of our city architects are thoroughly familiar with the provisions of the local building ordinance? A member of a leading architectural firm learned for the first time the other day, of the existence of a provision in the local by-law prohibiting the use of certain materials in partition walls, notwithstanding that the by-law has been in operation for two years. Architects will save themselves and their clients time and expense by acquainting themselves with the details of the regulations governing the construction of buildings.

* * *

Apropos of your editorial remarks on the growth of incandescent electric lighting in Toronto, a prominent official of the C.P.R. Telegraph Company directed my attention a few days ago to a new business building in course of erection on a leading thoroughfare. "Do you know," said he, "that there isn't a gas pipe to be found in that building? It is, as you see, wired throughout for electric lights. The intention is to depend entirely upon the incandescent light. I regard this as a striking illustration of the rapid strides which the electric light is making. Two years ago, no architect or owner of a building would for a moment have considered the question of dispensing with gas."

* * *

A Montreal architect remarked to me the other day that architectural students in Quebec are at a disadvantage as compared with students in Ontario. Being asked in what particular, he pointed to the use of the dual languages as being one serious drawback and also to the fact that well-equipped free public libraries, such as the one in Toronto, are not at the disposal of the students of Quebec. There is no doubt some foundation for this view of the case, and consequently the greater reason to hope that the Quebec Association of Architects will exert itself to the utmost during the approaching winter to provide such instruction for the students as shall, to a large extent at least, make up to them the loss sustained in the direction referred to. The students should scarcely need to be reminded that upon the extent of their own efforts will most depend their advancement.

PASSERBY.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

A MEETING of the Council of the Ontario Association of Architects and students of architecture was held in the rooms of the Association on the 5th inst. Mr. F. X. Berlinguet presided. The principal business before the meeting was to make arrangements for the instruction of the students during the coming winter. Messrs. Taylor, Raza, Hutchison and Dunlop were appointed a Committee to arrange a programme, which should include a series of lectures, and if possible, classes in architecture. The success of the undertaking will depend largely upon the students themselves. If they show their appreciation of the efforts which the Association is making for their benefit, by being present at the lectures and classes whenever it is possible for them to do so, satisfactory results are certain to follow.

A strong feeling seems to exist here in favor of a Dominion Association of Architects, and it is not improbable that at the next meeting of the Ontario Association a deputation from this province will be on hand to confer with the members concerning this most important subject.

Mr. Hadrill, the Secretary, reports that upwards of $175,000 has been subscribed for the erection of the new Board of Trade building. It is expected that the full amount required will be secured shortly, and that construction will begin early in the spring.

The practice of proceeding with the erection of buildings without complying with the by-law which provides that a permit must first be obtained from the office of the Inspector of Buildings, prevails largely in this city, as in the cities of Toronto, Hamilton and elsewhere. During the past week this practice of violating the law led directly to the death of a workman named Theodore Pouliot, employed on a building in course of erection by a contractor named Elzear Chenet, at 116 Desrivieres street. Chenet drew the plans for the building himself, and went on with construction without a permit. One side was constructed of planks three inches thick, laid horizontally one above the other and tongued and grooved, supported only by a post at each end. Under the weight of the last storey this wall bulged out at the center near the foundations, and the structure collapsed, killing Pouliot as stated. Mr. Lacroix, the Inspector, testified at the inquest that owing to a defect in the by-law persons intending to build were not required to submit plans of the proposed building, but only a general description, and that while Chenet should have notified him three days before the foundations were commenced, he did not do so until two days after the roof was on. It was shown that the contractor had obtained a blank form which he should have filled in and returned to the Inspector's office before proceeding with the work, but which he did not so return. Because this form was not handed in, the Inspector concluded that work had not been commenced. The jury brought in the following verdict: "We find that the collapse of the house No 116 Desrivieres street on Friday evening was due to bad workmanship and the want of experience on the part of the contractor, Elzear Chenet; moreover, we censure the Building Inspector for having given permits without knowing it the building had been started or not." Is it not time that a severe example was made of those who wilfully disregard the city building ordinance? It is also clearly desirable that all persons proposing to build should be compelled to submit plans for the approval of the Inspector of Buildings.

The Roads Department has expended thus far $355,371, out of a total appropriation of $406,642, leaving a balance in hand of $51,271. In addition there have been large expenditures for permanent pavements, the funds for which have been secured by special loan.

"CANADIAN ARCHITECT AND BUILDER" STUDENTS' COMPETITION.

WITH the object of promoting a feeling of friendly emulation on the part of students in the offices of members of the Province of Quebec and Ontario Associations of Architects which should result in improving the skill of the young men thus engaged, the publisher of the CANADIAN ARCHITECT AND BUILDER invites competitive designs for a suburban cottage to be occupied by a young man doing business daily in the city, owning the lot, possessing $2,000 in cash and having an income of $1,500 per annum.

The cottage is to be erected on an inside town lot having a frontage of 75 feet, a depth of 150 feet, and situated on the west side of the street.

There is required in the way of accommodation a parlor, small library, dining room and kitchen; cellar, suitable for heating apparatus and storage of fruit and vegetables.

On the first floor there are to be four bedrooms and bathroom.

The attic is to contain a servant's bedroom and store room.

The materials to be used shall be brick on a stone foundation.

There is no sewerage or water supply systems in the town, and the owner will have to dispose of all waste in the most sanitary manner, avoiding contamination of the soil from which he has to draw his supply of water.

Competitors are required to submit plans of the various floors, two elevations, unless accompanied by a perspective, when one will do.

Drawings must be made on sheets of heavy white paper or bristol board, 14 x 20 inches in size, and must be drawn sufficiently coarse to allow of their being reduced to one-half the above size. Drawings must be made in *firm, strong lines*, with *pen* and *black* ink. No color or brush work will be allowed. Each drawing must be marked with the *nom de plume* of its author, and the author's name, *nom de plume* and full address must accompany each drawing sent in. Competitors must also give the names of the architects in whose offices they are employed.

Drawings must reach the office of the CANADIAN ARCHITECT AND BUILDER, 14 King St. west, Toronto, not later than the 5th day of November next.

The right is reserved of publishing any design sent in. All drawings will be returned to the authors within a reasonable time after the competition is decided.

The first premium will be $15; second, $5; third, one year's subscription to the CANADIAN ARCHITECT AND BUILDER. A premium of $5 will be given for the best perspective sent in. The decision as to the respective merits of the designs submitted will be made by Mr. Thos. Fuller, chief architect, Department of Public Works, Ottawa, which decision will be final.

This competition is confined to students practising in the offices of members of the Province of Quebec and Ontario Associations of Architects.

TO CORRESPONDENTS.

IF the correspondent who sends us an enquiry signed "Subscriber" will comply with a well known journalistic rule by forwarding his name and address (not for publication), his question will receive attention.

A great deal of ingenuity is being expended upon machines and devices for sawing stone directly out of the quarry, and while thus far no positive success has been achieved, several machines are so near it as to suggest that the time is not far off when the result will be reached. Success would revolutionize and greatly reduce the expense of quarry working, and this in a time when there is so much competition in building materials, many of which are displacing stone, owing to superior cheapness in first cost, would be a boon to the quarry interests. The channeller, however, as yet stands as the only practical every-day quarry machine, but invention is after it with an energy that bids fair to be successful in no great time.

SPECIAL NOTICE TO CONTRACTORS.

THE special attention of builders and contractors is directed to a series of articles to be published in the "CANADIAN ARCHITECT AND BUILDER," and which are being prepared by a properly qualified quantity surveyor, with the object of instructing master builders and contractors in the methods of taking off quantities and arriving at a true estimate of the cost of erecting various kinds of buildings.

Designs and specifications of a dwelling, church, store, public building, etc., will be published, and practical illustrations given of the method of arriving at the quantities of materials pertaining to each of the several trades.

The value of this information to every contractor will be at once apparent. It will serve to replace the hap-hazard methods of estimating at present largely practiced, and which are responsible for many of the failures in the building trades, by a system which can be relied upon as being accurate.

This series of articles will be commenced in the CANADIAN ARCHITECT AND BUILDER for November, and will probably extend over a period of from one to two years.

For the usual subscription price, $2, the CANADIAN ARCHITECT AND BUILDER will be sent to new subscribers from November of the present year to the close of 1892.

Every contractor who desires to profit by the information given in this series of articles should at once become a subscriber.

THE BUILDING TRADES IN MODERN PRACTICE.

By GEORGE H. BLAGROVE.

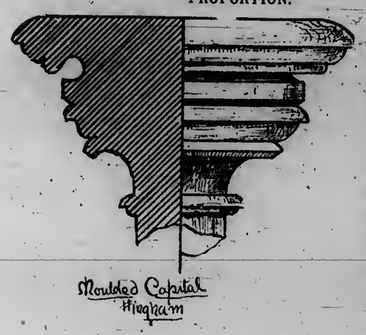
THE different densities of building materials have been studied with reference to the weight of their materials, their resistance to crushing, and their power of absorbing water. We frequently employ a harder and denser species of bricks in foundations than elsewhere, but beyond this there are few attempts made to dispose the materials of a building according to their density, for structural reasons. If materials of different densities are found in various parts of a building, it is usually with regard to their external appearance that they are so arranged. Yet it would not be difficult to design a large building in such a manner that the weight of its materials should be diminished towards the top, not so much by reducing the thickness of its walls as by the employment of lighter materials in their construction, thus combining the advantages of diminished weight with those of statical stability. In damp situations, the denser materials are generally preferred on account of their non-absorbent character, but the reason for this preference disappears when the outer surface is vitrified or otherwise rendered impervious.

Hollow walls, for the exclusion of damp, allow us to vary our materials on the interior and exterior, while the air-space serves for protection against changes of temperature. If we build one section of our hollow wall of substantial thickness, the other being only a half-brick or thin stone casing, and the two being connected by means of galvanized iron bonding cramps, the question arises whether the greater or lesser thickness should be placed outside.

It has been maintained by some that the greater thickness should certainly be placed on the outside, because it allows less damp to find its way into the cavity, such damp being quickly evaporated by the warmth of the dwelling. On the other hand, it has been pointed out that under such an arrangement the greater section of the wall must be permanently charged with damp, with disastrous results to any woodwork connected with it, and that if the cavity is to be dried by the warmth of the dwelling this can only have the effect of drawing the damp inwards, to the detriment of health and the destruction of wall paper. It is contended that these evils are avoided by placing the smaller section outwards, where, if it is the sooner penetrated by damp, it is the sooner dried in warm weather. Some are in favor of ventilating the cavity, for the purpose of keeping it dry, while others contend that this at once destroys the advantage of protection against rapid changes of temperature. It has often been found, however, that the cavity in a hollow wall, when it has no outlet, contains an accumulation of moisture, which gradually soaks through the inner section to the interior of the building. The cavity, if not ventilated at top and bottom, should have outlets for moisture at the bottom; and some persons go so far as to require that a cement splay be formed at the bottom of the cavity to throw the accumulated moisture outwards. It is certainly a good plan, where doors and windows occur, to introduce sheet lead at the head of the opening, the lead being turned up on the inside and down on the outside, so as to afford protection to plates and lintels.

As to the difference in cost between solid and hollow walls in brickwork, it has been calculated that where the inner and outer sections and the intermediate cavity are each of the same width, there is a saving of one-third in the number of bricks and one-half in mortar. The cost of cramps, or any other special means of bonding, must be added, and as the resistance to thrusts, the resistance being augmented by 20 per cent. in weight over brickwork. We have a substance which precludes damp more effectually than most kinds of stone, and which enables us to cope most satisfactorily with the modern increasing demand for rapid execution in building. We cannot urge much in favor of the external appearance of concrete walls, but with brick and terra cotta quoins, copings, window dressings and other accessories, there should be ample opportunity for the production of artistic effects. One of the objections raised against concrete buildings has been that they are difficult to pull down. This objection may commend it to the attention of those who will regard it rather as an advantage than otherwise. —*Specialties.*

PROPORTION.



THE whole secret of design in architecture may be summed up in the terms Proportion and Expression, for the differences which mark off one style from another are those mainly derived from the form and proportion of the openings, says *The Building News*. Professor Banister Fletcher, in his opening address to students of architecture at King's College, very appropriately alluded to the subject of proportion, which he illustrated by taking the openings of somerset House, and by showing by model the effect of first a doorway of half its width in height, next making it a square opening, then adding one-third of the width to the height, and lastly, making the height twice the width.

Though the low opening may be really high enough for a doorway, the mind naturally reverting to the human figure as a standard of proportion, or, to the "fitness" of things, at once condemns the proportion as bad for a doorway. We sometimes, it is true, see wide entrances to the pits of theatres, drill halls and warehouses; but they invariably look out of proportion—that is, they appear awkward and offensive to our sense of fitness. Even in some Queen Anne houses we have seen doors of about a square; which looks contrary to our standard, because we naturally recall to the mind the human proportions, though, as a matter of actual use, the wide opening may be an advantage in getting in or out large pieces of furniture. The manner of teaching proportion which the professor adopted, has the merit of ocularly demonstrating one of the essential principles of design, for there are many people who imagine that a few inches more or less in the width of a door or window make no difference whatever. The same disregard, or ignorance, of a pleasing proportion is seen in the planning or selection of rooms, as if it made no difference whether the room was square or oblong, and that furniture of a certain size and shape could be made to look equally as well in a square room as in an oblong room. The window, like the door, has its own pleasing proportion. We can widen a window, as Prof. Bannister Fletcher says, but we can easily spoil it by the operation unless we take care to preserve the unit of proportion by sub-dividing the width by mullions, as in a gothic window, or by bringing the eye to rest on proportion of one of the panes. But it is absolutely essential to preserve some unit or individual part in a wide window, or it would be quite as offensive as a wide doorway.

The lesson of proportion need not stop at windows and doorways, it can be applied not merely to plans of apartments and their heights, but to the art of composition itself. For example, Prof. Fletcher might have shown that into his first illustration of breaking up a plain building front into parts proportion enters. If, for example, we take a long, straight facade, perfectly flat of blank wall, or with windows in it, equally distributed, we may have a proportion that offends by its length and monotony. But break it up by projecting or recessing certain parts, say the two extreme ends and a wide centre, and the proportion of the whole is greatly improved, for although not an inch of height has been added the eye is arrested by the three individual parts into which the whole facade has been divided, and the extreme length, being broken by oblongs of the contrary direction, is rendered less fatiguing to the eye. By further dividing, or by making vertical lines, the proportions may be still more altered. The effect mainly due to the fact that the eye attends to the smaller individual parts instead of the whole. To take a concrete case, a continuous barrack front looks much longer than an equal length of houses forming a street of the same height, because each separate house being an upright oblong, arrests the eye, and the number of stories forms a scale to its real height. In design, then, the value of proportion is in composing the individual parts or subdivisions by giving them the proper ratio of height to width, and so drawing the eye from the proportion of the whole mass to that of the individual parts. What better illustration of this can be found than in towers? We constantly hear people talk of the proportion; it is either said to be squat or too tall, referring unconsciously to a standard in their mind's eye, from which they cannot get away. Thus, for example, St. Paul's dome would look very squat after looking at a tower and spire like that of Salisbury, and many towers would look too short after seeing the Boston Example. The proper proportion of any particular tower can only be judged by the individual parts or stories of which it is composed. It may look exceedingly tall and disproportioned if the belfry windows are small, and a mere repitition in every stage, but by subdividing the height into stories of unequal height, and by making the openings small here, and large there, the proportions will be pronounced excellent. Therefore, proportion is not a matter of mass only, though, of course, we have to see our buildings through dense fogs sometimes, when they ought to look pleasing, but is chiefly to be studied in the smaller parts of design. Bad proportion in a window, a door or a fire-place, will always be an eye-sore in a room, however well proportioned it may be, the same want of pleasing ratio will spoil a wall paper, the panelling of a door or dado, or any ornament, though the eye in the latter cases would have to be more educated. The ordinary sense of fitness in proportion is, however, pretty general; and, roughly speaking, we may say, that it exists amongst people almost as strong as the sense of harmony or music. As a discordant note jars on the faculty of hearing so we find a glaring disproportion, or want of fitness, produces an unpleasant sensation on the mind.

Proportion is, however, not confined to ratios and dimensions; we experience its influence in the right proportion of mass to detail, of plainness to ornament, and these are quite as necessary to learn by those who are studying artistic kinds of expression. The value of models or illustrations in the designs of carpets, wall papers, decoration applied to furniture and metal work is apparent. We often see patterns offensively obtrusive and distractive, owing to the want of quiet surfaces or a due intermixture of ground and pattern; furniture full of unrestful twists and turns and carvings that distract rather than please; because the artist has not realized a sense of proportion between the plain parts and the ornament. These are things that can be taught by showing how much ornament can be placed on one part without overloading it, what surfaces or members should be plain, and which may be enriched. The whole question of ornament is one of "more or less." The amount of ornament on a surface must indeed be in inverse ratio to the height of relief. Thus every square quarter inch on a Benares brass bowl may be occupied with incised ornament without offence to the eye, for the lines are narrow and the relief exceedingly low; but in repousse work of massive relief in the same metal, anything beyond a simple device broadly treated is felt instinctively to be intolerably coarse. To teach applied design on rational principles, the student is in need not merely of examples in the art he is studying, but of demonstrations or models that will show him the most agreeable combinations. He should not be taught to copy furniture and decoration of various masters and styles; but be taught to realize for himself the due proportion between structures and forms of the plainest and most direct kind and the ornament that should accompany them. It is in these more extended ways we may learn the values of proportion in the arts of design, and not merely in regard to the heights and widths and openings, the proportions of columns and entablatures, and of apartments, which appear to be the only kinds of proportions that are recognized by the Classic revivalists.

MAKING BLUE PRINTS.

According to the *Brickmaker*, the following formula can be used for preparing a quantity of blue print paper at once, and which can be laid aside to be used as wanted: Mix in one bottle a solution of two and one-quarter ounces of water to each ounce of citrate of iron and ammonia, and in another one ounce of red prussiate of potash to each eight ounces of water; these solutions if well corked will keep indefinitely. To use, mix one part of the iron solution with two parts of the potash just before using, and with a soft sponge flow over the surface of the paper a heavy coat and remove the superfluous liquid, stroking in one direction, dry the paper quickly and hang it in the dark. When dry it will keep well in a dark box, and will make clear, bright prints.

SANITATION AND HEALTH.

PUBLIC WATER SUPPLIES IN THE PROVINCE OF ONTARIO.*

BY WILLIS CHIPMAN, C. E.

IT is now an acknowledged fact that in cities and towns without a public water supply and without a sewerage system, the death rate is higher than in the rural districts or in those cities and towns that have availed themselves of these evidences of civilization.

From the standpoint of the economist no town of a population of 1,000 people can afford to be without a public water supply for fire protection, as the interest on the first cost will be met by the decrease in insurance premiums, while from the standpoint of the philanthropist, the humanitarian and the medical health officer, no town should be without an ample supply of pure water for domestic purposes, and a system of sewers to carry away the water used and the wastes with which it will be burdened, to such point that no danger can arise from its disposal.

In Canada we find that the first public water supply of any importance was introduced into the City of Montreal by a private company in 1801. These works were sold to another company in 1816, to a third company in 1832, and eventually to the city in 1845. New works were constructed by the city in 1853-56.

The next city to introduce a water supply was St. John's, N. B., where in 1836 a company constructed works which were abandoned in 1849-50, when new works were built. In 1855 the city purchased the works.

In Toronto, water works were constructed in 1841 by a company which operated them until 1873, when the city purchased the works.

Halifax purchased her water works in 1861 from a company which constructed them in 1845-48.

These were the only works in Canada in 1850. In 1860 we had nine works, in 1870 ten; in 1880 twenty-nine, in 1891 the number of cities and towns supplied with water works is nearly one hundred, but in about twenty of these the supply is for fire purposes only.

We will now consider the water works of Ontario only.

In this Province about 30 per cent. of the water works are owned and operated by private companies, while the population served is probably not 15 per cent. of the total supplied. The average total family rate in Ontario is about $20 per annum in works owned by municipal corporations and $25 per annum where owned by a company. The cost of works in Ontario is about 35 per cent. less per family in private works and the charge 20 per cent. more than where works are owned by the municipal corporation.

There are 44 cities, towns and villages in which the water works are now owned and operated by the municipal corporation, 13 of these being for fire protection only. Private companies own and operate 14 water works, in one of which (Napanee) the water is of such exceedingly bad quality that we will classify it as for fire purposes only.

In the majority of these 14 towns and villages the expenditure of a comparatively small additional amount would have secured an ample supply of pure water for domestic purposes as well as a fire supply, would have decreased the death rate and disease, and would probably bring in a revenue after paying operating expenses.

In many of these towns engineering advice was not sought, and in a few it was not followed.

In some of these towns the water is used for lawn sprinkling, for cattle and horses, for baths, for water closets, for all purposes except drinking and cooking, and the temptation may often induce people to use it for these purposes as well. Herein is a great danger. Water once drawn from a tap and used for drinking and cooking will probably continue to be so used until sickness occurs. To those towns supplied with elevated tanks, reservoirs or stand pipes in which to store the fire service water, the foregoing remarks especially apply.

These results are convincing that the private companies in the Province of Ontario now supplying water to cities and towns on the franchise plan are not giving these towns as good water as other cities, towns and villages are supplied with. In only one place is subterranean water being supplied, and in this place it was forced upon the company.

"Quantity" rather than "quality" is their motto.

The short-sighted municipal finance minister who, only considering water works from the standpoint of dollars and cents, revenue, interest and running expenses, and the silver-tongued (fingered?) franchise agent, are often (separately or jointly) directly responsible for the selection of so many inferior water supplies throughout the Province.

Where water works are contemplated, the local boards of health should investigate intelligently and thoroughly before adopting for a public supply a water that is of a suspicious quality or one liable to future pollution.

Analysis of water as now generally conducted are a humbug and a delusion, the honest scientist being no match for the wily manipulator. The color, taste, smell and temperature of the water supplied, and a study of the conditions surrounding the drainage area from which the water is drawn are of greater weight than any analysis in determining the purity of water. The problem of possible pollution from sewage or from farm drainage in the future should also be carefully considered.

In all cases the problem of selecting a source of supply should be carefully considered and reported on by some disinterested authority before the works are designed, and the schemes and machinations of the disciples of "quantity rather than quality" should be met by the remonstrances of all sanitarians.

* Abstract of a paper read before the Association of Medical Health Officers of Ontario.

PLUMBING PRACTICE.

IT is not expected that every plumber is possessed of knowledge requisite to thoroughly distribute water in all parts of a building, with equal facility to each floor upon which is placed plumbing apparatus, says *Fire and Water*. Where high pressures exist little difficulty is experienced, provided frictional resistances and cross section of area of pipe and branch supplies are considered in their relations to each other. It is often said by way of excuse for bad judgment in the plan of local distribution that there is a lack of pressure, when it is found to be a lack of volume of water—(pipe not large enough). It is a common practice in local distribution for plumbers to run one size of pipe throughout the entire building, with branch connections of same size on each floor, apparently forgetting or ignoring the fact that each added length, whether vertical or horizontal, increases friction, diminishes pressure and reduces flow.

In order to overcome these difficulties, a little study upon the subject will be a great help to the progressive plumber. A study also upon the question of "taking out branch supplies" from "the main supply," as to the angle of connection, will be found to be profitable. A great deal of pains is taken with water-pipe connections; as to angle of connections, the same rule applies with more force with respect to branch supply from main supply. Right-angle connections are very pretty as lines of harmony, but in water-pipe practice they should never be allowed. The rule of following parabolic paths or curvatures in connections will largely lessen friction and preserve the continuity of a water column passing from one line of delivery to another.

HOUSE HEATING IN THE FUTURE.

OBERLIN SMITH in a lecture before the Franklin Institute, at Philadelphia, spoke as follows of the possibilities of the displacement of coal in favor of gas or electricity for heating purposes:

"In the matter of warmth there is certainly an inviting field for our future inventors. That our present methods of heating by the burning of coal and the non-burning of smoke, and of cooling by carrying in lumps of ice, are crude and wasteful, as well as extremely irregular and uncomfortable, it is not necessary to argue about. It seems probable that in the near future, at any rate for our cities, some system of gas heating will displace coal and wood to a large extent, and this is the more likely from the fact that our streets and houses are already supplied with the necessary pipes, which may perhaps be gradually thrown out of use, as conveyors of illuminating gas, by the improvement and development of electric lighting. There also seems a tendency among inventors in recent years to attempt some kind of artificial cooling by the distribution through pipes of cold air or freezing mixtures of varying kinds; also to contrive cheap ice-making or other cooling machines, which can be economically used in individual buildings. All this is in a direct line of progress, but it seems probable that at some time in the future we shall depend upon the electric current brought into each building through a single wire, not only for our lighting and power, but for our heating and cooling also. Just how the latter process is to be accomplished we do not yet know, but reasoning by analogy, it would not seem outside the range of possibility when we consider the fact that the burning of coal in a furnace can be made to produce heat or cold at will. It is true that while electric heating in itself has been proved to be perfectly practicable, yet at present it is not economical. This is owing to the fact that our best and largest steam engines by which we run our dynamos utilize only from 10 to 15 per cent. of the energy stored in the coal, lavishly wasting the remainder. Fortunately, our dynamos have reached an efficiency of about 90 per cent., so that there is not much waste in using the electric current after the power to produce it is once generated. It is probable, therefore, that the use of electric heating will for the present be somewhat limited, and confined to special places where its convenience will offset its extra cost. For an extension of its employment thus, as for certain other important uses of electricity, and upon a scale far beyond anything we can now imagine, we must wait until we learn how to produce this current of pure energy from the coal or other fuel direct. Than the accomplishment of this feat, there is to-day no more fascinating problem in the realms of science. Many are working at it, with as yet but small success. We need not despair, however, as it seems to be a logical possibility, and the only thing required is to find out how to do it."

DECORATION AND FURNITURE

GLASS PAINTING.*

THE art of stained glass is not yet fully fortunate in speaking a language understanded of the people. Indeed, "I don't understand stained glass," is the remark one most frequently hears made about it, and this even from people of considerable appreciation for other forms of art. This comes home to one when one sees what pitiful stuff people of taste are content to have in the doors and windows of their own houses. The purplish birds on the yellow leaves within a circle of harsh red, the whole backed up by alternate oblongs of bad pink and green; how frequently one notices that work of art standing where it ought not! The builder inserts this and the like of it in the first instance, but the occupants suffer them to remain, not perhaps confident that they could find anything else so much more agreeable to their feelings as to warrant the expense of a change. It means, perhaps, that about even the highest development of the art, as usually practised, there still clings conventionalities of the parasitic or stifling sort; traditions that have arisen, that could only arise, in a period of bad art, and that have survived into a time of better things.

Wholesome conventionality, the acknowledgment of limits, and the determination to pull up well within them, is of the nature of a backbone to decorative art. Excellent, too, is healthy tradition. A man, or a school of men who have practiced a craft right well, bequeath to their successors, not a series of cast-iron rules and regulations, but a common-sense recommendation: "On such and such lines our art can be successfully carried out; adhere to them, we advise you, and see your way very clearly before you try to disturb them. If new possibilities arise, they must be dealt with! but do not change the old order for less than sufficient cause." Without some such tradition, a craft may become experimental and amateurish, and its productions perplexing.

Let us, before going further, try and understand stained glass.

The germ of it lies, not in the wooden-framed sash-windows with which we are most familiar, but in lead lattice, or, as it is perhaps most often called, casement. The simplest form of lattice consists of square or diamond shaped panes of white glass of the same size, connected by "leads"—that is, by strips of that metal, with a groove on each side, into which the glass fits, the leads being joined by soldering at the corners, and the interstices filled in with cement corresponding to the putty in our sash windows. From this simplest form of a lead-latticed window, the next step is the introduction of coloured glass. By this we get square or diamond-shaped panes alternately of white and colour, or of several tints in succession—a series of arrangements being possible whilst we still cut our glass in panes of straight-lined shapes all of one size. More variety comes with the half-step from this to panes still rectilinear, but of different sizes and shapes; and we have made a stride when we have found out how to cut our glass into pieces with curved outlines. Our framing line of ductile lead is as ready to go round a circle as along a straight line, and now with curve-contoured forms of varied colour arranged in groups, we have already a handsome stained glass window of pattern.

The next move is a momentous one, and may have a word of preface. The best ornamentist of the present time* has acutely noticed that some simple pattern shapes, that have been assumed to imitate natural forms, are in reality dictated by the tool or material employed. When their resemblance to nature struck the primitive artist, he did what he could to make it closer, but they arose at first independently. A single stroke of a full brush on paper, beginning with a point, spreading from that, and then ending with a sudden and more rounded diminution as the brush quits the paper, resembles the form of a leaf; the simplest combination of such touches suggest a leaf-cluster. Surround a large circle with a series of little ones, and you get a broad hint of a frequent flower type. So our window maker, having advanced thus far, could not fail to be struck with hints of natural form in his pattern, and suddenly his brain took fire longing to complete the resemblance. This led to an application to transparent glass of the long-practised process of enameling; lines and shadnws were drawn on it with a material that, when fired at a sufficient heat, unites with the glass and becomes permanently fixed. The imitation of form seldom goes far in any art before the designer tries to imitate the most interesting of all forms: to take on him the God-like function of making man in his own image.

* H. Arthur Kennedy in the *Journal of the Society of Arts.*
* "Every-day Art," by Lewis F. Day.

FRIEZES.

WE must refer to the differences in mural ceiling designs, to the circumstance that there are friezes that look well in lighter tints than the wall color; but the general practice is to have the coloring stronger than the latter. One rule applies to either mode, and that is, that the forms should be distinct, however vague the general wall design. Where the general hue of the frieze is lighter than the former, a few touches of bright color will often restore a balance. It was a true burst of artistic taste that led to the present depth of friezes instead of scrimping bands. It is here worth noting that the proportions followed by the Romans and illustrated at Pompeii allotted one part of the height of wall to dado, three parts to the field and one and a half to the frieze, proportions adapted to the heavy Roman architecture. Where the mouldings of a room are unusually heavy, we have known decorators to introduce grey and light-some friezes of a more than ordinary depth, to lessen the too heavy effect. The fault of dull and dark friezes is being steadily corrected. It is usually better that the field and frieze should not wholly correspond in color, but the ground of frieze may be the same if of a deeper color than the fold.—*Beck's Journal of Decorative Art.*

A new effect in color in wall decoration was devised by Whistler in the painting of a small room. The walls were first painted a pure black, which was afterwards overlaid with a coat of semi-transparent yellow. The effect was the apparent annihilation of the walls and the production of the impression of living in a petrified nocturne, an endless London fog, but the small room no longer looked small.—*Plumber and Decorator.*

The tendency toward light colors in house painting and decorating, both inside and out, is very marked, showing a complete revulson of feeling against the dark and rich colors which were so popular a short time since. Even in city houses, where the trimmings and sash were almost altogether red, green or brown, these colors are now rarely seen, and the more common effects are obtained from combinations of buff, ivory or cream white, and the various delicate gray tints. These changes have affected the demand for paper-hangings and curtain stuffs, which now tend altogether to light backgrounds and delicate treatment, very generally floral in pattern, or perhaps plain tints not darker than a gendarme blue or an an old gold as an extreme limit.

Mr. William Kennedy, Newmarket, Ont., has been granted a patent for a hot water heater.

The wickedness of plumbers is always a favorite theme and is likewise a very suggestive subject, as witness the latest information that when a plumber was pitched out of a fifth floor window by his employer he charged double time from the moment he left the window till he struck the pavement.—*British Architect.*

We learn from the *Brickmaker* that Boston architects are beginning to think that it is desirable to break the monotony which steady rows of red brick buildings have, by introducing brick of other colors. It is surprising to see how many of Boston's newer buildings are of tinted brick. It is somewhat more expensive, since the clay pits about Boston all produce a red brick; but with cheapening rates of transportation the city is likely to use more brick from a distance. Instead of freighting the brick from the place of their manufacture, the clay itself is now being shipped to some kilns near the city, and there baked. A striking edifice in yellow brick will be the new building at Tufts College. The yellow brick will not turn, and the mortar will not whitewash, and the yellow brick is believed to harmonize better with the landscape than the standard red.

ST. PAUL'S CHURCH, BLOOR ST. EAST, TORONTO, ONT.

MESSRS. EDWARD AND GEO. K. RADFORD, ARCHITECTS

SUPPLEMENT TO CANADIAN ARCHITECT AND BUILDER VOL. IV. NO. X.

Alteration & Addition to 116 Adelaide St. W
TORONTO

DENISON & KING
Architects

BROCK MEMORIAL CHURCH OF ST. SAVIOUR, QUEENSTON, ONT.

Royal Academy Silver Medal Awarded Charles Wm Baker

Choir Stalls South Side.
St Paul's Cathedral
Details

Drawing No 2

Side Elevation a.

Front Elevn a

Plan a

Plan b

Mouldings Bish Th A

Flute and Base to Stone Piers

Front Elevn Bracket

Mould.s h

Mould.s i

Part Side Elevn Pediment g

½ Panel over Doors

Upper and Lower Panels to Stone Piers

Capping to Partition Gallery

String to Stone Piers

Detail of Seats Gall.y

Baluster to Gallery

Opn.g Front Bish Th B

Door Side Bish Th B

Front to Bishop's Throne A

Door Side Bish Th A

Elevn of Step

Door and Step c

Panel front of Door

Cap and Base to Column Bish Th

Front Elev.n

Cornice and Bracket f

Side Elevn Bracket

Pan.elling

Cornice e

½ Soffer to Ceiling

Shell Ornam.t Bish Th B

Capping Panelling and Dentil above Seat b B

Side Elevn of Door d

Pediment and Door m

½ Wrot Iron Grille to Doors m

Cornice to Screen at Back

Impost k Door n

½ Wrot Iron Grille to Door n

Base

inches

feet

...tect
and builder

CANADIAN ARCHITECT AND BUILDER.

VOL. IV.—No. XI. TORONTO AND MONTREAL, CANADA, NOVEMBER, 1891. PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

14 King Street West, - TORONTO, CANADA.

64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1891.

PRESIDENT	W. G. STORM, R.C.A., Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton.
TREASURER	D. B. DICK, Toronto.

COUNCIL:

W. A. EDWARDS	Hamilton.
EDMUND BURKE	Toronto.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
DAVID EWART	Ottawa.

REGISTRAR:

W. A. LANGTON	Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1891.

PRESIDENT	F. X. BERLINQUET, Quebec.
1ST VICE-PRESIDENT	VICTOR ROY, Montreal.
2ND VICE-PRESIDENT	J. NELSON, A.R.C.A.
SECRETARY	C. CLIFT, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. C. HUTCHISON, R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
ALPH. RAZA	Montreal.
J. E. PEACHY	Quebec.

IT is announced that the Province of British Columbia will be represented at the World's Fair by a building composed of every variety of wood that grows in her forests, adorned with ferns and mosses grown within her boundaries.

THE architect and decorator desirous of learning how to secure the most pleasing color effects, might profitably have spent a few of the latter days of October in studying autumn foliage in its unusually varied and brilliant aspects.

WE have been informed that previous to the publication of the October number of the ARCHITECT AND BUILDER, a misapprehension existed in the minds of many as to who was the author of the design of St. Paul's Episcopal Church, Toronto. We are pleased to know that unwittingly we were the means of removing this misconception, and of placing the credit of the design where it properly belongs.

WE would like to point out to the late secretary of the Toronto Architectural Sketch Club, who is now a resident of the "Ambitious City," a worthy object of ambition. It is that he seek to establish among the architectural students of Hamilton an organization similar to those now existing in Toronto and Montreal. There should be sufficient material available for the purpose, and Mr. Bond's enthusiasm and ability might be depended on to do the rest.

MUCH loss is said to have been caused the builders of Winnipeg by a recent strike of union plumbers. A local paper states that the employers signed an agreement to pay journeymen $4 per day after the 1st of August last, but when the time came, they claimed to be unable to carry out their promise on account of one shop in the city employing unqualified workmen at low wages. If this is the only reason the employers have to offer for the non-fulfilment of their written agreement, we unhesitatingly say that it is not a justifiable one.

THE Inspector of Buildings and the chief of the fire brigade have recently been engaged in making an examination of the public buildings of Toronto, with a view to determining whether sufficient means of exit exist. Their report has not yet been published, but, from private sources it is learned that some buildings in which large congregations of visitors daily assemble, have been found to be dangerous in this particular. The last inspection of this kind took place in 1879. The public safety demands that for the future such inspection should be conducted at more frequent intervals.

RIGHTEOUS indignation has been aroused at the action of the Consumers' Gas Co. in tearing up the asphalt pavement recently constructed on Bay St., Toronto, for the purpose of laying mains on the intersecting street. Citizens were under the impression that no interference with permanent pavements of this character would be allowed, otherwise they would not have consented to be heavily taxed for the improvement. The large sums spent of late on asphalt pavements in Montreal and Toronto will prove to have been wasted if corporations of any kind are allowed to break up the roadway. Heavy penalties should follow any future attempts in this direction.

A GOOD report reaches us from Hamilton concerning the plumbers of that city, to the effect that their work is of a uniformly higher grade than can be found in most of the cities on this continent. However this may be, some work which we recently had the opportunity to examine in houses of moderate cost in that city, is certainly very creditable, while the materials and fittings used are of a substantial character and superior finish. There can be no doubt about the wisdom of sacrificing, if need be, exterior ornamentation for the purpose of making a house as perfect as possible in its sanitary appointments. We are informed that Hamilton has become too warm a place for the "skin plumber" to make a living in, and that in consequence the architects feel that they can entrust their work to any of the existing firms with confidence that it will be carried out as satisfactorily by one as by another. This must be admitted to be a gratifying condition of affairs.

IN the present number of the CANADIAN ARCHITECT AND BUILDER is commenced the publication of a series of short biographical sketches of the City Engineers of the most important Canadian cities. The problems which the City Engineer of modern times is called upon to solve, demand that he should represent the highest ability in his profession. It is expected that the majority of our readers will be interested in knowing something about the gentlemen who occupy this important position, and the history of their successful efforts should prove an incentive to young men entering upon their career.

SCARCELY a week passes during the building season that is not marked by serious injury or loss of life by reason of defective scaffolds. It is unfortunately true that the responsibility for most of these accidents rests with the workmen themselves rather than with their employers, and for this very reason it is impossible to guard against their recurrence. The workmen themselves construct the scaffolds, and should see that in point of material and construction they possess the necessary margin of safety. Reckless overloading of scaffolds has probably led to most of the accidents. Workmen are justified in refusing to venture upon a scaffold which they have reason to fear is too weak to support the strain to be put upon it. Difficulty is often experienced, however, in inducing them to exercise necessary caution in this direction.

AN article headed "Who is the Rumper and Where does Rumping Start?" appears in the *Monthly Circular* of the Stone Cutters' Association of North America, over the name of Albert Phillips, of Toronto. Mr. Phillips places the man who does more work than the average man, in a worse category than the so-called "scab," "copperhead," and "snake-in-the-grass" who works for under pay. He says: "How often do we hear the remark made 'Bill spoiled this yard; it used to be a good, easy shop, before he came.'" To prevent other workmen from following Bill's bad example of working too fast, Mr. Phillips advises: "Keep your place, and consider it two bats behind." From the above, may the inference not fairly be drawn that the teaching of unionism is that it is the duty of its members to carefully guard against outstripping the efforts of the *average* workman, while at the same time endeavoring on all occasions to secure an advance in wages. This is, we take it, the meaning of "keeping two bats behind," and the reference to the "good, easy shop." It is another method of enforcing the unreasonable demand that all workmen must be paid the same wages, irrespective of their earning capacity. The workman is held to be worthy of being despised who exhibits any ambition to excel. The idea is one which, if attempted to be carried out in all branches of human industry, would speedily put a stop to the world's progress.

THE Toronto Architectural Sketch Club may properly be said to have been a successful organization from the outset, nevertheless its promoters think that in some respects it is open to improvement, and they are laboring earnestly to bring it up to a higher standard of perfection and of usefulness. New and more commodious quarters have been procured, and the work for the coming winter has been entered upon in a spirit which bids fair to result most satisfactorily. Prof. Wright, of the School of Architecture, has very kindly offered to conduct the classes in mathematics, and Mr. John Kiely, the classes in modelling. These classes will meet alternately on Tuesday and Thursday evenings of each week, and are certain to be the means of affording much valuable instruction in these important branches of knowledge. The officers have also been successful in arranging a series of lectures by gentlemen of recognized experience in the building trades on a variety of subjects pertaining to building construction. Thus means have been provided for students to make rapid advancement in the knowledge required in the practice of their profession. It remains for them to properly improve the opportunities thus placed within their reach. It is gratifying to learn that the Club starts the season with a largely increased membership. The officers elect may, we think, be relied upon to put forth every effort to make the future of the Club increasingly prosperous, and if properly supported by the members, they will no doubt succeed.

A CERTAIN class of real estate owners appear to be always on the look-out to take advantage of municipal authorities. If a public improvement is proposed, and any portion of their property is required for the purpose, they immediately place an exorbitant price upon it. The slightest pretext is made use of to prefer claims for damages. The action of such persons has frequently been the means of blocking public improvements, and in some cases the municipality, and indirectly the citizens, has thereby suffered great inconvenience and loss. In view of this, we note with satisfaction an instance which occurred in Toronto recently, wherein the tables were turned and the biter bitten. A certain speculative land owner some months ago brought suit against the city, claiming heavy damages on account of the construction of a sewer through his property, and to the public surprise, was awarded the sum of $35,000. The city authorities thought their best course would be to purchase the land outright and convert it into a public park. The owner was asked to state a price, which he did, but the amount, $74,000, was considered so exorbitant that the idea of purchase was abandoned. A week or two ago, the owner was surprised to learn that the assessment on this land had been appealed against by the City Solicitor on the ground of undervaluation. The City Solicitor insists that the property shall be assessed at the valuation put upon it by the owner, which would seem to be a reasonable enough proposition, although the latter indignantly refuses to view it in this light, which may be taken as proof of the old saying, that "circumstances alter cases."

THE builders and contractors of the Australasian colonies have determined to adopt the British system of basing their tenders upon Bills of Quantities prepared by competent quantity surveyors. The tendency in this direction is becoming very marked in the United States also. In Canada the uniform basis of tendering is perhaps as urgently required as in any other part of the world, but as yet no steps have been taken to obtain it. The *Australian Builder* describes the English method as follows:—"In London the Quantities are usually taken out by a quantity surveyor (or firm) appointed by the architect, and responsible for the accuracy of such Quantities. In large and important jobs two independent surveyors usually are appointed and work together, sharing the commission between them, by which the risk of error is reduced to a minimum. The Quantities are then lithographed along with the Specification, before tenders are called for. The lithographed Bills of Quantities and Specification are supplied together to tenderers, and the former bear, after the first Total, on the Summary of Trades sheet, the words, "Surveyors' Commission on the above (so much) per cent.", left blank. This, every tenderer fills in, in order to arrive at the gross amount of his legitimate *estimate* (which may, or may not, form the amount of his actual *tender*), and the successful tenderer pays the surveyor out of the first cash instalment he receives upon his contract. The tenderer, as a rule knows nothing as to who takes out the Quantities, until they are taken out and lithographed, and tenders are called for. We know of no practice or proposal more thoroughly equitable and satisfactory to all parties than this."

AN enterprising firm of architects in Montreal have opened a school for architectural students. We are not aware what subjects are taught that would assist students to gain a knowledge of architecture, but are informed that nothing in the shape of practical teaching relating to building construction is imparted. At a meeting of members and student associates of the Province of Quebec Association of Architects recently held for the purpose of listening to a paper on "Architectural Training" by Mr. Hutchison, a representative of this firm appeared and proceeded to advertise the merits of his school. In view of the fact that the Quebec Association had appointed a committee of its members to report on the institution of classes and lectures for the instruction of students who should become members of the Association, this action must be regarded as a somewhat presumptious one. It is surprising that the Association should have permitted it. It is still more surprising that some of the members should actually have opposed the proposition for the formation of classes and deliverance of lectures under the auspices of the Association, notwithstanding other members had volunteered to place their time and talent at the disposal of the students for this purpose. They surely must have overlooked the fact that they were aiming a serious blow at the prosperity of the Association, while working into the hands of those interested in preventing instruction being afforded the students by the Association. We are informed that the private school referred to, gives instruction in the French language only, and thus, no matter what may be its advantages to the French student, it is of no service to many students who are unfamiliar therewith. We were of the opinion that the education of students by means of classes, lectures, &c., was one of the most important of the objects which the Association was designed to accomplish. The fact ought at least to be apparent that the Association cannot hope to build up a successful future if it disregards the interests of the students. If the idea of affording instruction to students is abandoned, one of the strongest inducements which could be held out to them to become members will have been taken away. We hope that those who have at heart the present and future welfare of the Association will see the wisdom and necessity of making it a source of benefit to the rising generation of architects, and thereby rallying them to its support.

OUR ILLUSTRATIONS.

CARVED WOOD CAPITALS, ST. ALBAN'S CATHEDRAL, TORONTO.—EXECUTED BY THOS. MOWBRAY, TORONTO—R. C. WINDEVER & SON, ARCHITECTS, TORONTO.

PROPOSED NEW DRILL HALL, TORONTO.—THOS. FULLER, DEPT. OF PUBLIC WORKS, OTTAWA, ARCHITECT.

"ALPHONSO BLOCK," VICTORIA ST., TORONTO.—DICK & WICKSON, ARCHITECTS.

The Rathbun Co., of Deseronto, Ont., recently shipped a carload of doors and window sashes to South Africa.

Mr. C. S. Nellis, from the headquarters of the Adamant Manufacturing Co., Syracuse, N. Y., is at present making a tour of the Dominion in the interests of the Toronto Branch of the business.

HOW TO ESTIMATE.

By WM. H. HODGSON, ARCHITECT.

IN pursuance of the announcement made to contractors in the CANADIAN ARCHITECT AND BUILDER for October, I present to the reader the first of a series of articles designed to instruct the contractor in the method of preparing estimates on an accurate basis. The quantities herewith furnished have been taken with the greatest care and accuracy from the accompanying design and specification for a residence, and consequently are reliable. They give the actual materials in the building when completed, and the method by which the quantities have been arrived at. No allowance has been made for what is termed "waste"; this has to be considered by the contractor in his pricing of the several works. No attempt has been made to affix prices, as these vary so widely in different localities. The contractor should be familiar with prices in his own locality. The adoption of this system would place all contractors on equal footing so far as the preparation of their tenders is concerned, and would do away with all guess-work:

SPECIFICATION.

EXCAVATOR, MASON AND BRICKLAYER.

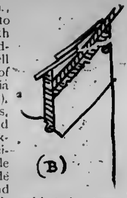
Excavate the ground as required for the cellars, and foundation of walls, chimney breasts, glazed pipe drains, etc. All vegetable mould to be put to one side for future use as directed. Fill in and ram and use the superfluous earth in terracing and leveling the lot, or cart away, as may be directed. The excavation to be 9 in. larger on all sides than the building, and no filling to be done till the stone walls are plastered outside and inspected. The drains marked G. P. on plans to be executed in with the best vitrified salt glazed pipe (Scotch or American), laid to proper fall as may be directed, jointed in cement, with all necessary bends, junctions and traps complete. Connect with sewer in street, contractor paying all fees. Put McGuire's cleaning out trap as shown, pipe from same to be carried to within 18" of surface and covered with stone flag. (All sewage drains inside of building will be of iron as per plumbers' specifications.) Lay 3" common tile weeping drains as shown properly graded and connected to main drains behind running traps as shown. Foundation walls to have footings of broad, flat stone 6" thick, projecting 4" on each side of wall above, and no stone to be less than half the total width of footing. The walls to be carried up to the height shown in good rubble masonry, composed of lake or other approved stone of the best quality, laid in the best prepared mortar, well built and bonded together, and having the joints on each side neatly struck with the trowel; the portion showing above ground and where lined is to be of brown Credit Valley courses in stone, neatly tape pointed in brown mortar, and having one border to at least every superficial yard of wall. The jambs to be tooth chiselled and to show a narrow draft on outer face. Plaster or parge outside of foundation walls from footings to finished ground line with ½ Portland cement mortar. None but hard bricks will be allowed on the premises. Brick walls in basement to be built of hard clinker bricks, with a neat struck joint. Build in all brick walls in basement a double course of roofing slate on top of footings 1" wider than wall to prevent rising of damp. Pier carrying front steps to be of hard clinker bricks on stone footings. The walls from underside of plinth to be carried up in brickwork of best hard, well-burned bricks laid in best prepared mortar. Projecting bays to be tied to main walls at every 5th course with stout hoop iron bond carried well into walls. Provide four (4) wrought iron straps 2"x¼" to be forked and built into brickwork, and well spiked to studding of front where prepared for tiles. The walls to be faced with the very best selected Carlton or other equally approved red bricks, selected of dark color, true and straight, laid in English bond, and finished carefully with a bead tool joint in mortar colored with Cabot's or other equally approved dark brown mortar stain; bricks to be well wetted. On completion of gutters, thoroughly clean down with acid. Inside walls of back ponds to be faced with white bricks finished with neat bead tool joint. Turn relieving arches of at least two rings over all openings of doors, windows, &c., and neat cut, and pointed arches at openings as shown. Build in strips for battens at every 2 feet in height in all outer walls and wherever else directed—strips to be provided by the carpenter. Beam fill on all walls to underside of floor and roof boarding, making all spaces thoroughly tight and weather proof. Turn proper arches over fire place openings on 2½"x½" wro't iron chamber bar, all flues to be formed circular 9" diameter, carefully built round moulds 3 ft. long, which are to be drawn up a few inches at a time as the work proceeds. Provide and build in proper galvanized iron collars to one flue in each room, (except those having fire places). Flues not connected with fireplaces to have proper iron soot doors in iron frames. Form ash dumps from ground floor fireplaces as shown, having iron soot doors set in cast iron frames. Leave 9"x12" opening into vent flue near ceiling of kitchen, and 9" diameter into same flue near ceiling of bath room. Chimneys to be carried up in brickwork of uniform color with projecting courses for caps. Bed in mortar all bond timbers, plates, etc., and build in all lintels, wood bricks, frames, cut stone and other work required to be set in masonry or brickwork. Support foot of iron soil pipes with 9"x9" brick pier, three courses high. Form substratum of concrete floor with a 6" layer of clean broken stone chips, pounded flat and level. The entire cellar floor to be laid in concrete 3" thick, of Portland cement, sharp sand and coarse gravel in proper proportion, and all but laundry and back porch floated to a smooth surface with a coating of Portland cement and sand ½" thick. Laundry and porch joists will be bedded in concrete. All hearths to have 4½ brick trimmer arches and to be of concrete as specified for cellar floors. Finished hearths will be of tile provided by the proprietor. Brickwork to be built from outside scaffolding which is to be left for the use of other trades till directed to be removed by the architects, special care being taken to prevent walls being splashed from scaffolding. The labels and strings where shown to be one course of plinth brick, set thus: (A).

(A)

Provide and set sills of Credit Valley stone to basement windows, to be 6"x9" and weathered; fuel doors will have wood sills. The sills to all other windows as tinted brown to be executed in the best quality of Portage Entry stone, or other approved brown stone, throated, chiselled or rock faced, weathered and seated; rear sills may be of Ohio stone. Heads of fuel doors to be of brown stone 9" high. Head of entrance door to be of Portage Entry stone, 1½ bricks thick, cross tooth chiselled. Corbels at front pilasters to be of similar stone similarly finished. Carefully set in fine mortar and protect with boarding till the completion of the work. Bricklayer to attend on other trades in the execution and for the perfect completion of the work.

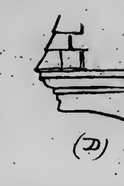
CARPENTER AND JOINER.

The lumber for the carpenters' [illegible] good description of w[illegible] pine thoroughly seasoned, free from sap, shakes, loose or large knots, or other imperfections, and to hold the full sizes shown or specified, when fixed in the building; good sound seasoned hemlock may be used for joists and rafters. The joiner's work (unless otherwise specified) to be of best description of white pine, clear and thoroughly seasoned. Inside work on ground and first floor will be varnished. Provide and fix all necessary centrings and turning pieces to openings of doors and where required. Provide and fix lintels to all openings of doors and windows, cambered at top, and not less than 6" in depth at centre, and resting 6" on walls on each side. Provide straps 2½"x¾" to be built into walls under bearings of joists and elsewhere as required for fixing skirtings, trimmings of doors, windows, etc., and other finishings, and at every 2 feet in height of outer walls, on which to nail battens. Batten all outer walls, (including attic where necessary) and elsewhere as required with 2"x1¼" battens, at 16" centres—battens not to be placed till walls are parged. Porches will not be plastered. Provide proper grounds for fixing trimmings, etc. Cellar floors of laundry and porch to have 3"x4" cedar joists bedded in concrete. Ground, first and attic floor joists to be 10"x2" at 16" centres properly trimmed at fire places, wells of stairs, etc., trimmers to be 4" thick or double 2" and framed with double tenons. Put a tier of 2"x2" herring bone strutting to each bearing of joists on all floors. Prepare floors for pugging at gables where projecting beyond wall line with one inch boarding. Sloping roofs, 6"x2" rafters, at 16 centres, and valleys 8 in. x 3 in., plates 9 in. x 3 in., collars 6 in. x 2 in. at 16 in. centres. Ends of rafters to be dressed where visible. Sloping roofs to be laid with dressed ¾ in. matched boarding in widths not exceeding 7 in., free from loose knots, shakes, or sap, well nailed. Put saddles behind chimneys boarded as roof and 3 in. rounded roll to ridges. Put dressed facia and 1 in. beaded soffit to eaves, and bed moulding. (B).

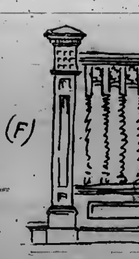

(B)

Gables to be 4 in. of studding at 18 in. centres, sheeted both sides with narrow matched stuff and lined on inside before battening with a double thickness of sheathing paper well lapped; batten as specified for other walls, sheet soffits with narrow, double beaded stuff matched on double sheathing paper made close and tight at walls, etc., and (C) form eaves and bed mouldings, as shown. Beams and corbels at side gable to be dressed and moulded as shown. Front gables to have dentil moulded large boards, as shown, (D), secured in strongest manner. Roof of rear porch to have

(C)


(D)

dressed rafters, and 1½ in. matched and beaded dressed roof boarding. Partitions to have heads, sills and braces 4 in. x 3 in.; door studs 4 in. x 4 in., or double 4 in. x 2 in.; common studs 4 in. x 2 in., 16 in. centres, all to be properly framed and cross-braced, those carrying joists or rafters to have heads 3 in. x 4 in., and upper studs to be carried down to them and to be well braced. Studs to be placed on flat in confined places. The ground and first floors to be laid with ⅞ in. dressed, tongued and grooved seasoned flooring of the best quality, in boards not exceeding 3½ in. in width, blind nailed to joists, and properly cleaned off on completion; attic and basement, (where called for) to be laid with ⅞ in. matched flooring of good quality, in boards not exceeding 5 in. in width. Floors in attic to extend to wall line. Ground and first floors to be laid on thicknessed 1 in. boarding laid diagonally with a double thickness of carpet felt between. Carpenters not to lay any floors till all gas or other pipes are put in, and finished floors not to be laid till completion of plastering. Put mitred margins to hearths. Main stairs to be built on 1¼ in. moulded strings, 1¾ in. wall strings to have 1¾ in. treads, rounded and returned nosings, cavetto and fillet and cut brackets, ⅞ in. risers, two 7 in. panelled and moulded newels at foot, and the rest 5 in. turned and moulded cherry newels, 3 in. x 3 in. moulded cherry handrail with 2 in. roll, and 2 in. turned pine balusters. Stairs to be built on proper carriages, well bracketed with 1 in. brackets nailed to each carriage under each step. Spandril at side of stair and forming enclosure to coat closet of 1⅜ in. framed and moulded panelling, all according to drawings; panelled door to closet under. End of stair facing entrance to have balustrade as shown. (F). Back stairs to have 3 in. rounded hardwood rail, 4 in. hardwood newels, and square balusters, to have 1¾ in. treads, rounded and returned nosings and scotia ⅞ in. risers, put together in the best manner, with 1¾ in. wall strings. Stairs to cellar to have close strings, 2 in. treads, 3 in. rounded rail, 4 in. x 4 in. chamfered newels. The kitchen, back stairs and pantries to be sheeted with ⅞ in. matched and beaded sheeting 3 ft. high, and bath room 5 ft. high, blind nailed to proper grounds, and finished with moulded capping; boards not to exceed 4 in. in width, except in bath room, where they will not exceed 2½ and to be double beaded or moulded. Drawing and dining rooms, hall, vestibule and staircase to have 10 in. double facia moulded skirtings, and the rooms and hall on first floor 9 in. single facia ⅞ in. thick, all properly scribed to floors and nailed to proper grounds. Nail fillet to floor at base. Base in attic 7 in. torus. Trim at registers and cut for plumbers, and hot air pipes. Put ⅞ in. staff beads to all projecting angles in kitchen and attic. Bracket down for plaster arches on ground floor and first floor, as shown by dotted lines, bracket down for drawing room. The cellar windows (except where otherwise specified to [illegible] x 4 in. solid rebate upon chamfered frames, 1¾ in. sash [illegible] Elsewhere [illegible] -sent tim


(F)

hung at top with 3 in. butts, and to be furnished with iron water-bars, 4 in. barrel bolts and hooks to hold them open. Cold air inlet to be protected with stout wire having ¼ in. mesh and well secured. Fuel doors to have 2 in. oak sills, to be 1¾ in. panelled and prepared with stops for glazing, hung at top and furnished with hooks and 6 in. bolts. The whole of the windows above cellar (except where otherwise specified) to have proper boxed frames, 2 in. double sunk sills, outside hangings of stiles, 1¾ in. moulded sashes hung with the best sash cord over the best iron axle pulleys. Front drawing room window to have boxed head, fixed fanlight, moulded transom as shown. Four (4) windows on front elevation to have 2⅜ in. sashes with stops in preparation for plate glass. Windows to be fastened with approved fasteners of the value of $4.50 per doz., and furnished with best bronze window lifts. Bed room windows, first floor, front elevation, to have simple, moulded pilasters, sills, heads and transoms as shown, fanlights to be fixed and prepared with stops for lead glazing. Short window at first main stair landing, and that in linen closet, to have solid rebated frames, with stops for lead work. Windows in coat closet under main stairs, and side windows in attic to have casement sash with drip and water bar, properly hinged, to have knobs, and secured with brass bolts. Dormers to be according to details and to have casement sash with drip and water bar, to be properly hung and fastened with spring catches and brass bolt. Fit to four windows in west elevation 1⅜ in. outside venetians properly hung and fastened. Prepare four windows in front elevation for Willer sliding blinds with all necessary stops, fillets, blocks, etc., complete. That on ground floor will be made to slide in pockets, behind window back, and covered with hinged flap. Entrance door to have 6 in. x 4 in. rebated and moulded frame, 2 in. staff bead, and 2 in. rounded oak sill, door to be 2⅜ in. oak veneered on outside, panelled and moulded and prepared with mouldings above for glazing, to be hung with three 5 in. loose butt bronze hinges, and furnished with hall door lock of the value of $4, and having 2½ in. bronze knobs. Vestibule doors to be 2½ in. panelled and moulded below, and prepared with mouldings above for glass, doors hung in rebated and moulded jambs with three pairs of 4 in. loose butt bronze hinges, and furnished with 4 in. American rebate mortice locks, brass bolts, keys, bronze knobs and furniture, 9 in. bronze flush bolts. Back porch door to be 1¾ panelled and bead flush, hung on 6 in. x 3 in. rebated and chamfered jambs, having 2 in. oak sill, to be properly hung and furnished with Carpenters' rim lock, white furniture and 8 in. barrel bolts, hinged and bolted fanlight. Side porch door to be similar, but to have hall door lock of the value of $2, porcelain and plated furniture. The doors to the two principal floors to be 1¾ panelled and moulded and hung to 1¾ in. rebated jambs. Doors to principal rooms, ground floor, to be hung and furnished as specified for vestibule doors, those to first floor to be hung with 4 in. loose butt Berlin bronze hinges and furnished with 4 in. American mortise locks, brass bolts and keys, and porcelain and plated furniture. Sliding doors to have proper overhead track, and to be furnished with Clarke's patent hangers, and with sliding door lock and flush handles. The other doors throughout (unless otherwise specified) to be 1⅜ in. panelled and moulded, hung with 4 in. loose butts to 1⅜ in. loose jambs, and furnished with American mortise locks, brass bolts and porcelain and plated furniture, two doors in attic to have pivoted fanlights. Closet doors to be 1⅜ moulded one side, furnished with locks and furniture to correspond with other doors. Doors marked "swing" to be 1¾ in. thick hung with nickle plated, Chicago spring hinges, and furnished with porcelain finger plates, both sides, and brass bolts. Opening marked "curtains" will not have doors but to be prepared for them, with rebated jambs, casings, etc. Doors in basement to be 1⅜ in. batten in 1⅜ in. jambs, having stops planted on, hung with 4 in. butts, and furnished with rim locks and mineral furniture. Architraves on ground floor main building to be 5½ in. double faced with hand moulding. Architraves on first floor to be similar 4½ in. wide. Architraves in small rooms, passages, kitchen, attic, etc., to be 4 in. moulded with plain chamfered blocks. Put 2½ in. picture mould at spring of cove in drawing room. Window, except those to two principal rooms, ground floor, to have 1½ in. moulded window boards, bed moulds and moulded aprons. Windows of drawing and dining rooms to have panelled and moulded window backs. Front steps to have turned newals, moulded rail and balustrade as shown, treads to be 1¾ in. and slatted. Kitchen pantry to be fitted up with six tiers of 1 in. dressed and beaded shelving supported on proper bearings. Fit up dressers in kitchen and service pantry, having 1½ in. panelled and moulded doors, properly hung and fastened, ⅞ in. beaded shelving—lower portion to be wider and to have drawers and cupboards below, having properly hinged and fastened doors, all according to detail; top of wider portion of dresser will be flush with top of sink, and to be of hardwood grooved for drainer. Bed room closets to have beaded shelves as shown, 5 in. beaded rail and strong bronzed metal hooks, 9 in. apart. About 30 feet of beaded rail with hooks 9 in. apart, to be placed where directed, also 100 feet of shelving on bearers, all in addition to that specified for closets. Hanging shelf in larder to be of 1⅜ in. stuff, suspended from ceiling with four ½ in. wrought iron rods. Fit up two tiers of 1½ in. shelving at each end of larder on proper supports. Linen closet to have wide shelves six in height, at ends, and enclose those at one end with hinged cedar fronts, fastened with spring catches. The steps in back porch to be of pine 1¾ in. treads, 1 in. risers, 2 in. strings, rounded rail, bar balusters and chamfered newels. Fit up stands for kitchen and cellar sinks with hardwood capping. Do all necessary attendance and fitting for bath, basin and water closets (not including plumbers' work). Case plumbers' work where required with narrow sheeting hinged and bolted at front. The capping of bath and lids and seats of w. c.'s to be of cherry, the latter supported on moulded brackets; w. c.'s to have double lids for slop sink. Front of bath to be of same sheeting as specified for room; panelled, hinged and bolted doors to front of basin. Provide all necessary boxing and beaded runs to pipes; do any necessary cutting for plumber. W. c. in cellar to be enclosed with sheeting, and batten door, and hung and furnished as other basement doors. Door to be kept 6 in. from floor and ceiling. Borrewed light as shown. Put 2 in. planking in yard at doorway as shown, on 4 in. x 4 in. cedar sleepers. Form slatted walks as shown with 2 in. x 2½ in. dressed stuff, dressed three sides, on 4 in. x 3 in. cedar sleepers; put rounded curb at edges of that to main entrance. Put side gate as shown, formed with narrow pickets, and strong framing, hung with strong T hinges and furnished with wrought iron thumb latch, bolt and padlock, dressed and rounded cedar posts, footed, and having chamfered head piece. Erect short piece of picket fence 6 feet high, on south side to harmonize with gate, also a short piece on north side of porch. Fuel bins to be constructed of 2 in. horizontal planking, strongly nailed to 4 in. x 4 in. posts extending from floor to ceiling; the front to be made to slide in grooves for removal if necessary. Construct cold and fresh air duets of dry 1 in. matched stuff with hinged valve, which will close inlet from floor when opening that from outside. Carpenter to attend on other trades in the execution and for the perfect completion of the work.

SLATER.

Line valleys with galvanized iron 15 in. wide, increasing to 18 in. near foot. Joints to be soldered where in danger of snow backing up water, and to have 4 in. lap in other place. Cover ridges, etc., with No. 28 iron. Step and cloak flash against all walls, chimneys and checks and apron of dormer. Put strip of galvanized iron 5 in. wide, 3 in. on roof and 2 in. drip over back of gutter, well secured. Cover flat of cornice over three windows on first floor with galvanized iron, lapped, tacked and soldered, and turned up 6 in. behind tiling. Cover the sloping roof, including back porch and cheeks of dormer, with best quality of Canadian roofing slate from the Rockland quarries of about 20 in. x 11 in. size, and having double courses at eaves. Slates to be laid on heavy felt provided and laid by slater. All exposed portions of dormer to be carefully covered with felt well lapped. Cover east and south gables as shown with Daney's, Ontario, or other equally approved tiles, of good rich, dark red color, well secured to walls, and laid on heavy felt, well lapped and tacked.

TINSMITH.

Put 4 in. eave troughs of galvanized iron to eaves of back porch, and 5 in. do. to eaves of house of No. 28 guage iron. Gutters to be stiffened with 7-16 in. x 7-16 in. wro't iron bars and well secured to rafters, and to have backs carried up to slates. Put three (3) stacks of 4 in. octagon down pipes to house and one 3 in. to back porch, all to be of the very best iron, No. 28 gauge, approved brand, properly connected with gutters, secured to walls with iron holdfasts, and extending to surface of ground and there connected with drain pipes with proper caps to pipes. Carry 3 in. down pipes from gutters on south gable to main eaves.

PLUMBER AND GAS FITTER.

Lay on through house best tested iron piping, beginning with 1¼ in. at meter, and connected with various points marked on plans with letters P for pendents and B for brackets, nipples left capped ready for fixtures. Pipes to diminish according to position to 1 in., ¾ in. and ½ in., all to be thoroughly tested. Drop lights to be taken out of the side of supplies and all supplies to brackets to rise from supply below, and in no case to drop from pipes overhead. Lay on separate supply from separate meter, to two fire-places on ground floor and to gas-stove in kitchen, beginning with ¾ in. and diminishing to ½ in. Provide cocks with keys at fire-places. Lay on water to sinks, bath, basin and water closets with ½ in. 6 lbs. lead supply. Service from street line to line of branches to fixtures to be ⅝ in. 8 lbs. lead. Provide hose connection at window of furnace room, with key cock, and provide stop and waste cock near floor. Put ¾ in. brass stop and waste cock immediately inside wall of house, and all pipes to be graded to this point. Fit up in bath room best No. 14 guage tinned and planished copper bath 6 ft. long, with ½ in. 6 lbs. lead, hot and cold supply, and best heavy plated Fuller double bath cocks, plated rose and 1½ in. overflow, 1½ in. waste, Dubois trap, and brass trap screw, and plated plug and chain. Wash basin of best marbled earthenware, oval, and having Moits standing waste, 1¼ in. counter sunk marble top, 1 in. back and end, 12 in. high, heavy plated Fuller cocks, ½ in. hot and cold lead supply and 1¼ in. lead waste, Dubois trap and brass tap screw. Basin to be attached to marble top by means of brass clamps. Provide and fit up on first floor an all porcelain flushing rim wash-out closet, equal in value to the Inodoro or Unitas, with lead lined tank, having brackets, valves, supply, overflow, ball cock, &c., complete. Provide porcelain drip tray. Soil pipe to be 4 in. of cast iron carried from drain 2 feet beyond wall to 4 feet above roof at point of exit and to down pipes at surface of ground, to be coated both sides with coal tar and joints carefully caulked with ohum and lead. Dig for these pipes and replace earth properly leveled, and cart away surplus if any. Pipe to be of weight called for in city by-law. Provide all necessary traps, and hand-holes, with brass cleaning screws as shown. Foot of soil pipe will be supported on brick pier built by mason. Carry 3 in. cast iron waste from kitchen sink along ceiling of cellar to main soil pipe, supported on wro't iron hangers. Carry a 3 in. cast iron vent pipe from basement closet connecting to soil-pipe above highest fixture (in bath room), and leave connections for vents from the various traps as required. The 4 in. soil pipe to be enlarged to 6 in. above roof line, and to have opening mouthed top. Carefully flash on to roof with 16 oz. copper, into hub which must be kept clear of roof. W. c. in basement to be a flushing rim, cane ware wash out with 4 in. trap, syphon, cistern, etc., complete. Ventilate from seat to special flue in laundry with 3 in. galvanized iron pipe. Put a 7 in. diameter enameled valve register in vent flue near ceiling of bathroom. Put a 9 in. x 12 in. enameled valve register near ceiling of kitchen into vent flue. Ventilate drain by means of a 4 in. cast iron pipe connected to drain and carried 2½ feet above finished ground line with return bend top. Put under bath and wash basin on first floor proper safes of 3 lbs. lead with ¾ in. waste, with brass flap valve on the same emptying over kitchen sink. Carry proper safes under all pipes crossing ceilings. Safe under w. c. on first floor to be of marble, 1¼ in. thick and counter sunk; put brass strainer on outlet of waste and connect to other safe wastes. Fit up in kitchen best galvanized iron sink 2 ft. 6 in. long, with brackets and enameled back and having 1¼ in. heavy lead waste with Dubois trap, and brass trap screws and hot and cold supply of ¾ in. lead pipe with brass Fuller cocks. Fit up in kitchen at back of stove on proper stand a heavy galvanized iron round topped cylinder of 40 gallons capacity, with ⅝ in. heavy lead hot and cold supply, ¾ in. brass connections with stove in kitchen with shut-off cock; connect to stove with 1 in. iron pipe. Cylinder to have ¾ in. sediment pipe and cock at bottom; also place ¾ in. stop cock on supply pipe. Boiler to be supplied from pressure; provide combined safe and vacuum valve. Fit up small cast iron sink in cellar, having 1½ in. lead waste, trapped and supplied as other sink. Overflow pipe from basin and bath to be branched into dip of traps from same. Make all necessary Y branches for work as required, all waste pipes to have vents of 1½ in. and 2 in. lead pipe, carried into 3 in. pipe before mentioned. Vents for w. c.'s to be 3 in. diameter. Prove and fix from hall near head of main stairs to kitchen a proper tin speaking tube, with silver plated mouth pieces, etc., complete. All to be left complete and perfect in every particular. All work to be in conformity with city by-laws.

PLASTERER.

Inner face of all outside walls, including attics, to be well rendered with best hair mortar after being built and before battening is executed, and make thoroughly tight also between all joists, etc., entering therein, also about all door and window frames. Floors at gable in attic to be deadened with mortar 1½ in. thick. Lath the partitions, ceilings, soffits of stairs and other places prepared for lathing, with the best sawn pine laths, 1 in. wide for ceilings and 1¼ in. for walls, 5-16 in. apart, ends butted and joints broken every 18 in. Outer walls will be battened for lathing. Porch will not be plastered. Plastering to be of the best two coat work hard white finish. The ceilings of cellars throughout to have two coats hard white finish. The first coat of plaster in all cases to be continued behind skirtings, trimmings, etc. Form slightly rounded corners to all projecting angles to principal rooms and hall on ground and first floors. Simple cove in drawing room springing from wooden picture mould. Plaster cornice in dining room to be 24 in. girth, in hall 20 in., and in vestibule 15 in. Put 2½ ft. moulded centres to dining and drawing rooms, and 18 in. diameter to hall. Form simple moulded beams in ground and first floors as shown by dotted lines. Twice lime whiten walls of cellars. The whole to be executed with the best description of material and workmanship, and to be left sound and perfect after making good after other trades. Plasterer to remove rubbish and broom out floors on completion. Leave woodwork clean and ready for painter.

PAINTER AND GLAZIER.

The whole of the internal and external dressed woodwork usually painted and except where otherwise specified, including outside steps and slatted walks, and dressed fence and gate to be painted three coats of white lead and linseed oil paint of approved tints. The work to be properly knotted and stopped, and well rubbed down after first and second coats. The woodwork of ground and first floors to be stained, oiled and twice varnished with best copal varnish. Treads and risers of main and back stairs to be stained and twice oiled. No inside blinds to be included in tender. Outside venetians to four rear windows to be painted three coats after priming. The visible galvanized iron work to be painted three coats. Except where otherwise specified, the whole of the windows and fanlights, glass doors, etc., to be glazed with double diamond star glass, selected free from flaws and defects, to be well puttied and back puttied, and bradded, the whole of the sashes to be primed before glazing. Glaze four windows on east elevation with ½ in. polished plate glass, and the small square lights of east windows in attic with rolled cathedral glass of selected tints. The glass in fuel doors to be ⅛ in. rough rolled plate secured with stops. Other glass in cellar to be diamond star. The two windows at staircase landings and fanlights of four windows in east elevation to be glazed with stained glass provided by proprietor. Glass in vestibule doors will be provided by proprietor. Glass in entrance door to ⅜ in. be polished plate, bevelled. Glass in fanlights as marked to be ground; glaze borrowed light in basement w.c. with ground diamond star glass. Clean windows, scrub floors before and after painting, and leave all clean and perfect on completion. Put in sashes when directed, and do any necessary re-glazing required.

EXCAVATION, DRAINAGE, ETC.

	$	c.
325 cubic yards of excavation, includes filling, levelling, etc., and carting away surplus earth		
6 lineal yards of 6 in. vitrified tile drains, complete		
5¾ lineal yards of 4 in. vitrified fresh air inlet, complete		
36½ lineal yards of 3 in. tile weeping drains		
1 McGuire's cleaning out trap, and stone flag covering, complete		

NOTE.—Excavations are measured "cube," that is, length, breadth and depth, thus: 54 ft. 9 in. x 22 ft. 6 in. x 5 ft. 6 in. = equal to 6775 ft. 4 in. divided by 27, the number of feet in a cubic yard, gives 251 cubic yards, less (1 ft. 8 in.). Tile drains are measured lineal, that is, running measure, as indicated in above items.

MASONRY AND CUT STONE.

	$	c.
29 toise of masonry (86 ft. cube English measure) in foundation walls, (parg-tted in cement outside)		
168 ft. 9 in supl. ft. Credit Valley cut stone base, inch draft and chiseled to jambs, complete		
4 Credit Valley stone sills, fine buchard, to cellar windows, 3 ft. 9 in. x 9 in. x 6 in., weathered		
1 Credit Valley stone sill, fine buchard. to cellar window, 3 ft. 3 in. x 9 in. x 6 in., weathered		
1 Credit Valley stone sill, fine buchard, to cellar window, 2 ft. 9 in. x 9 in. x 6 in., weathered		
1 portage entry stone sill, chiseled, to front window, 7 ft. 6 in. x 11 in. x 9 in., weathered and seated		
1 portage entry stone sill, chiseled, north window, 4 ft. 9 in. x 11 in. x 6 in., weathered and seated		
2 portage entry stone sills, chiseled, north and south windows, 4 ft. 0 in. x 11 in. x 6 in., weathered and seated		
7 portage entry stone sills, chiseled, north and south windows, 3 ft. 9 in. x 11 in. x 6 in., weathered and seated		
1 portage entry stone sill, chiseled, north and south window, 3 ft. 6 in. x 11 in. x 6 in., weathered and seated		
1 portage entry stone sill, chiseled, south window, 2 ft. 9 in. x 11 in. x 6 in., weathered and seated		
3 portage entry stone sills, chiseled, 2 ft. 0 in. x 11 in. x 6 in., weathered and seated		
3 Ohio stone sill, chiseled, rear windows, 4 ft. 0 in. x 11 in. x 6 in., weathered and seated		
1 Ohio stone sill, chiseled, 3 ft. 0 in. x 11 in. x 6 in., weathered and seated		
2 brown stone fine Bouchard heads to fuel doors, 3 ft. 0 in. x 9 in. x 9 in., checked for frames		
1 portage entry stone head to front doors, 7 ft. 0 in. x 13 in. x 14 in., chiseled and with curved sunk face		
2 portage entry corbels, curved face, 2 ft. 0 in. x 9 in. x 40 in., temporary protected with boards		
Bedding to frames, lintels, etc.		

NOTE.—Masonry is measured cube and the totals of dimensions added together, divided by 86, the number of cubic feet in a toise. The French measure per toise being 6 ft. x 6 ft. x 2 ft., equivalent to 6 ft. 4½ in. x 6 ft. 4½ in. x 2 ft. 1½ in. English measure, the French foot being ¼ of an inch longer than one foot English. Cut stone is measured superficial, that is, square, thus: 20 ft. x 20 ft. gives 400 superficial feet. Sills, heads, steps, etc., are counted and the number given according to sizes and quality of work, as shown in above items of quantities.

BRICKWORK.

	$	c.
7,648 hard clinker brick in cellar walls		
37,725 best hard common brick		
18,889 best Carlton facing brick, cleaned down with acid		
1,375 white brick, inside porch		
252 lineal feet of bevil and projecting bricks, labels, strings, etc.		
16 lineal feet of curved labels, strings, etc.		
77 lineal ft. of 2 rows slate on footings of brick walls, 20 in. wide		
100 lineal ft. of hoop iron for ties		
24 relieving arches		
6 curved arches (semi-circular and elliptic)		
4 fireplace arches on 2½ in. x ⅛ in. iron camber bars		
4 brick trimmer arches in concrete, to hearths		
8 circular flues (built round moulds) to chimneys		
4 wrought iron forked straps, 2 x ¼ in., and spikes		
7 galvanized iron collars to flues		
5 iron soot doors and frames to ash dumps and flues		
2 openings to vent flue, kitchen and bath room near ceiling		
3 chimney caps of projecting brick courses		
Bricklayer to build in strips for battens in outer walls and where directed, beam filling to doors and roof timbers, bed bond timbers, lintels, plates, wood bricks, frames, &c., and attendance on other trades		
Scaffolding on outside for brickwork (left for other trades)		
105 square yards of concrete, 3 in. thick, and substratum 6 in. thick, broken stone chips		
80½ square yards of Portland cement and sand, floated ½ in. thick		
Bedding, laundry and porch joists in cement		

NOTE.—Brickwork is measured cube and in Montreal the number of bricks given in estimating, is 20 bricks to the cube foot, and is ascertained thus:

6 bricks long say 4′ 0″
9 " high " 2′ 0″
54 8′ 0″ = divisor.
3 brick thick

8 | 162 | 20 to the foot.
16

The openings are measured and deducted from the solid work. Concrete when not deep is measured by the superficial yard, thus, 3 ft. x 3 ft. gives one yard. Concrete in heavy work is measured cube, 3 ft. x 3 ft. x 3 ft., or 27 feet to the cubic yard. Arches, etc., are given in numbers and other items noted as above.

ARCHITECTURAL TRAINING.

By A. C. HUTCHISON, R.C.A.

THE following paper on the above subject was read by the author at a meeting of architects and students of architecture held in the rooms of the Province of Quebec Association of Architects, Montreal, on Thursday, the 5th inst.:

I take it for granted that the object of architectural training is to properly qualify any person wishing to practice the profession of an architect by such a course of scientific and art instruction as will render him a competent architect. The question will at once arise, when can any architect be termed competent? I think the least that can be expected of any claiming to be competent is, that leaving aside any special skill that may be required in designing works of a monumental character or special technical knowledge required for designing a building for some novel or extraordinary use, he should be able to design a building for any ordinary purpose or situation so that its construction shall be safe and its appearance such that no violence shall be done to any canon of Art. For illustrating and working out of his design he should be able to prepare all the plans, elevations, sections, etc., as will make his intentions clear and to be understood by others. He should also be able to make a perspective drawing of any portion of his design, by which he can better illustrate his intentions to non-professionals who might not be able to appreciate them from the examination of geometrical drawings. He should also be able to prepare a specification in which the quality of materials, modes of construction and quality of workmanship are defined in such manner as to make his intentions clear to the workmen charged with the carrying of his design into execution. He should further be able to determine by an inspection of the work as it progresses whether his instructions are being carried out in a proper manner. To do this satisfactorily to himself and his client, he should by previous training be familiar with building materials and their use, and be able by a knowledge of construction to apply them in such manner that they are not wasted, and that his building is safe and perfectly able to fulfil the purpose for which it was intended. He should also have a knowledge of sanitary science, heating and ventilation, so that the building designed by him shall not only be comfortable to live in, but also free from anything prejudicial to health. In addition to this, he should have a general knowledge of the different styles of architecture, and such a definite knowledge of the styles or the style he adopts for his design as will enable him to apply it correctly.

I think it will be admitted that in the interests of the profession and of the public, a lower qualification than I have just indicated should not be entertained.

Before entering upon the question as to the character and scope of the scientific and art training necessary to qualify a person to become a competent architect and how such training can be obtained, let us briefly consider the position of the profession in the Dominion, its relations to the public and to the training required to qualify as an architect.

Until the obtaining of Acts of Incorporation from the Provincial Legislature by the Ontario Association of Architects some eighteen months ago, and still more recently by the Association of Architects for the Province of Quebec, there was nothing to prevent anyone, whether qualified or not qualified, from practising as an architect. In both of these Acts provision has been made for passing examinations before entering upon the study of architecture, and before entering upon active practice as an architect. The first or preliminary examination required by these Acts is to determine whether the candidate wishing to study architecture is qualified by his previous education to proceed upon such study; the second or final examination is to determine whether the candidate after completing his course of study has obtained such scientific and art knowledge as will qualify him to practice as an architect. As both of these Acts provide so many claims of a compulsory character, it is evident that a somewhat broader architectural training necessary to qualify for entering effect far more is one of vital importance, especially to those of the old methods entered upon or propose to enter upon the profession.

Heretofore and at the present time

ing such instruction is for a pupil to enter an architect's office, where, during three years pupilage, he is expected to acquire all the instruction and training required to qualify him to pass the final examinations required by the Association.

I think you will admit that the office work usually allotted to a student during his pupilage, while giving him a good training in practical work which could not be otherwise so well obtained, does not really afford the training in many subjects with which he should be familiar, the acquisition of knowledge in these subjects depending almost wholly upon his own diligence in the study of such works on architectural subjects as may be within his reach. When we consider the cost of architectural works, and the usually very limited means which an architect's student has for purchasing them, it is evident that his means for obtaining information in this way is somewhat limited, and unfortunately, it is to be regretted that the public libraries of Montreal do not contain the class of architectural works most useful to the student who might have the privilege of consulting them.

Until within a comparatively recent period, the same conditions as exist here for acquiring the training necessary to qualify for the practice of architecture existed elsewhere, but during the last thirty years many members of the profession in Britain, France, and the United States, have realized the fact that while the pupilage system has many advantages which cannot be ignored, it does not really afford a training in many subjects with which the student should be familiar if he expects to reach a high position in the profession.

It was probably owing to a realization of the defects of the pupilage system some thirty years ago by eminent members of the R.I.B.A., that an agitation was commenced for the establishment of a standard of qualification to which a candidate should attain before he was considered fit for practice as an architect, and that his fitness should be proved by passing examinations in prescribed subjects in the same manner as was required by the members of other professional bodies. The result of the agitation was, that the Institute prepared a scheme for voluntary examinations in subjects prescribed by them, the first of which took place in 1863. As the successful passing of the examinations under this scheme conferred no distinction upon the candidate, nor did it give him a position in the profession over those who did not attempt to qualify under the conditions, it is not surprising that the scheme, leading to no practical result, was in a great measure a failure, and the examinations carried out under it gradually languished. After a few years trial of the scheme, some modifications were made in it which had the effect for a time of giving it new life and bringing forward more candidates for voluntary examination. These modifications consisted principally in the dividing of the examinations into two classes, termed "preliminary," and "proficiency," and the granting of certificates to successful candidates with the title of "Graduates of the Institute," but still leaving them entirely voluntary. After the scheme thus modified had been in operation for some time, it was felt by many of the leading minds in the profession that though connection with the Institute as Associate had a very considerable value, it did not always give the holders of it the standing in the eyes of the public that they should have: it was, therefore, proposed some ten years ago, with a view to increase the value of the title A.R.I.B.A., to make the examinations compulsory on all future candidates for Associateship of the Institute. This proposal was, after considerable discussion, adopted, and a scheme of examinations prepared, the successful passing of which entitled the candidate to rank as an Associate; this scheme has now been in operation for about ten years.

The adoption of compulsory examinations by the Institute soon made it evident that a better system of training than was then in vogue was required to enable candidates to successfully pass them, consequently we find that in University College and Kings College, London, in which the study of architecture formed part of the regular course of instruction, modifications were made in their curriculums which better adapted them to furnish, if not the practical, at least the theoretical knowledge necessary to enable their students to pass the examinations fixed by the Institute. Besides these colleges there were a number of institutions of various kinds in London and elsewhere throughout Britain that offered pupils in architects offices an opportunity of obtaining instruction in subjects necessary to qualify for such examinations.

At this distance it would appear as if the opportunities for architectural training in Britain were ample, but judging from the action lately taken by the Architectural Association composed principally of the younger members of the profession, they do not consider the existing system of education entirely satisfactory, and during the last two years have promulgated a scheme, which is now in actual operation. The promoters this scheme, while disclaiming any intention of being nistic to existing institutions in which architecture is r of interfering in any way with the present pupilage ma k they can supply the particular education required air d o otherwise be obtained and better calculated to from floulents to pass the examinations prescribed by trades in t.

proposed curriculum of the Architectural Line valleys, it extends over a period of four years, foot. Joints to be to have 4 in. lap in

of Greek and Roman architecture, their origin, development and application; the several varieties of classic ornament; the nature of ordinary building materials and the elementary principles of construction; plane geometry applied to actual work; projection of solids and development of surfaces; elementary physics as applied to building; the rudiments of perspective mensuration, chemistry, geology, geometrical drawing of ancient examples and free hand drawing.

Second year—English architecture from the Conquest to A. D. 1500 and the successive development of the styles; the characteristic mouldings and ornaments of each period; the nature of ordinary building materials and the elementary principles of construction continued from the first year; the calculation of the strength of materials; land surveying and levelling; chemistry of building materials; elementary ornament and color decoration; drawings of ancient examples; free hand drawing; solid geometry.

Third year—History of architecture and features of mouldings and ornament; materials and their application in building; strength of materials; specification writing and taking of quantities; ornament and color decoration; sanitary science as applied to drainage; elementary natural philosophy, including light, sound, heat, hydrostatics and electricity; designing and construction of modern buildings; free hand drawing; perspective; construction masonry.

Fourth year—History of architecture; materials and their application in building; sanitary science, including water supply, ventilation, lighting and heating; measurement and valuation of buildings; professional practice; design and construction of modern buildings; drawings of ancient buildings; graphic statics and perspective; modelling and water color.

From this brief description of what is being done in Britain for architectural training, it is evident that it is a subject of vital interest to the profession, and one which at the present time is receiving greater attention than has ever before been given to it.

This interest in the education of architects is not confined to Britain. In France the subject has received the attention of the State, so that some two years ago an Official Commission in Paris was appointed to examine the legal conditions under which the profession of an architect is exercised, the system of study which gives access to it and the character of the diplomas granted in connection with this study. This Commission after a year's investigation, in which they were assisted by provincial societies of architecture, made a report respecting the training to be obtained in Provincial Ecoles des Beaux Arts, and called attention to what they considered defects in the system, the principal defect being that after providing a course of training to qualify as an architect no diploma was granted that would give the holder of it a status as an architect duly qualified to practice his profession. In the report the Commission also calls attention to the peculiar legal responsibility for his work which the law imposes upon an architect in France, and points to the anomaly that while the State exacts certificates of proficiency from contractors doing work of the most common character, it requires no certificate of proficiency or diploma from the architect who is supposed to be a compendium of knowledge in all that relates to building. The Commission recommend the establishment of district schools in affiliation with faculties of the State for the study of architecture, and that entrance to them should only be obtained after the candidate has shown by examination that he is sufficiently advanced in his studies to enable him to follow the special course of instruction necessary for his training as an architect.

The course of instruction recommended for these schools embraces pretty much the same subjects as are provided for in the curriculum of the Architectural Association to which I have already referred, and consists of the study of architectural forms, analysis of monuments, study of design, decorative art, history, archæology, perspective stereotomy, hygiene, theoretic, technical and practical construction, ventilating, heating, lighting and professional practice.

The Commission strongly recommend the granting of diplomas to those who pursue the full course of construction and pass the examinations, and to make the diplomas of value they suggest that only those holding diplomas shall be entrusted with government or municipal work.

The subject of architectural training has of late years received a large share of attention in the United States, where in addition to many art and technical schools of local character that afford assistance to architects' pupils in the prosecution of their studies, there are several universities, colleges and institutions which have Chairs of Architecture in which a full course of architectural training may be obtained. Among the institutions I may mention the Universities of Cornell, Illinois, Philadelphia, Columbia College and the Institute of Technology, Boston. In each the course of instruction extends over four years, and their curriculums embrace all the subjects of a scientific and art character necessary to qualify their graduates for practice. In the first two years other subjects are taught which do not pertain directly to architecture, but in the last two years of the course the studies are almost wholly confined to architectural subjects. The art schools of the Metropolitan Museum of Art in New York also conduct courses in architecture, which are so arranged as to prepare pupils who desire it for admission to the Ecoles des Beaux Arts in Paris, while for pupils who are engaged in architects' offices, and cannot devote the time necessary for a full course, special classes and lectures are arranged to occupy only

part of the day or evenings for special subjects, instruction in which could not be obtained in their offices.

From the brief description of what is being done for architectural training in Britain, France and the United States, it will, I think, be evident that it is a subject which at the present time is considered of great importance, and is receiving a large share of attention. From the experience gained during the last twenty years, the consensus of opinion appears to be that study in the scientific and art subjects before referred to are essential to fully equip an architect for fulfilling the duties of his profession.

While the subject of architectural training has of late years and in other lands received great attention, and facilities more or less complete have been provided for imparting instruction in the special subjects required by an architect, no attempt has yet been made in the Dominion for the foundation of a Chair of Architecture in connection with any of our universities or colleges, nor are there any schools of art or technology in which pupils who have already entered upon the study of architecture in offices can obtain any practical assistance in the prosecution of their studies. Some time ago there was a rumor that the Minister of Education for the Province of Ontario intended founding a Chair of Architecture in the University of Toronto, but the scheme has not yet materialized.

It is to be hoped, however, that the Associations of Architects now formed in Ontario and Quebec will in the interests of the architects agitate for some means of affording the special instruction required by present and future pupils in preparing them to pass the examinations required by the respective Associations, either by the foundation of Chairs of Architecture in connection with our existing universities or colleges, or by the establishment of lectures and classes in immediate connection with the Associations. It would be premature at this early stage in the history of the Associations to suggest any particular scheme of education, but I feel that the necessity for affording some means of instruction in special subjects to present and future student associates, to enable them to pass the final examinations for registration, will soon force itself upon the attention of the associations.

For the present it would be a step towards and preparation for a more complete scheme if the Faculties of Applied Science of one or more of our universities would add a Chair of Architecture, and by means of lectures or classes in special subjects, afford instruction in such subjects as cannot very well be obtained in the daily routine of an architect's office.

At the present time the faculties of law in connection, I believe, with McGill and Laval Universities, while providing for a full course of instruction qualifying their graduates to pass the examinations for admission to the bar, also provide for lectures at such hours as will admit of students in law offices attending them, and that attendance on these lectures are compulsory on the students. If some such arrangement as this could be carried out, it would meet the present requirements.

NOTE.—Since preparing this paper I am glad to learn that a Chair of Architecture has been founded in the University of Toronto, and that Mr. C. H. Wright has been appointed as Professor, and hope that other universities may soon follow the example set them by Toronto.

MR. P. W. ST. GEORGE, CITY SURVEYOR, MONTREAL.

CANADIAN CITY ENGINEERS.

I.

THE subject of the accompanying portrait, Mr. Percival Walter St. George, City Surveyor of Montreal, was born at Torres, Morayshire, Scotland, on the 22nd of October, 1849, being the youngest son of Lieut.-Col. James D. N. St. George. After having spent seven years in France and at the University of Edinburgh in acquiring an education, he came to Canada in the year 1866.

The first two years of residence in this country were spent on the Nova Scotia Railway, and the succeeding four years, from 1868 to 1872, on the construction of the Intercolonial Railway. During the year 1873 Mr. St. George was engaged on the North Shore Railroad; 1874 saw him back again on the Intercolonial road. The following year his services were given on behalf of the Northern Colonization Railway.

From 1875 to 1873, he held the position of Deputy City Surveyor of the city of Montreal. In the latter year he was appointed engineer-in-charge of maintenance way on the Norfolk and Western Railroad, of Virginia. In December of the same year, he received the appointment of City Surveyor of Montreal. He was a member, in 1886, of the Royal Flood Commission of Montreal; associated with him were Messrs. Thos. Keefer, John Kennedy and Henry Perley.

Mr. St. George is a member of the Institution of Civil Engineers, of London, of the Council of the Canadian Society of Civil Engineers, also of the Association of Municipal Engineers of Great Britain. He married in 1872 Flora Stuart, only daughter of the Rev. Canon Townshend, rector of Amherst, Nova Scotia, and has issue six children.

HALIFAX, N. S.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

TRADE DIFFICULTIES.

IN this city each trade has its own association, and nearly all city tradesmen are members of their respective associations. Then here is the Amalgamated Trades and Labor Union. When any member of an association has a greviance to complain of against his employer, or when an employer violates the rules of an association, the case is investigated by the association to which the aggrieved belongs, or whose rules have been violated, and if the investigating committee find that the employer has dealt unjustly with an employee, or contra to the rules of the association, or violated the rules of the association in any way, and refuses to comply or rectify wrongs, the matter is laid before the amalgamated union, and all members are under obligation to quit work on that employer's job until he has made amends, &c. One of the rules of the Painters' Association was that no master painter should have more than three apprentices in his employ. The firm of Thomas Reardon & Co. took on a fourth apprentice, insisted on retaining him, and set him to work on the City Club building, now in course of erection, which resulted in a strike of all workmen on that job. Reardon's entire staff of painters being union men, quit work on his other jobs. Other master painters endeavored to assist Reardon, which caused their union men to strike also. This strike on the City Club building occurred during the last week of August. About a fortnight after, master painter David Roche, who was one of the parties that tried to assist Reardon, and who had the sub-contract for painting the new Catholic Glebe House, now in course of erection, sent an apprentice to prime work on that job, when all hands there struck work. Then followed strikes on several other jobs from similar causes.

Manufacturers and master workmen of the various trades then formed an Association, when committees from this and the Amalgamated Trades and Labor Union met a number of times to try and arrange a settlement. Two difficulties stood in the way of a settlement. First, Reardon positively refused to adhere to the painters' rules regarding the number of apprentices to be employed, and the other master painters sided with him in this respect; secondly, a day or two after the strike on the City Club building, two union painters went back to work with Reardon, thereby making themselves liable to a fine of $5 per day according to the rules of the Painters' Association, and which the painters demanded before agreeing to a settlement with the master workmen's Association. The latter, however, considered it unfair to these men who stuck to their work during the strike to leave them unprotected by their Association. Finally, after many meetings, it was agreed to leave the case of these men to be dealt with by the Painters Association. As to the apprentice question, an agreement was reached by the Manufacturers and the Trades and Labor Council, which provides: That all strikers shall at once resume work, the number of the suspended members of the Painters' Union to be left with the Union to be dealt with; the pay of painters' apprentices to be $2.50 per week the first year, with an increase of $1.50 per week each year, including vacation, but excluding bonuses; every apprentice must be able to read and write the English language, and be not less than 16, nor above 21 years of age; every apprentice must agree to abide by the rules jointly agreed upon by the Associations; master painters must keep apprentices under legitimate instruction and otherwise comply with the conditions of agreement; a record to be kept of all apprentices employed, and the term of their apprenticeship; the joint committee of the two Associations to supervise the employment of apprentices, adjust all appeals preferred either by employers or apprentices, and for cause terminate apprenticeships, or place an apprentice with a new employer; apprentices to be entitled to and to be paid for one week's vacation; a certificate to be furnished the joint committee by the employer when an apprentice has completed his term, and the seal of both Associations shall be attached to such certificate, which shall then be accepted as evidence of the holder's right to rank as a journeyman. The agreement further provides that no strike is to be inaugurated until the points in dispute have been submitted to the Manufacturers' and Master Mechanics' Association and the Trades and Labor Council, and if necessary, referred by them to arbitration. If the latter course is adopted, the decision of the arbitrators is to be final. Should a member of either Association infringe in any way the conditions of this agreement, the Association to which he belongs shall forfeit the sum of $100. Unfortunately, strong opposition has developed in the Trades and Labor Council to the ratification of this agreement assented to by its representatives, while the union painters refuse to go to work until the question regarding the non-union men is settled, consequently a final adjustment of the entire difficulty, which was supposed to have been well-nigh reached, seems to be almost as far distant as ever.

Master Mechanics Association and the Trades and Labor Council, which

If lead and oil paints do not wear as well as of old, as so many claim, they have at least been partially replaced by the Cabot shingle creosote stains, which wear as well, are cheaper, and give a coloring effect far more agreeable and artistic than is obtainable by any of the old methods.

TORONTO ARCHITECTURAL SKETCH CLUB.

At the meeting held on Nov. 9th, Mr. John Millar, of the J. F. Pease Furnace Co., addressed the members on the subject of "Heating." The president of the Club, Mr. Pearson, occupied the chair.

Mr. Millar said: "I appear before you to night to give a talk upon the important subject of heating buildings. My experience has been gained in a practical way, and from this point of view I propose to talk to you this evening; it is possible that views may be advanced that will conflict with your ideas, but a great deal of knowledge is gained by hearing the opinions and experiences of different men engaged in every given line, and I will leave you to form your own conclusions.

"The three great systems of heating are by the use of steam, hot water and warm air." (The speaker here explained the meaning of the terms "direct," "indirect," and "direct-indirect" heating by steam and hot water, and went on to explain further heating by the system known as the "combination.") "This can be done by a combination of steam and warm air, and by hot water and warm air. The advantages of this system over steam and hot water are, that perfect ventilation can be secured at less expense, and perfectly free from any danger of the system freezing up. The pure air from the outside of the building is passed into the heater and out through the registers, warmed, giving forth sufficient pure warm air for ventilating. The balance of the heat required is given by the radiators which may be placed in rooms at a distance from the heater.

Of the different systems, heating by warm air is the cheapest, and in greater demand than any other, but there are many difficulties in the way to secure good results. These to a great extent can be removed by you, and I propose now to deal with some of them and point out to you how they can be obviated.

"It is of great importance that a good location be secured for the heater, and just here you can assist the heating man to advantage; arrange your cellar rooms so that the heater can be centrally located, if necessary giving the rooms to the north and west the advantage."

Here the speaker made a sketch of the ground floor of a building, showing how it could be heated with the very best results, and without taking up very much room in the cellar. In Fig. 1, dotted lines show the furnace and pipes in the cellar. Another sketch was made (Fig. 2) showing how some architects would like to have the work done.

"It would be of great advantage to the furnace men if larger space could be secured to run pipes to large and exposed rooms. This can be done by using 2 x 6 studding in place of the 2 x 4 which is generally used. A little forethought on this particular point will make a heating system a success that would otherwise be a complete failure."

"Ground floor registers should be placed in the floor. They may be placed in the wall provided there is capacity enough in the space between the studding for the size of pipe required, but

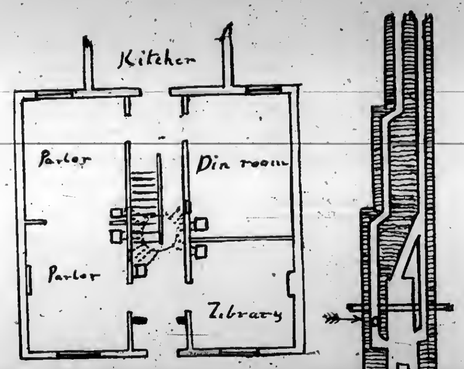


Fig 1

Fig 3

very much better work can be secured from registers placed in the floor."

The attention of the audience was then drawn to the defects to be found in chimneys. Fig. 3 shows a defective flue, when by making the change to the other side of the chimney (Fig. 4) a good flue can be had for the heater, leaving the crooked flue for the fire place. The flue should be straight without openings except that for the smoke pipe, and well and smoothly parged."

The speaker then spoke of the proper position in rooms for warm air registers and steam and hot water radiators.

"Registers should be placed as far away from windows as possible, and on the opposite side from a fire place. This cannot always be done, people do not build houses to suit the heating apparatus, so we have to do the best we can with the house presented for the work.

"Steam and hot water radiators should be placed near or under windows; they radiate heat and warm the air coming in contact with them. Warm air from the furnace is conducted, and if conducted into the room near a window, the warm air is cooled quickly by coming in contact with the cold surface of the glass, and falling to the floor cold, cannot be heated."

As there is no rule to guide in laying out a system of heating by warm air, the speaker's advice was that architects should not

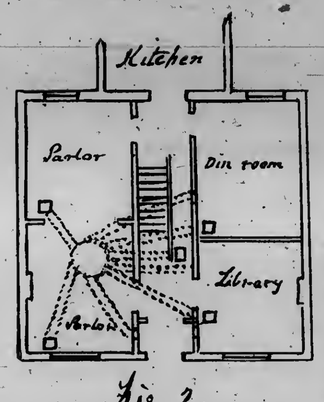


Fig 2

Fig 4

attempt the work, but leave it to the heating expert, especially as a guarantee is always given to heat the building.

In conclusion he thanked the Club for the close attention they had given him, and said he would be pleased to answer any questions, or explain any points that might not have been made as clear to them as he would have wished.

An interesting discussion took place, Messrs. Curry, Gregg, Johnson, and others taking part.

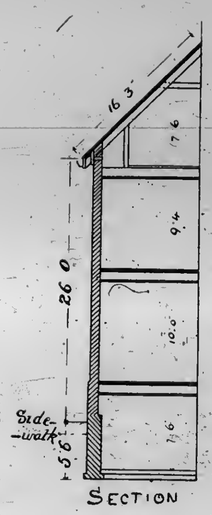
Mr. Curry explained some very interesting points, and referring to the lecturer, said "we have had one of the most instructive lectures given to us in a long time."

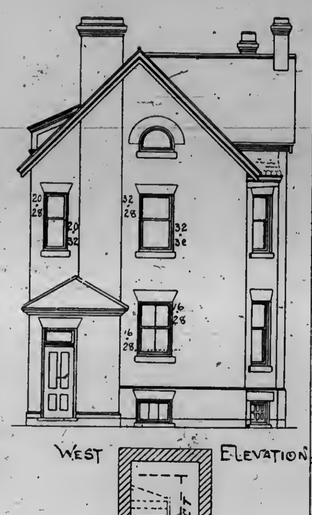
A hearty vote of thanks was passed to Mr. Millar, the chairman expressing the opinion that the speaker had fully covered the subject.

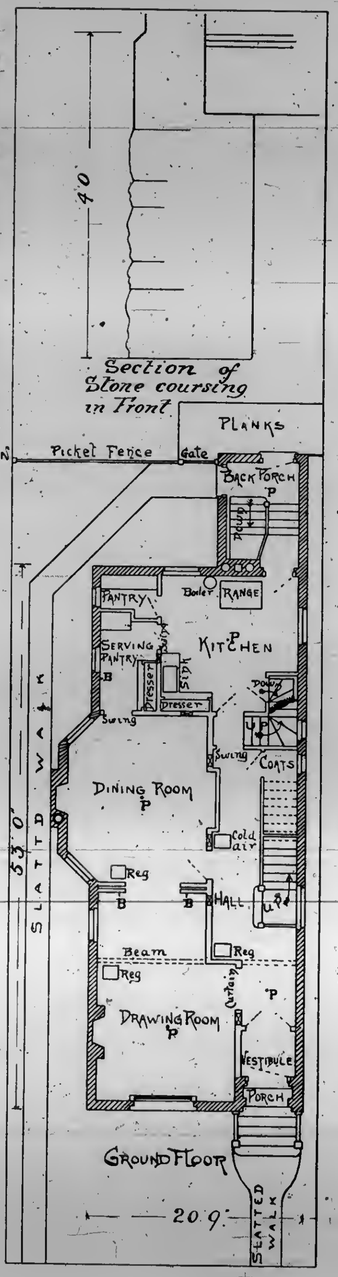
The following is a synopsis of the "Talk" on Classic Architecture" at the Club rooms, Oct. 26th, by Mr. Gambier-Bousfield, A.R.I.B.A. (Mr. Bousfield had prepared some rough crayon sketches of details of proto-classic caps and a map of the countries in which the art flourished before the birth of Christ, and these were exhibited together with prints from various professional journals bearing upon the subject.)

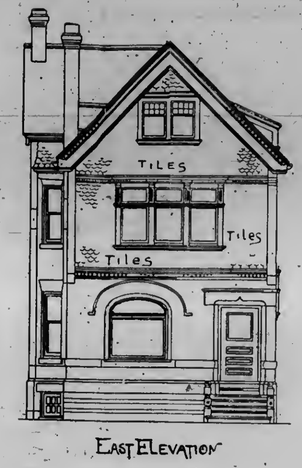
The lecturer called the attention of the chairman to the absence of note books among the students, and urged upon them the necessity of taking notes, as he also advocated very strongly that the students should come prepared to ask questions at the conclusion of the "talk," as discussion was the only way to bring out points that a lecturer might have omitted, especially in an extemporary "talk" like the present. He said he was gratified at being invited to give the opening "talk" of the season, and only regretted that more time had not been allowed him for the preparation of a paper, but he trusted that his audience would exercise patience towards a man unaccustomed to extemporary speaking. He did not intend to treat so much upon the subject of proportion as to show how false was the notion that the Greeks "*invented*" the orders, and to explain how the orders were developed from previous and distant empires. The Greeks were, as a nation, the most conceited people that ever lived; they attempted to show to their posterity that they invented everything they made use of—that they even invented astronomy—even if they did not go so far as to pretend they invented the stars. Certainly they were a wonderful people, possessed of a genius unknown before, but had it not been for the foundation of art laid in other countries hundreds of years before, upon which the Greeks added a superstructure, they could never have attained to such perfection in the art as they did.

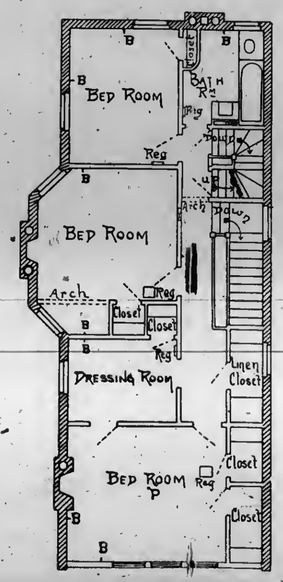
To understand this, it would be necessary to take a glance at the map, which exhibited the boundaries of some eight or ten great empires that preceded the republics of Greece. There was the Egyptian empire, dating from B. C. 4,000 to B. C. 600; the newly discovered, but no less important, empire of the Hittites, covering the whole of Asia Minor and holding away alternately with Egypt over Syria, where history ran concurrently with that of Egypt, or from about 2,300 B. C. to 1,300 B. C. (The lecturer here called attention to the fact that he was purposely making use of round numbers in his dates to simplify the subject.) Then in the centre of that area which had at its four corners the Black

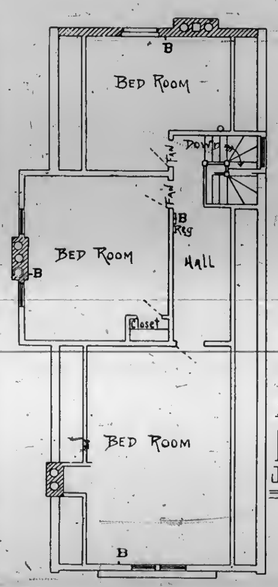


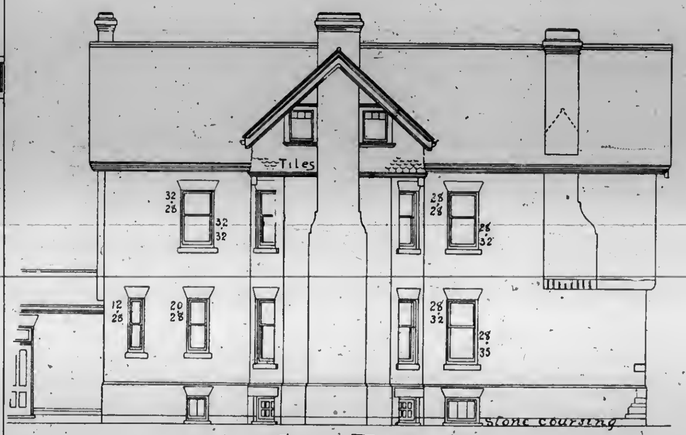


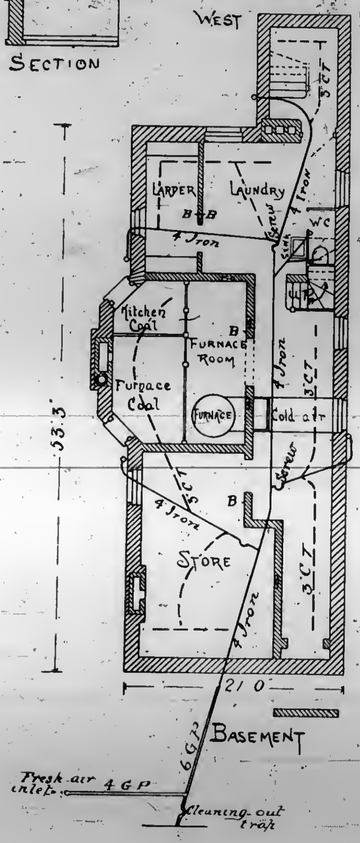






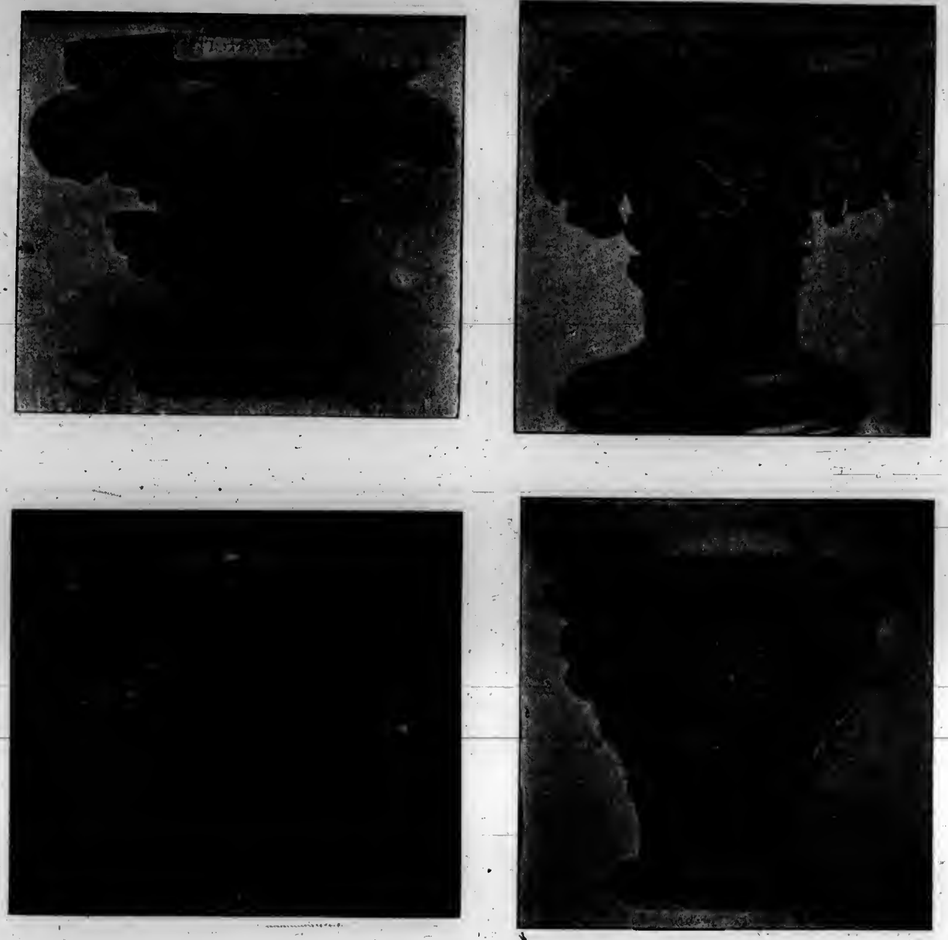






for Bill of Quantities

Scale 0 5 10 20 30 40

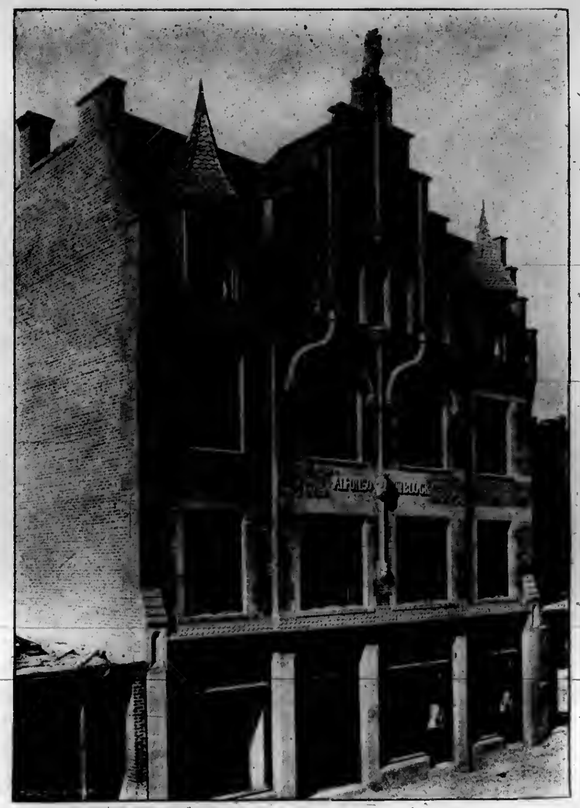


Carved Wood Capitals.

St Alban's Cathedral, Toronto

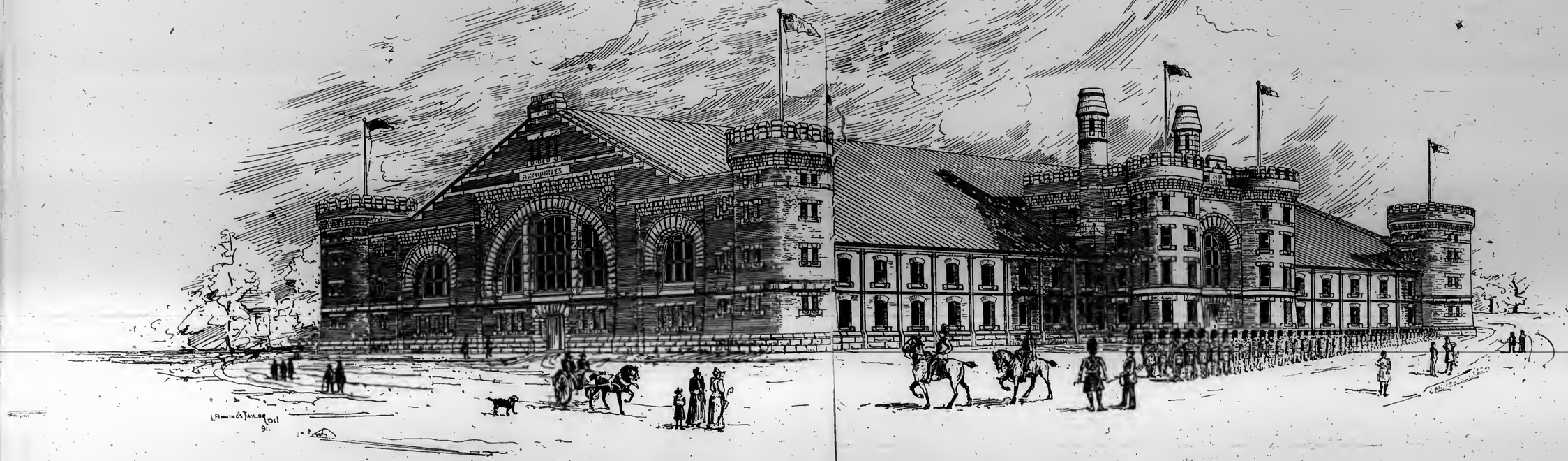
R. C. Windeyer & Sons, Architects.

Executed by Thomas Mowbray.



"Alfonso Block," Victoria Street, Toronto.

Dick & Wickson, Architects.



PROPOSED NEW DRILL HALL, TORONTO, ONT.

Thos. Fuller, Dep't of Public Works, Ottawa, Architect.

CANADIAN ARCHITECT AND BUILDER.

VOL. IV.—No. XII. TORONTO AND MONTREAL, CANADA, DECEMBER, 1891. PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

14 King Street West, - TORONTO, CANADA.

64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1891.

PRESIDENT	W. G. STORM, R.C.A., Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton.
TREASURER	D. B. DICK, Toronto.

COUNCIL.

W. A. EDWARDS	Hamilton.
EDMUND BURKE	Toronto.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
DAVID EWART	Ottawa.

REGISTRAR:

W. A. LANGTON	Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1891.

PRESIDENT	F. X. BERLINQUET, Quebec.
1ST VICE-PRESIDENT	VICTOR ROY, Montreal.
2ND VICE-PRESIDENT	J. NELSO, A.R.C.A,
SECRETARY	C. CLIFT, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL.

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. C. HUTCHISON, R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
ALPH. RAZA	Montreal.
J. F. PEACHY	Quebec.

CLOSE OF VOLUME IV.

THE present number completes the fourth volume of the CANADIAN ARCHITECT AND BUILDER. A comprehensive index to this volume is presented herewith. As a result of continued effort and the generous support which we have received, we are enabled to look back upon a year of progress. Satisfactory increase is shown in the number of subscribers and advertisers, in return for which, we have sought to add to the value of the paper. Nowhere do we find information of equal quantity and value supplied for so small a price. Our policy in the future, as in the past, will be to endeavor to increase the value of the monthly and weekly issues to the fullest degree warranted by the measure of support accorded us. To every reader we extend the wish for a Merry Christmas and Happy New Year, and to those who have assisted in any way to advance the interests of the CANADIAN ARCHITECT AND BUILDER, may 1892 bring added prosperity.

WE regret to learn that our esteemed contemporary, the *American Architect*, has recently suffered considerable loss and inconvenience in consequence of the building in which are its offices having been partially destroyed by fire.

The publication of Mr. Doran's paper on "Building Inspection," read at the last meeting of the architects and students of Montreal, together with several other articles intended to appear in this number, is unavoidably deferred owing to unexpected demands upon our space.

THE sketch which we present of Mr. Chas. Baillairgé, City Engineer, of Quebec, outlines the record of an unusually busy and useful life. Conjoined with a brilliant mind, Mr. Baillairgé is the possessor of a lightsome disposition, and the physical ability to work eighteen hours a day. To this fortunate circumstance is no doubt largely due the extent and value of his accomplishments, and the fact that at the age of sixty-five, a further period of usefulness appears yet to lie before him. That such may be the case, is the wish of his many friends.

THE near approach of the municipal elections is being taken advantage of by the Toronto Trades and Labor Council to urge upon the city Council the passing of a by-law for the inspection of scaffolds. A committee consisting of three members of the Trades and Labor Council, three members of the Builders' Association and the City Commissioner, has been appointed to draft a by-law and report. Such a by-law as the one proposed is not likely to prove satisfactory to anyone except those who may succeed in getting appointments as "inspectors." Builders will have the right to insist that when the by-law comes into operation their liability for accidents on ("inspected") scaffolds shall be transferred to the city.

THE Toronto plumbing by-law makes it compulsory that the drainage in all new buildings shall undergo proper inspection. The ordinance is a wise one, and is, we trust, faithfully administered. There is reason to regret that it was not enacted at a much earlier period in the city's history. The character of much of the work done prior to the existence of the present law, is of the worst description. The outbreak of disease has led in recent instances to an examination of some of these uninspected drains, disclosing the fact that they were laid in the most careless and criminal manner, without the use of an ounce of cement. It is safe to assert that many a life has been sacrificed to this wilful neglect, and as the provisions of the present law are not retroactive, the injury will continue.

A CENSUS was recently taken of the vacant houses in the city of Toronto. The number is shown to be about 4,000. By some this is taken to indicate lack of prosperity. Others do not so regard it. They point to the fact that many of the houses that are vacant are old and dilapidated, and have been deserted by their occupants for those of modern date wherein greater convenience and comfort are afforded. It should also be borne in mind that houses are constantly being erected which, having been ill-designed and planned, appear to everyone except the builder to be undesirable, and consequently are shunned by house-hunters. Making due allowance for such causes as mentioned, we are nevertheless of the opinion that four thousand vacant houses is a greater number than should exist. We believe it to be the fact that increase in population has as yet failed to overtake the abnormal building enterprise following what is known as the "Toronto real estate boom."

THE corner-stone of the county and city buildings at Toronto was laid by the Mayor in the presence of a distinguished company of citizens, on the 21st of November. Unfavorable weather marred to a considerable extent the proceedings. The occasion called forth reference to the progress made by the city of Toronto and the Dominion since a similar ceremony was performed in 1844 in connection with the erection of the present city hall. Seven years have elapsed since the first steps were taken to obtain a suitable site on which to erect the new buildings. A great deal of time was spent by the city and county authorities in arriving at a satisfactory understanding on all points. The work was further delayed pending the vote of extra money by the citizens. Subsequently there arose the dispute over the payment of a clerk of works, and this was followed again by the death of one of the contractors. The massive foundations are now in however, and it is hoped that nothing will interfere with the completion of the building in the shortest period consistent with thorough workmanship.

A SETTLEMENT of the differences between the carpenters and joiners and master builders of London, England, by reason of which building operations in that city have been paralyzed for six months past, has at last been reached. Mr. J. Macvicar Anderson, President of the Royal Institute of British Architects, who was asked to adjudicate upon the case, and by whose award both parties to the dispute consented to abide, has announced his decision. Some of the minor demands of the workmen, touching the hour at which work should begin, etc., are found to be sustained by the evidence. The demand for increased pay, however, is found not to be sustained, the conditions, such as the decrease in the trade of the country, pointing to the curtailment rather than the expansion of wages. The arbitrator calls attention to some results of this strike which we have not before observed, but which are worthy of the serious consideration of carpenters and joiners, as being in some degree likely to succeed a strike in any part of the world. On this point the arbitrator says: "The recent strike has been the means of inflicting injury on the trade of the carpenters and joiners of London, from which, in my judgment, it will not recover, for a large amount of carpenters' work has been superseded by other methods of construction which are likely to be increasingly adopted in future."

THE scheme for bringing water for Toronto use from Lake Simcoe will probably die the death of its aldermanic sponsors, and will be interred with their bones on the ides of January next. Apart from the fact that the quality of the water is much inferior to that at our doors—simply to be had for the pumping—the cost of the enterprise would considerably outweigh its possible advantages. It is stated that the revenue for power supplied to manufacturers would be enormous. We have shown in a previous issue that the idea is fallacious. If the power is to be distributed hydrostatically to the different factories, new mains of immense size would have to be laid all over the city—if electrically, the loss in transmission, cost of maintenance of apparatus, and the *smallness of the available power* would put revenue out of the question. Especially would this be the case were the whole arrangement under municipal control. Then it is stated it would do away with the necessity for a trunk sewer, probably by using the present suction pipe as an outlet. Even if it were large enough it must be remembered that it could only be reached by means of a trunk sewer intercepting all the others. The power to be developed by the city water supply from Lake Simcoe, which would have to be developed miles outside the city in any event, is purely a figment of the imagination, and it is well that the citizens should have this fact impressed upon them before they determine to spend fifteen or twenty million dollars to get bad water.

THE Canadian Society of Civil Engineers has issued its ballot list for officers for 1892. Mr. John Kennedy, chief engineer, Harbor Commissioners, Montreal, has been nominated for president, and an opposition ballot has been issued in favor of Mr. E. P. Hannaford, chief engineer of the Grand Trunk Railway. It appears from the regulations of the society that a Nominating Committee is specially struck at each annual meeting to prepare this ballot. This committee is elected by the whole society. In its composition it is made as representative as possible. The duty of the society is to acknowledge its wisdom in selecting this committee and accept the nomination made by them. The rules empower any five members to present a list of names to the council, who shall issue them for ballot. This gives an opportunity for certain distficts or branches, such as mining, electricity or hydraulics, to be represented, but after the decision of the Nominating Committee has been announced, an opposition ballot should be issued only for very special reasons, none of which appear to exist in the present case. We look upon the nomination of Mr. Hannaford as a compliment to him from some of his numerous personal friends; the wisdom of it is doubtful. He has been placed in opposition to the carefully considered selection of the specially appointed Nominating Committee, with whose duties and powers he is fully conversant. As a former vice-president and member of the council, Mr. Hannaford has rendered good service to the society. He has shown many tokens of his deep interest in its welfare. He has now an opportunity of serving it still more, and he can by a very simple act lay the society under a perpetual obligation, and create for himself an even greater and higher *prestige* than that which he so honorably occupies.

AT intervals during the last three years the necessity of providing means of imparting technical instruction to artisans has occupied the attention of the City Council of Toronto. On each occasion the question, after having been to some extent considered, was on various pretexts "referred back." So frequently did it meet this fate, that its friends were almost ready to despair. It is therefore doubly gratifying to the friends of the movement to observe that definite action has at last been taken. An appropriation of $6,000 for the purpose of founding a technical school has been voted in Council, and a Board of Management appointed, comprising representatives of the City Council, the Architectural Guild, the Trades and Labor Council, the Association of Stationary Engineers and the Manufacturing interest. The Toronto Architectural Guild will be represented on the board by Messrs. S. G. Curry and Mr. E. Burke. It has wisely been decided to establish at present but one school, to be located in the centre of the city. The course of instruction has not yet been outlined. The selection of subjects to be taught is a matter requiring the most careful consideration, and will, we trust, be approached with due deliberation and a proper knowledge of the requirements of the various classes of students. In view of the decadence of the apprenticeship system, it is from technical schools the coming generation must receive instruction of an elementary character pertaining to the various trades, a fact which should give additional interest to the present movement. Gratifying success has attended the classes for technical instruction conducted for several years past in the city of Montreal under the direction of the Council of Arts and Manufactures of the Province of Quebec, and if equal interest is manifested, the success of the Toronto school will be assured.

Messrs. J. M. Williams & Co., of Hamilton, Ont., have leased the stove foundry of Mr. Mowat, at Dundas, Ont., and are starting it up with a force of fifty hands, for the manufacture of stoves, furnaces, etc.

The Richmond Slate Manufacturing Co., have purchased a slate quarry in the county of Brome, near Sutton Junction, Que. It has been reported on as being very valuable, and so situated as to be capable of being very easily worked.

COMPETITION FOR CHURCH DESIGNS.

THE Presbyterian Church in Canada has determined upon making an effort to improve the architecture of its churches, and with that object proposes to issue a pamphlet containing approved designs with letterpress explaining the same and essays on church architecture.

It is proposed to have a competition of designs for churches as per the list of requirements given herein, and to illustrate those designs which may be deemed of sufficient merit by the experts. It is hoped that there will be such a hearty response on the part of the architects that the committee will be enabled to publish designs suitable to the needs of all congregations. It is to be distinctly understond, however, that only such designs will be illustrated as may be deemed by the experts to possess architectural merit worthy of illustration. In case there should not be a sufficient number of good designs sent in to permit of the publication of the pamphlet, the same will not be issued. The plan and perspective, with possibly one elevation, will be illustrated, as it is not desirable to give sufficient drawings to allow of the design being made use of except through the author. This pamphlet will be placed in the hands of representatives of every Presbyterian congregation in Canada, and it is hoped that any congregation proposing to build will select from amongst the designs the one which most nearly fills their requirements, and instruct the author to prepare drawings for the erection of the proposed church at the regular commission.

The publication of the pamphlet will at least bring before the notice of congregations proposing to build the names of architects who are competent to design churches of some architectural merit, which should benefit those who have been successful in having their designs illustrated.

The following prizes, namely, $75, $50, and $25, will be given to the three best designs in order of merit, irrespective of the class under which they have been sent in. No money prize will be given to any design which is not of sufficient merit to allow of its being published, even though the same should be the best submitted in the competition.

Any architect who would like to send in designs for illustration and who does not care to enter the competition for the prizes, may send in designs, and the same will be published provided they are of sufficient merit in the judgment of the experts.

The experts, three in number, who will decide as to the merits of the designs which may be entitled to the prizes and the designs which may be of sufficient merit to be published, will be selected by the Council of the Ontario Association of Architects. The decision of the experts will be final on all points.

The excellence of a design will consist in the closeness with which the conditions have been fulfilled, the quality of the designs and the inexpensiveness of erecting the building. No limit has been made as to the cost in any class, as it is desirable that the designer should not be hampered except in so far that he must bear in mind that a good design which is inexpensive is of greater value than an equally good or even better design which will cost more money to erect.

The three designs which may be awarded the prizes will be chosen from among those standing first and second in the different classes. The experts will be instructed to favour the designs for small and inexpensive buildings in preference to those for large and costly ones.

The following drawings will be required: General floor plan, two elevations and one perspective. Other drawings may be sent in at the option of the designer. The drawings are to be in black and white to a scale of 8 feet to the inch. The plans and elevations are to be in line only, with the windows blacked in or not as may be preferred by the designer. The perspective should be a thoroughly good drawing, and may be rendered as thought proper by the author (but not in colour). The perspective is to be set up from a plan drawn four feet to an inch. Bad or inferior drawings will not be illustrated, no matter how good the design may be, but an opportunity will be afforded the author to prepare, or have prepared, suitable drawings.

Each competitor is requested to send in a short description of his design, and to state clearly the material which he would use in its erection, together with a statement of its cost. The experts will have a right to correct the estimate of cost placed on any design as may appear to them just. The above statement is to be printed in the pamphlet along with the selected design, together with the name of the author and his business address.

The following is a list of the classes of building which are required to meet the wants of the average congregations in each of the classes in which it has been thought well to divide church buildings:

1st. Country church to seat from 150 to 200 persons, with one room to be used as vestry and library. Church to be heated by stoves.

2nd. Village church, capacity 250 to 300 persons, with one room to be used as vestry and library. Church to be heated with stoves.

3rd. Large village church, seating 350 to 400 persons, with vestry and library. To be furnace heated.

4th. Small town church, seating 350 to 400 persons, with vestry, library and school room.

5th. Large town church, with seating capacity of from 500 to 600, with vestry, library, school room and kitchen.

6th. City church, seating from 600 to 1,000, with vestry, library, school rooms and kitchen.

7th. Large city church, seating from 1,000 to 1,300, with vestry, library, school rooms and kitchen.

In the last four classes the designer will himself settle the method of heating and arrange for same.

Competitors will please send in their drawings before the first day of April, 1892, to Mr. W. A. Langton, Registrar of the Ontario Association of Architects, Merchants' Bank Building, Toronto.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION.

THE report of the expert appointed to judge the designs submitted in this competition is as follows:

OTTAWA, 18th Nov., 1891.

SIR,—I duly received the thirteen sets of plans which had been submitted in response to your invitation to students for competitive designs for a suburban cottage to be occupied by a young doing man business daily in the city, owning the lot, possessing $2,000 in cash and having an income of $1,500 per annum. This condition hardly seems to give a definite idea as to the outlay to be incurred, and does not appear to have been understood by many of the competitors. After examination of the various designs the following have been selected:

"Piapot" is given first place. The arrangement of the rooms in this plan are very good, but the entrance and vestibule are too small. The elevation is simple in design and well drawn. Altogether, both in plan and design, it appears to be the most appropriate for a suburban cottage. No perspective sketch.

"Kata Phusip" is given the second place. The staircases in this design are not so well arranged as those of "Piapot." The design is simple and appropriate, and the perspective is freely sketched.

"Jack Plane" is given the third place. The arrangement of this plan hardly entitles it to this place. The relative position of the dining-room and kitchen is objectionable, and there is no provision for servants stairs. The elevation is plain, and the perspective well drawn.

"Kata Phusin" is given first place for his perspective.

There is not much evidence of skill in the other designs, and they differ so little in degree that it is not worth while to attempt to grade them.

It occurred to me that in such a competition amongst "students," some consideration should have been given to the length of time the students have served in an architect's office, and also that a certificate should have accompanied each design, that all the drawings had been made by the competitor without outside assistance. There having been no condition to this effect, and as I had no information on the subject, only the relative merits of the designs have been taken into consideration.

The thirteen sets of plans have been returned to you this day by Dominion Express Co. I remain, sir,

Your obedient servant,

THOS. FULLER.

The names of the successful competitors are:—"Piapot," Mr. A. E. Wells, office of Mr. S. H. Townsend, Toronto; "Kata Phusin," Mr. W. Lawrence Munro, office of Mr. G. M. Miller, Toronto; "Jack Plane," Mr. J. W. Siddall, office of Messrs. Knox & Elliott, Toronto.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Real estate for building purposes is reported to be in increasing demand in the upper western portion of the city.

The course of instruction in freehand, mechanical and architectural drawing, stair building, building construction, plumbing, wood carving, etc., under the direction of the Council of Arts and Manufactures of the Province of Quebec, is now open.

It is a pleasure to be able to state that the members of the Province of Quebec Association of Architects in Montreal have entered in earnest upon their work. Regular monthly meetings have been established, at which papers of interest to the profession are read and discussed. Since the publication of your last number, classes for the instruction of students have been formed. A large class under the direction of Mr. Hutchison meets every Thursday afternoon from five to six o'clock for the study of Roman architecture. Mr. A. F. Dunlop and Mr. Maxwell will conduct a pen and ink drawing class, and arrangements are now in progress for the organization of a modelling class.

At the regular meeting of architects and students held on Thursday evening last, there was a large attendance of students. Mr. Doran read a paper on "Building Inspection," which has been forwarded to the CANADIAN ARCHITECT AND BUILDER for publication. In his introductory remarks he stated that a committee had been appointed to deal with this subject, and pending the report of that committee, he would not refer to the present system of inspection, but would point out what he considered to be the requirements of a proper building inspection by-law. The discussion on the paper was taken part in by Messrs. Walbank, Hodson and Hutchison. A hearty vote of thanks was tendered to Mr. Doran for his valuable paper.

Mr. Andrew T. Taylor, the well known architect, of this city, was married on the 5th inst. at Holy Trinity Church, London, Eng., to Mary, second daughter of Assistant Army General J. Elliott, H. M. Ordinance Department. The best wishes of numerous friends will greet Mr. Taylor and his bride on their arrival home.

Mr. A. F. Dunlop left for Toronto and New York on Thursday last.

I regret to learn that the condition of health to which Mr. Clift, Secretary of the Province of Quebec Association of Architects, has been reduced by his recent illness, has made it necessary that he should indulge in a period of complete rest. Acting on the advice of his physician, he will leave shortly for Florida. It is earnestly hoped that the change may prove beneficial.

HOW TO ESTIMATE.*

By Wm. H. Hodgson, Architect.

II.

CARPENTER AND JOINER WORK.

	$	c.
7,000 ft. of hemlock timber (board measure) in joists, rafters, plates, lintels, etc., and labor in same		
21¼ squares (100 ft.) of ⅞ in. G & T flooring, 3½ in. wide, ground and 2nd floor		
12¾ squares of 1 in. matched flooring, 5 in. wide, attic and part cellar		
23 squares of ⅞ in. matched roof boarding, 7 in. wide		
21¼ squares of 1 in. rough boards, laid diagonally and carpet felt (between flooring)		
5 squares of 4 in. x 4 in. studding at gables, sheeting both sides, and on one side double thickness of sheeting paper		
33¼ squares of 4 in. x 3 in. stud partition		
25 squares of 2 in. x 1¼ in. furring, on walls		
1 square of floor pugging at gables, projections		
¼ square (75 ft.) of 2 in. planking on 4 in. x 4 in. cedars		
130 running ft. of 3 in. x 4 in. cedar joists bedded in concrete		
25 squares of beam and corbels dressed and moulded		
34 running ft. of denril, mould, cornice, etc., firm and secure		
98 running ft. of dressed headed facia, soffits and bed moulds to eaves		
60 rupning ft. of gable eaves, and bed moulds		
76 running ft. of narrow double beaded soffits, matched stuff and sheathing paper, tight to walls		
34 running ft. of matched beaded boards, and 25 dressed rafters		
69 running ft. of ⅞ in. matched sheeting 4 in. wide, 3 ft. high, and mould capping, grounds, etc.		
30 running ft. of ⅞ in. matched sheeting, 2½ in. wide, 5 ft. high, double beaded, capping grounds, etc.		
183 running ft. of 10 in. single base, with grounds scribed to floors and with fillets		
274 running ft. of 9 in. single base, with grounds scribed to floors, and with fillets		
220 running ft. of 7 in. torus base		
170 running ft. of angle bead		
92 running ft. of 3 in. ridge rolls		
100 running ft. of shelving and supports		
50 running ft. of 2½ in. picture mould—dining room		
30 running ft. of bead rail, and 40 hooks		
100 running ft. of 2 in. x 2½ in. dressed, slatted walk, on 4 in. x 3 in. cedars, and 24 ft. round curb, at front		
18 running ft. picket fence, 6 ft. high, to match gate		
2 hardwood sills to fuel doors, 3 x 15 x 16, weathered		
4 hearth's, boxing and trimming for same		
3 rows of 2 in. x 2½ in. herring bone bridging, 162 feet in all		
38 2 in. basement stair steps—stairs to attic and from porch to cellar		
15 1¼ in. stair steps, mould nosoing, and 1 landing, cherry rails, newels, brackets, etc., 2 in. turned pine balusters, etc., complete, and mould stand rail to closet b heath		
7 front steps, turned newels, and balustrade complete		
2 rear steps to porch		
1 2⅜ in. front outside door, oak veneer, complete with architraves, etc.; lock, $3.00, upper panel for glass		
1 2⅛ in. vestibule door in 2 pirts, mortice lock $2.50, complete as above, and brass bolts, and upper panels for glass		
2 2 in. porch doors, mortice $1.30 to ofie, and $2.00 to side brass bolts, fanlights, complete, as above		
13 1¾ in. ground and second story doors, mortice lock $1.35, brass bolts complete as above		
3 1¾ in. swing doors, complete as above, brass bolts and one doorway for jambs, etc., prepared to receive door		
4 1¾ in. 3rd story doors, complete as above, morticed $1.. 2 of them with fanlights		
1 2¼ in. sliding door, over head tracks, patent hangers, sliding door lock and flush handles complete, as above		
4 1⅛ in. head and flush doors, complete frames, etc., rim locks		
2 fuel doors, panelled, etc., complete, hung on top		
1 side dormer window		
7 (windows) for mould casings outside		
1 borrowed light, etc., complete		
5 cellar windows, complete, hung on top		
1 2 in. large front sash, mould transom, elliptic fitnlight for plate glass complete, architraves, etc., and with Willer slide blinds, in pocket behind window back		
21 2 in. English sashes, 3 of them for plate glass, and 3 with transoms, fanlights and Willer sliding blinds, as above		
5 semi-circular head sashes, complete		
30 centres for 30 arches		
3 chimney saddles		
2 cold air inlet and stout wire guard, hinged valve, etc., firm and secure		
1 bath fitting up complete, cherry sheeting and cistern, 30 in. x 18 in. x 14 in.		
2 water closets complete and 1 wash basin; cherry ends and seats, double lid for slop sink		
2 sinks fitting up complete, and hardwood capping		
2 dressers in kitchen and pantry, doors, drawers, shelving, etc., complete		
6 tiers of 1 in. shelving supports to kitchen and pantry		
2 tiers of 1⅛ in. shelving, each end of larder		
1 hanging shelf in larder and iron rods from ceiling		
6 shelves in linen closet, ends enclosed with cedar joists and spring catches		
1 side gate, rounded posts, footed and capped and hardware complete		
2 fuel bins—1 large for furnace coal and smaller in kitchen		
Fit up 4 bed room closets with rails and 24 hat and coat hooks; and shelves, etc., complete		
Bracketting for 3 plaster arches, and cove in drawing room		
Dressing ends of 76 projecting rafters to main roof		
Trimming registers and cutting for hot air pipes, etc., attendance on plumber cutting holes, boxing pipes, etc., etc.		

NOTE.—Beginning with bearing timbers, (undressed) the measure, thus: joist 30 ft. x 10 in. x 3 in. = equal to 6 ft. 3 in. cube—to bring into board measure; multiply by 12 (for a foot square) gives the board measure 75 feet. Flooring, roof boarding, studding, furring, &c., measured length and breadth, thus: 25 ft. x 16 ft. gives=400 ft., equal to 4 squares of 10 ft. x 10 ft. Lineal measure or running feet applies to cornices and dressed work generally, the sizes stated either in quantities or specification. Items in numbers, such as doors, windows, &c., as above.

SLATER.

	$	c.
24½ squares (100 ft.) of Rockland slating on 1 ply tarred felt		
5 squares of Dancy's Ontario tiles on 1 ply tarred felt		
32 lineal feet of galvanized iron valley linings, 15 in. to 18 in. wide		
98 lineal feet of galvanized iron strips, 5 in. wide at eaves to gutter		
12 lineal feet of galvanized iron strips 15 in. wide on cornice (3 front windows), 6 in. up behind tiling		
92 lineal feet of galvanized iron strips, 28 ounce, ridges		
Step and cloak flush to (5) chimneys and walls, cheeks and apron of dormer		

NOTE.—Measured, and contents given in squares, before mentioned, lineal measure, also, and the sizes as above.

TINSMITH.

	$	c.
98 lineal feet of galvanized iron, 28 gauge, eaves troughs 5 in. wide and holdfasts		
34 lineal ft. of 4 in. galvanized iron, 28 guage, to porch		
75 lineal ft. of 4 in. octagon down pipes to porch, 3 connections to gutter and drain pipes		
16 lineal ft. of 3 in. octagon down pipes to porch		

NOTE.—The measurements for this work as given above, lineal.

PLUMBING AND GASFITTING.

	$	c.
95 lineal ft. 1¼ in. iron gas piping, hold fast, &c., leaded joints		
118 " 1 " " " " " "		
90 " ¾ " " " " " "		
147 " ½ " " " " " "		
32 " ¼ " " to fire places, with cocks and keys		
30 lineal feet of ½ in. iron gas piping to gas stove in kitchen		
90 " " ⅝ in. lead supply water main pipe, 8 lbs. to the yard		
100 lineal feet of ½ in. lead supply pipe, branches, 6 lbs. to the yd.		
105 " " ⅝ " " hot water, 8 lbs. to the yard		
22 lineal ft. of ½ in. lead waste and overflow pipe, plated rim to bath		
10 lineal ft. of ½ in. lead pipe (heavy) and Dubois trap and screw		
28 lineal ft. of ¾ in. lead waste, 3 lbs. lead safes and brass flap valves		
37 lineal ft. of 4 in. cast iron soil pipe, tarred, and holes, screws, &c., complete		
4 lineal ft. of cast iron soil pipe, 6 in., above roof and flashing		
110 lineal ft. of 4 in. cast iron soil pipe at basement, digging, levelling, &c.		
12 lineal ft. of 2 in. cast iron soil pipe waste, with iron hangers		
35 lineal ft. of 3 in. cast iron vent pipe, with vent connections		
10 lineal feet of 4 in. cast iron pipe with return bend top		
20 lineal feet of 3 in. galvanized iron vent pipe		
12 lineal ft. tin speaking tube, silver plated mouth piece		
1 14 oz. copper bath, Dubois trap, plated plug and chain complete		
1 marble earthenware oval wash basin, counter sunk, marble top, back and end; Mott's, standing waste, Dubois trap and screw brass clamps		
1 porcelain flushing rim washout water closet (Inodore or Unitas) valve, balls and ball cocks, &c., complete, cistern lined with 4½ lbs. lead, &c., with porcelain drip tray, complete		
1 flushing rim water closet in basement, trap, cistern, etc.		
2 plated double Fuller bath and basin cocks		
1 key cock and hose connections		
1 soap and waste cock, boxed in		
1 7 in. dia. enamelled valve at bath room, ceiling		
1 9 in. x 12 in. dia. enamelled valve at kitchen, ceiling		
1 1¼ in. counter sunk marble safe, under water closet, &c., complete		
1 pair brass Fuller cocks		
1 galvanized iron cylinder, 40 gals. and stand, ¼ brass connections, shut off cocks, inch iron pipe to stove, ½ supply cock and ¼ sediment, pipe and cock		
2 cast iron sinks, trapped, &c., complete		
4 vents to waste pipes, and Y branches, 1½ and 2 in.		
2 vents to waste pipes and to water closet, 3 in.		
1 30 in. galvanized iron sink, brackets and enamelled backs, &c., complete		

NOTE.—In these works there are many and various items, as will be noted in the above, comprising lineal measure and numbers.

PLASTERING.

	$	c.
1041 1-9 superficial yards of 2 coat work, hard white finish		
404 2-9 superficial yards of 1 coat work on walls		
233⅔ superficial yards of 2 coat work, lime washing		
11 1-9 superficial yards of 1½ in. thick mortar, attic floors		
70 lineal feet of cove, drawing room, ceilings and walls		
66 lineal ft. of 24 in. cornice, dining room		
73 lineal ft. of 20 in. cornice, halls		
24 lineal ft. of 15 in. cornice, vestibule		
26 lineal ft. of mould beams		
2 30 in. centre pieces		
1 18 in. centre piece		
30 window and door frames for filling, air tight		

NOTE.—Superficial measure is given, that is, the walls and ceilings are measured through, openings are measured and deducted from same, showing the net number of superficial yards done. Cornices and other moulds in plaster are lineal measure, the girths of same added for mitreing internal and external angles. Centres are numbered, giving diameters.

PAINTER AND GLAZIER.

	$	c.
440 superficial yards of 3 coats painting		
287 superficial yards of staining, oiling, and 2 coats copal varnish		
34 superficial yards of oiling, and 2 coats copal varnish		
216 superficial ft. double diamond star glass		
33 superficial ft. diamond star glass		
15 superficial ft. ground glass		
40 superficial ft. stained glass, glazing only		
15 superficial ft. rolled cathedral glass		
7 superficial ft. rough rolled plate		
1 pane plate glass, 5 ft. 4 in. x 3 ft. 8 in.		
3 panes plate glass, 3 ft. 4 in. x 2 ft. 7 in.		
1 pane bevelled glass, 2 ft. 3 in. x 2 ft. 3 in.		
4 pairs blinds, &c., 3 cts. and priming		
Cleaning windows, and scrub floors twice, &c., complete		

NOTE.—Painting measured and given, superficial yards in quantities as shown. Glazing, measure superficial feet, and in plate glass at per pane, with size stated.

*The first of this series of articles, together with the plans and specification on which the bills of quantities are based, appeared in the CANADIAN ARCHITECT AND BUILDER for November, 1891. Back numbers will be supplied.

CLIMATIC INFLUENCES UPON ARCHITECTURE.

By G. F. Stalker.

The elements with which an architect is bound to concern himself in the preparation of his designs, and in the course of his practice, are so varied and so numerous that it is almost impossible to catalogue them. It is a still more difficult matter to assign to each its proper position of importance; for what would exercise a dominating influence in one country, and under a certain line of circumstances, would be of little account in another country and under changed conditions.

This may be said to be a kind of truism and so apparent as to render it almost unnecessary to be set down here. Still the fact remains, that buildings have been, and are being erected, by architects of good ability, which are disappointing and unsatisfactory. Artistically, and on paper, the designs may be most creditable to their authors; but practically, and *in situ*, they are failures. The cause of this may be the fact that this truism, like all other truisms, and just because it is a truism, is very much overlooked or neglected. And there is probably no element affecting architectural design so frequently and so easily left out of consideration as that of climate. One would think that this cannot certainly apply to Canada, for everyone knows that here we have plenty of climate. But when we are engaged upon our designs we are generally comfortably officed, and we become so engrossed in working out the architectural lineaments of some pet style or theme, that we forget that just outside the window the thermometer registers zero, the snow is deep in the streets, and the wind is keen.

The artistic treatment and scientific construction of a building are the chief characteristics which distinguish an architect from a builder. But common sense does not belong exclusively to any class of men, neither is it the outcome of any kind of technical education; and architects, like other men of professional culture, are sometimes distinguished for their want of it. And so it happens that artistic skill is often misapplied, and constructive ability absolutely wasted for very lack of common sense. We admire the beautiful conceptions of men of genius, and are sometimes tempted to imitate them, without giving a thought to the suitableness of local surroundings and circumstances. Fashion is an absolutely despotic mistress over all who swear allegiance to her. And there is such a thing as fashion in art. And just as we see the votaries of fashion in dress attired in Canada in a style which is only suitable for Paris or London, so we find the followers of fashion in art designing their buildings as if locality and climate were in these days reduced, by some artificial means, to a universal dead level. But nature will assert herself in spite of us, and if we wilfully and persistently blind ourselves to the fact that dress was originally, and is still, primarily intended as a covering for our nakedness, and a protection against the scorching sun of summer and the biting frost of winter, and that buildings were, and are still, primarily erected as shelters for man, we must expect to pay dearly for our temerity in so doing.

The problem, in this respect, set before architects in Canada is, it must be confessed, more difficult in solution than in countries where the difference of the temperature in summer is not evidenced by such a tremendous dip of the mercury in winter as we are accustomed to. We do not make our own weather, but the climate of this country, like that of all other countries, is practically a settled thing, and, in a general way at least, pretty well understood. It cannot be said to be capricious, neither is it uncertain, and, on the whole, it is not very variable; one year resembles very closely those that have gone before it. But we can say this of it, that it is very decided. We have a very short spring and a very short autumn; but when summer is here, we might as well be living in the tropics, and when winter is with us we are practically absolutely ice-bound. Business men, engaged in whatever industry of our country you like to name, are forced to take our climate into their reckoning. They would be considered almost culpably careless and negligent of their duty if they did not. Even building operations must be suspended during the winter; and this, of itself, should be a sufficient reminder to architects that our climate is a very important and potent factor in true Canadian architecture.

It may be urged in this connection that we can accomplish all that is necessary to bring the natural elements into subjection by artificial means. We can defy the frosts of winter by our furnaces, stoves and winter sashes, and we can modify, to a bearable extent, the heat of summer by a judicious adjustment of summer blinds. And for such mercies, even coming "in such questionable shape," let us be thankful. But it is not wise to rest and be thankful with such a condition of things. The effects of climate have had a very direct influence upon the minds of all the great architects of the world; so much so, that wherever a true style of architecture has grown into existence, we can, from the buildings which still remain as examples of it, almost infallibly tell what were the climatic conditions of the country and the time to which they belong. A thorough student of architecture is as little likely to go astray on this point, after a careful examination of a building, as he would be in regard to the date of its erection. And when we consider how carefully and systematically buildings were designed and erected in ancient times (for nothing was done in a hurry then) this is not to be wondered at. What was more natural than that the architects in those days, being allowed time to think, and to think of everything, should give some consideration to the climate of their country in the preparation of their designs? And to what other cause can we ascribe, for example, the difference in the forms, and particularly the slopes of the roofs, that have always been, and are still considered characteristic features of the several styles of atchitecture? There is nothing in the internal arrangements and formation of an Egyptian building that of necessity demands that it should be covered with a flat roof, neither is it necessary from structural or æsthetical reasons that a Gothic building should be finished externally with a pitched roof. But Egypt is a country of almost perpetual summer, and its climate is dry, while western and north-western Europe are damp and rainy.

If one reflects for a little on some of the more striking points which distinguish one style from another, and endeavors to find a reason for such marked and distinctive features as exist, one is forced to admit that climate has had a very powerful influence in the production of such a variety of architectural expression. True, it has not been the Alpha and the Omega of design, but it has existed from the beginning and will continue to the end, asserting its prerogative and refusing to be left out of consideration in any style of architecture that pretends to be true and national. The size and number and the positions of openings, the aspect of buildings, the sites on which they were erected and the general disposition of their parts, were not matters which were allowed to arrange themselves at hap-hazard, nor be chosen or decided upon carelessly. They were the outcome of the imagination, the result of foresight engendered by long experience, and the thoughtful and vigorous application of keen intellectual acumen, regulated to a very large extent by a wholesome utilitarianism and a recognition of surrounding natural exigencies. But if we continue our reflections a little further, and call to mind the general features of the buildings which have been erected in recent years, and in Canada in particular, we cannot fail to be struck with the want of consideration that has been shown to Dame Climate. We certainly have not a Canadian style of architecture, though considering our age as a nation this is a pardonable offence, if offence it be. But we have not even given a Canadian expression to any style that we have followed. Norman Shaw, in England, revived Queen Anne, but he clothed his work with such freshness and originality of treatment, that one can scarcely recognize in his buildings that they are only a revival of a defunct style. And so with Richardson, of Boston. He revived and modernized the style of Normandy and the north of France, but he treated it in such a manner, and made it so suitable to the local surroundings he had to deal with, that his work only bears a family likeness to its original. So also with Thomson, of Glasgow, who designed in as pure Greek as if he lived in the days of Phidias, but who had mental vigor enough to make the style of his adoption his servant, and to look as much at home among the rugged hills of cloudy Scotland as in the plains of sunny Greece; and these men, being men of genius, have each had their crowd of imitators who have, in their turn shown us how much and how little they have imbibed the spirit which animated their great masters. Norman Shaw revived in England a style that had been practised there more than two hundred years ago, and had been found suitable to the country. Richardson revived, in the northern states of America, a style which existed nearly a thousand years ago in a country subject to climatic conditions similar to his own, while Thomson's revival was only in the spirit of pure Greek architecture, the local and climatic conditions of Scotland being entirely dissimilar from those of Greece. In each case, however, the revivals were successful, and depended for their success not only on the great artistic ability and natural genius of these men, but on the manner in which they grasped and gave expression to local surroundings and modern requirements. And it is in this latter quality that the greatest distinction between Shaw, Richardson and Thomson, and their host of disciples lies.

It has already been said that there is such a thing as fashion in art; and it may be safely affirmed that the three most fashionable styles of architecture at the present time are Queen Anne, Norman and Neo-Grec, and Norman Shaw, Richardson and Thomson are respectively the prophets of these schools. Some might be disposed to call them the modern leaders of fashion in architecture, but this would be derogatory to their great names, for they are in no way responsible for the "run" which their distinctive revivals have had. On the contrary, being men who could appreciate true art in any style, they would have preferred to see men of great ability striking out in roads of their own finding, where they would have had more freedom and probably have discovered and set before the world new beauties, rather than follow in their wake (sometimes too

blindly) and produce designs which can only be said to be "after" their manner.

Now, let it not be understood for a moment that these observations are made in the spirit of fault-finding. It is quite natural, and the thing to be most expected, that men of genius in any walk in life will have followers. But the thing which is not always done, which, in fact, is rarely done (more's the pity), is to follow them intelligently. Had any of the three men, to whom reference has been made, lived and practiced their profession in Canada, the probability is that they would have brought about the same revivals which they have done, but their respective styles would have been made to serve the local and climatic conditions of this country, whereas those who have followed Shaw and Richardson into the Queen Anne and Norman styles (the Neo-Grec has not taken root here) have erected buildings which would have suited England or a more southern climate very well, but which are altogether unsuitable for Canada.

But the fact of the great difference in the climate of this country from that of any of the countries where a national style of architecture has exised, or does exist, so far from casting a damper upon our architects, should stimulate them to accomplish what has hitherto been neglected, and to give a Canadian cast of features to our buildings. The Greeks took as the basis of their noble marble structures which are still among the glories of art, the humble wooden huts of the primitive days of the country. But these huts had all the requirements of good buildings, as far as they went, and they were admirably suited to all their local surroundings. There are huts in Canada too, which those who have lived in them tell us afford stronger protection against the severity of our winters at all events than our modern houses. And, if we want examples of greater refinement in buildings than there is to be found in our log shanties, but which have fulfilled the requirements and stood the test of a climate similar to our own, we can find them in the picturesque Swiss chalets, or in the more substantial villas of the northern Tyrol. But it would be, perhaps, as unwise to imitate these as to continue in the line of imitation that has taken such root among us. The chief thing, the only thing for us to do in this matter, is not to ignore our climate, although it can treat us with supreme contempt, but to give it in our architecture that consideration and study which is its due, and which will give a certain amount, at least, of national character to our buildings.

ONTARIO ASSOCIATION OF ARCHITECTS.

THE Council of the Association met on Wednesday, Dec. 16th. Present, Messrs. Storm, Rastrick, Edwards, D. B. Dick, Arnold, Burke, Curry and Townsend.

Of the business done the following is of general interest:

The Registrar was instructed to open a register for assistants desiring employment. Any registered draughtsman out of employment may send in his name to the Registrar without fee, and the Registrar will send lists of all names so received to any registered architect applying for it.

In the matter of the Presbyterian Church Competition, it was announced that the Committee Board of the Presbyterian Church having the matter in hand is about to issue a circular to architects containing the conditions of a new competition.

A form of Students' Indenture has been adopted by the Council for the use of members of Association, and when printed may be obtained free of charge on application to the Registrar.

Examiners were appointed for the examinations to be held on April 7th.

Preparations were made for the proceedings of the next convention.

ESTIMATING.

17 BERRI ST., MONTREAL, Nov. 26th, 1891.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—The remarks in the last issue of your valuable paper re Bills of Quantities seem very opportune. Nothing at times causes so much trouble and unpleasant feeling to all parties concerned as the disputes that will and do arise in reference to the quantities contained in a structure. The English system of employing qualified quantity surveyors works most satisfactorily, and I can speak from experience, having had seven years in that branch of the profession, also estimating. They are prepared much in the same way as is described in that concise and lucid series of articles now running in your journal on "How to Estimate," by Mr. W. H. Hodgson. I may think of any use to you, I will gladly send you a copy, say, a legal and printed form of contract is also in use amongst the building fraternity which alike protects employer, architect, and contractor, and is of the most detailed character. If you together with blank bills of quantities of a large contract for your perusal or publication if you think of any material use.

Yours very truly,

WM. STANLEY GOSNELL.

P. S.—If you would not take it out of place, I would ask, could you not open a column in your widely read paper for "Situations Vacant and Wanted, &c." for the convenience of the building trades generally.

OUR ILLUSTRATIONS.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION FOR A SUBURBAN COTTAGE—DESIGN BY "PIAPOT" (MR. A. E. WELLS, TORONTO), AWARDED FIRST POSITION.

A note accompanying this design says:—"The author has sought to obtain the most favorable aspect for the various rooms, and at the same time keep them in their proper relation one to another. The parlour and library both have a south aspect, and the dining room is placed where the rays of the morning sun will flood the room at the breakfasting hour. The library and verandah adjacent, overlook the lawn. The entrance is placed where it does not interfere with the privacy of the verandah or lawn, and being on the east side of the house, it is sheltered from the cold winds of winter.

The kitchen at the north-west corner of the house, projects sufficiently to the west to admit of a south window; thus it is not dependent for sunshine on the low rays of the western sun, which in summer would make the room uncomfortably hot. The sill of this window is placed sufficiently high to prevent the verandah and lawn being overlooked from it. The second window in the kitchen is placed diagonally opposite this one, in order to ensure thorough ventilation by a current of air across the kitchen.

The kitchen is separated from the dining room by a passage that has direct communication with the outside air, with the doors so placed that the interior of the kitchen cannot be seen from the dining room.

The kitchen and sewing pantry, by not being connected by a door, both gain in accommodation. The stairs to the cellar is arranged so that the person tending the furnace need not pass through the house to get at it.

The soil pipe stack runs straight up through sewing pantry and bath room, and the fixtures in each floor are grouped around it, so that the cost is reduced to a minimum and the whole system is very simple and direct. It will be seen that every fixture has an abundance of sunlight about it.

The bath room is placed with regard to the convenience of the occupants of the different bed rooms. None of the bed rooms on this floor have sloping sides, but are finished under the rafters with a plaster cone about two feet in radius.

The cost of this house would probably range from three to four thousand dollars, which amount could be raised easily on the security mentioned in the conditions of competition.

PHOTOGRAVURE PLATE—RESIDENCE ON MADISON AVENUE, TORONTO, E. J. LENNOX, ARCHITECT, TORONTO.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION FOR A SUBURBAN HOUSE—DESIGN SUBMITTED BY "KATA PHUSIN" (W. LAWRENCE MONRO), AWARDED SECOND POSITION.

RESIDENCE FOR MR. JAS. HEDLEY, ST. JOSEPH ST., TORONTO. S. H. TOWNSEND, ARCHITECT, TORONTO.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION FOR A FRONT FENCE—DESIGN BY "ARM AND HAMMER" (A. EWART, OTTAWA).

TORONTO ARCHITECTURAL SKETCH CLUB.

THE regular fortnightly meeting was held on the 7th inst. Mr. Pearson, president of the Club, being absent from the city, Mr. Barrett, vice-president, occupied the chair.

Different subjects of interest bearing on architecture were discussed, Messrs. Gregg, Parker, Wells and Woolnough taking part.

Messrs. H. Boswell, T. Connell and W. Mollington were elected members of the Club.

CORRECTION.

TORONTO, Dec. 10th, 1891.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—In your next issue kindly correct a printer's error in the report of my remarks on Classic Architecture before the Toronto Architectural Sketch Club, which is misleading, though the context may set the reader right. It occurs on page ix. of the November issue, first column, third paragraph, fourth line, "that of the Syrians" should read "that of the Lydians." There are a few other typographical errors, but probably the reader would know them to be such. For instance, "Medinet Habon" and "Bern Hassau" should be Medinet Habou and Beni Hassan.

Yours truly,

R. W. GAMBIER-BOUSFIELD.

It is a relief, says Mr. Brown, in *Painting and Decorating*, after the endless succession of houses finished in hard wood white pine stained in many cases—to find a return in the better work to china gloss. Many people imagine that this class of work looks well only in white, but I have seen some very nice effects in colors, especially in pale and delicate tones. One room in pink was very dainty, and another in blue gave a very pretty effect. A parlor finished in chocolate and gold was rich and warm in color tone, and the gold gave a much more brilliant effect than when used with the customary accompaniment of white. The gas fixtures in this room were in gold ormolu, thus harmonizing with the woodwork.

CANADIAN CITY ENGINEERS.

II.

MR. CHAS. BAILLAIRGE, C.E., M.A. & F.R.S.C., City Engineer, Quebec, since October, 1866, was born at Quebec, Sept. 27, 1826, and is therefore now 65 years of age. His father, P. F. Baillairgé, who died in 1865 at the age of 68, and who had been "Road Surveyor," Quebec, for 36 years and up to the time of his death, was a son of F. Florent Baillairgé and of Melle. Cureux de St. Germain, both of French origin. His mother, Charlotte Jauverin, daughter of Lieut. Horsley of Her Majesty's Navy, was born in the Isle of Wight, England, of Helen Welling of Jamaica, Long Island, N. Y., whom he met and married there after the War of Independence of the U. S. Our subject's grand uncle, Frs. Baillairgé, de "l'Academie Royale de Peinture et de Sculpture," France, and who carved several of the statues of the Basilica, Quebec, had his studio in the quaint old building, in St. Lewis street, opposite Parlor street, now occupied by Campbell's livery stables, and was almost daily visited during the latter's stay in Quebec by the late Prince Edward, Duke of Kent, father of our reigning sovereign, Queen Victoria.

Mr. Baillairgé, whose portrait we reproduce, was educated at the Quebec Seminary, where, finding the ten years curriculum too long and slow, he, after seven years tuition, entered upon the study of mathematics, philosophy, logic, etc., and commenced his apprenticeship in architecture, engineering and surveying, receiving his diploma as sworn surveyor of lands in 1847. At the age of 17 he, with another schoolmate, designed and built a double cylindered carriage for common roads, often at that time driving to the country with it, with his friends. In 1848 he married Delle. E. Duval, daughter of John, and step daughter of H. J. Duval, for many years Chief Justice of the Court of Appeals of Lower Canada, by whom he has had eleven children, four of whom survive.

During the nineteen years previous to his entering on his present occupation of city engineer in 1866, he designed and superintended the construction of the Laval University buildings, the asylums and churches of the Sisters of Charity and Good Shepherd, the Music Hall, the new jail, and of very many private residences. He designed and built the Church of Ste. Marie, Beauce, a view of the elegant interior of which, of Gothic architecture, appeared in Vol. III, No. 7 of this journal for 1890. Many other parish churches, presbyteries, school houses, cottages, villas and other structures were erected after his designs. In 1860 he erected on the St. Foy Road, the cast iron bronzed monument to the braves who fell there under General Levis in 1760, and to which Prince Gerome Napoleon contributed, at a cost of over $5,000, the crowning statue of Bellona.

R. CHAS. BAILLAIRGE, C. E. ENGINEER, QUEBEC.

Mr. Baillairgé was for many years hydrographical surveyor and engineer to the Quebec Harbor Commission, member and chairman of the Board of Examiners of Land Surveyors, and a representative of St. Louis Ward in the Quebec City Council from 1858 to 1861. His services have often been required by the Local and Federal governments, by the courts and clergy, and by private concerns, as arbitrator on disputed claims and boundaries, and on questions of technology, and during all this busy period of 19 years, laboring as he always has done and still does for 18 hours out of every 24, he found time to write and deliver in the old House of Assembly, Quebec, and elsewhere, numerous lectures and conferences on "Steam and the Steam Engine," "Pneumatics," "Mechanics," "Optics," "Astronomy," and the like. In 1863-5 he was called to Ottawa as joint Architect and Engineer with Messrs. Fuller and Page on the Parliamentary and Departmental Buildings, then under construction; and during those two years he completed in the French language, his 900 pages treatise (including mathematical tables) on "Plane and Spherical Geometry and Trigonometry," published in 1866, where he shows at page 330 the fallacy of Thorpe's pretended solution of the trisection of an angle, for which the Government Patent Bureau granted him letters patent of invention, poor man, after his laboring at the solution, so he says himself, during 34 years of his existence. Mr. Baillairgé's work, at pages 232 to 331, contains the solution of some 200 pertinent problems, among which he introduces at page 251 Mr. Steckel's elegant solution of the hydrographical problem of the four points, not heretofore solved by a simple geometrical construction. We would also invite attention to Mr. Baillairgé's easy solution, founded on his new theorem Prop. LX, page 189, of the heretofore difficult problem of dividing up land by a straight line running through a given point (page 197) and at page 280 to his novel solution of the important and difficult problem of laying out city lots between non parallel commercial streets where every inch of frontage is precious, in a way to contain given or proportional areas, with proportional frontages on each of the streets.

Since our subject has entered on his civic duties in Quebec, he has planned and built Dufferin Terrace, which is 1500 feet in length and flanks the crest of the cliff overhanging Champlain street at a height of 182 feet above mean tide level of the river St. Lawrence. The foundation stone of this structure was laid by Lord Dufferin in 1878, and the terrace when completed inaugurated and thrown open to the public by Their Excellencies the Marquis of Lorne and the Princess Louise in 1879. In 1881 he reported on, and in 1883-5 put in the new line of 30 inch water pipe from Lorette to Quebec, a distance of nearly nine miles. During his 25 years as City Engineer he has had occasion to plan and build wharves, ferry landing piers, slips, pontoons, and ferry boats. The new dredge and water works in the adjoining parish of St. Foy were planned and carried out under his superintendence, as well as those in the recently annexed municipality of St. Sauveur, under the more immediate direction of Mr. Gallagher, Asst. City and Water Works Engineer.

He has planned and built fire and police stations, market halls, etc., and many of his yearly reports, as those of 1868, '70, '72 and '78, are voluminous, interesting and instructive, and have been sought after by City Engineers and others of many portions of Canada and the United States. Steep hills have been replaced by grades of easy access; the fortification walls have been cut through and streets prolonged to meet those in the suburban districts; ornamental iron stairways have been erected as designed by him to afford communication between the upper and lower wards of the fortress city.

In 1874 Mr. Baillairgé published in both languages his "Key to the Stereometrical Tableau," "Clé du Tableau Stéréométrique," giving applications thereof to numerous solid forms. This system (see De Brodker's letter from the Ministry of Public Instruction, St. Petersburg, 14-20 February, 1877) was to be taught in all the elementary schools of Russia, and by a subsequent letter of a year and a half later, from the same source, Mr. Baillairgé was informed that "the system having been found to work well, will moreover be applied to all the polytechnic schools of the Russian empire."

In February, 1874, Mr. Baillairgé was called to France, when in the "Grand Conservatoire des Arts et Metiers" he received the gold medal of the "Societé de Vulgarisation de l'Ensignement en France," also the medal called "Philippe de Girard" given by M. de la Boronne de Pages' for the most useful invention or discovery of the year, and he has since received 13 medals of honor and 17 diplomas from France, Italy, Russia, England, Brazil, Japan, Belgium, Canada and the United States of America.

After the death of his first wife in 1878, Mr. Baillairgé in 1879 married, Anna, daughter of Capt. Benj. Wilson, of the English navy, by whom he had six children, four of whom survive.

In 1854 Mr. Baillairgé published in both languages "The Stereometricon," ("Le Stéréométrican") thus perfecting his system, by applying the prismoidal formula to some 200 elementary geometrical forms, giving in each case the nomenclature of the solid and of the class to which it belongs, the nature and mode of arriving at the areas of the opposite bases and middle or other sections, the form or shape and area of the developed lateral and other surfaces thereof, the object of which the model is representative or suggestive, and of the many other uses to which the figures may be applied. In 1880 our subject was chosen by Lord Lorne, then Governor General of Canada, as one of the members of the so-called "Royal Academy of Arts," and in 1882 he was made one of the foundation members of Section III of the Royal Society of Canada, before which he has read many papers, several of which have been published in the yearly transactions.

Being, as he is, of a humorous and versatile turn of mind, Mr. Baillairgé in 1873 wrote a play which he called "Le Diable devenu Cuisinier," which was played by the Mangard Company then in Quebec at the Music Hall, and then at Jacques Cartier Hall, to the great delight of the audience on each occasion, and in 1875, as member of the "Club des 21" of the literati, artists and savants of Quebec, he read a paper in which in his happy style, he hit off the peculiarities and portrayed the qualities of every member of the club, and of the chairman himself, the Count de Premio Real, then Spanish consul at Quebec. His later works are, in 1888, a French dictionary (some 700 pages) of homonymous words and of the component elements thereof; his last work of 1890 being a vocabulary of nearly 200 pages of "English Homonymes" and one of over 200 pages of "Homonymes Francais," both for the use of schools and educational purposes in general, and at different times he has edited articles on the art of building, the defects in our system of construction, and many other subjects too numerous to enumerate.

We may say in conclusion, that Mr. Baillairgé is of opinion that a good City Engineer should know enough of land surveying to plan and lay out streets and squares and take the levels absolute and relative thereof, widen and prolong them as required, and prepare "designs and "proces verbals" of all lands and parcels of land of whatever form or size, to be expropriated for the purpose; to lay out parks and banal grounds; that he should be enough of an engineer to grade and pave hills and roadways, lay down sidewalks, crossings, water channels and put in catch basins; to compute the size of plan and lay out and superintend the construction of city drains and sewers and water and gas distribution pipes, man holes, hydrants, drinking fountains, water troughs, etc.; to lay out lights, gas, arc or incandescent, and telegraph, telephone, fire alarm and light circuits, and attend to the position of each post (if for overhead systems), or put in underground channels therefor (if to be laid beneath the surface); to plan, specify and superintend the construction of retaining walls and crib work for roadways on side hills, wharves, ferry piers and landings, pontoons and slips and ferry boats, terraces, hills either straight or tortuous or zig-zag to overcome differences of level, public stairways of wood or iron and the like; to lay out city tramways, etc., etc.—and enough of an architect to plan and build fire and police stations, market halls, nests of shambles, weigh houses, public conveniences, elevators, crematories and the like.

PUBLICATIONS.

The *Canadian Shoe and Leather Journal* has issued an exceedingly attractive special number in the interests of spring trade, 1892.

The publishers of the *Dominion Illustrated* have issued a Christmas number which for beauty and interest is not surpassed by any European publication of similar character. The number reflects credit on the country as well as on the publishers. The announcement is made that the *Dominion Illustrated* will in future be published monthly as a magazine, the subscription price being reduced to $1.50

SOCIETIES.

The third annual dinner in connection with the School of Practical Science, Toronto, took place at the Arlington hotel recently. The faculty, graduates, guests and students numbered one hundred. The occasion was greatly enjoyed.

The General Water Pipe Co., of Liege, Belgium, is seeking information regarding the extent of the Canadian market, with a view to establishing a branch of its business here.

The importations of cement into Canada during the last few months is said to have been in excess of the requirements and dullness in the market is looked for in consequence.

SANITATION AND HEATING

STEAM HEATING.

AT this season of the year the heating of houses is a subject of interest to nearly every one. Many of the readers of our paper are especially interested in steam heating, and are now engaged in getting such appliances ready for the winter's work.

The most important part of a steam heating apparatus is the boiler, and next to that in importance is the furnace. Unless these are suitable and of sufficient capacity, all the rest of the apparatus will be found unsatisfactory, no matter how skilfully it may be done. Some steam fitters advocate the use of sectional boilers of cast iron, and containing the furnace within the parts of the boiler. These, no doubt, are cheaper and more convenient to sell and erect in place; but when that much has been said in their favour, the list of their good qualities is about complete. In some circumstances it is necessary to have a boiler in which steam is quickly raised, but it should be remembered that a boiler in which steam can be quickly raised is also one in which it will quickly go down, should the fire become dull.

For this climate, with its great variations of temperature during the winter, the boiler of a steam heating apparatus should be made large enough to give ample steam for the coldest weather, and the furnace part should be so arranged that the fire may burn slowly and yet maintain a steam pressure. The boiler should contain a considerable quantity of water, and it will be found of advantage to have the furnace of brick, so as to form a reservoir of heat, which will be radiated to the boiler whenever the fire becomes dull.

The boiler and furnace should be of such capacity and so arranged as not to require the constant attendance of the man in charge. The first cost may be more, but the annual expenditure for fuel, attendance and repairs will be less when the boiler is large and the furnace made so that a slow burning fire keeps up steam. The comfort and satisfaction obtained will more than repay for the greater outlay.

In another article the size of boiler and furnace in proportion to the amount of piping to be kept hot will be discussed—at present it is proposed to say something about getting ready for ater.

The boiler, it is assumed, is all right and not requiring any repairs; what, then, should be done in order to get ready? The boiler should be carefully gone over, and all dirt and dust removed from it and from the furnace. This should be done, even though it was all cleaned out in the early summer. The next thing to do is to remake the hand hole and man hole joints. The hand hole joints should be very carefully made, as they should be absolutely tight in order to prevent the slightest amount of leakage. Corrosion of the boiler head soon follows a little leakage at the hand holes. In making these joints, it is a good plan to use moderately thick rubber, and to make a paste of black lead and oil, and put it on both sides of the rubber. The hand hole cap should not be screwed up too tightly when the boiler is cold, and should be screwed up after steam has been up or the water at the boiling point. All the valves about the boiler and its connections should be examined, and the spindles properly packed if new packing is needed. Then close the blow-off cocks, see that any check valves either in the feed or return pipes are in order, and while free to rise have not too much lift. The lift should never exceed one-fourth the diameter of the valve, and may be less. Open the valves on the steam and return pipes, and then turn on the water and fill the boiler to within a couple of inches of the level at which it is intended to keep the water when steam is up.

While the water is being run in, the guage cocks, or safety valve, should be open to allow the air to escape from the boiler. The fire should then be lighted, and the water slowly heated until steam is raised. When steam has begun to flow through the pipes the valves at all the radiators should be opened, and any requiring packing marked for attention by re packing. If any radiators do not heat, the air valves should be opened to allow the air to escape.

When steam is up the return pipe should soon become warm, showing that circulation is going on throughout the apparatus. If it does not become warm, the cause of the stoppage of circulation should be searched out and removed.

ELECTRIC LIGHT AND HEAT.

IT is certain that we are upon the eve of great discoveries in the field of electrical science. The perfection to which electric lighting has attained, great as it is, is but the threshold as it were of the possibilities yet to be realized. When it is considered that of the amount of energy expended not one-tenth appears as light, leaving the larger proportion to take the form of heat, it is at once seen that absolute perfection is yet a long way off. Light without heat is the dream of the scientific explorer in the realm of nature, and when it is successfully achieved our present wasteful methods will appear crude indeed. We are burning up our stoves as well as our fuel. We are like the Chinaman who invented cooked pig—we burn down our house to get roast pork. The experiments of Tesla with currents of high frequency are upon this line, and may yet take practical shape. If a medium of sufficient tenuity could be found capable of transmitting the almost inconceivably rapid vibrations of light as set in motion and maintained by the subtle force of electricity, the grosser form of caloric would be passed and left behind, and the cold and brilliant aurora glow of heatless light would be attained. But where is this medium to be found? The molecules of ordinary metals are incapable of being attuned to the rapidity required. Copper, our best conductor, would probably be too inert to transmit the vibratory force, and be dead as so much wood. Although the electric current may be weighed and measured with precision and appears to follow certain fixed laws, but little is known of its actual constitution, and in what manner it is transmitted along the most favorable path. But there are immense possibilities in it, and before long we may look for further discoveries in its application to the production of light.

A valuable paper on "Sanitary Plumbing" was read by Mr. Cesare Marani, lecturer in Sanitary Engineering, at a recent meeting of the Engineering Society of the School of Practical Science. Messrs. Burke, Curry, Townsend and Bousfield, members of the Ontario Association of Architects, were present, and took part in the discussion which followed.

It is proposed in future to charge builders in Toronto with the cost of plumbing inspection in buildings under construction. The proposal is a proper one. There is no valid reason why the cost of this work should be charged against the general expenditure of the city. If inspection of old plumbing is required, a fee of $5 must be deposited by the person who desires the work done. There is no better reason for free inspection of new work than of old. The charge should simply form another item in the builder's estimate, and should ultimately come out of the pocket of the owner of the building.

A jury recently found the city of Toronto guilty of negligence in allowing foul-smelling refuse to be dumped in proximity to a citizen's dwelling, thereby causing an outbreak of diptheria in his family and the death of two of his children. While the verdict was undoubtedly just, the amount of damages awarded to the plaintiff—less than $400—was ridiculously small. It is well, however, that the courts should sound the warning that those who carelessly endanger the public health will be called to account. The comments of the judge upon the danger arising from the system of ventilating sewers into the public streets were timely. An improvement which would secure the discharge of sewer gas at such a height that it would not assault the passerby or invade citizens in their homes or places of business is urgently required.

PERSONAL.

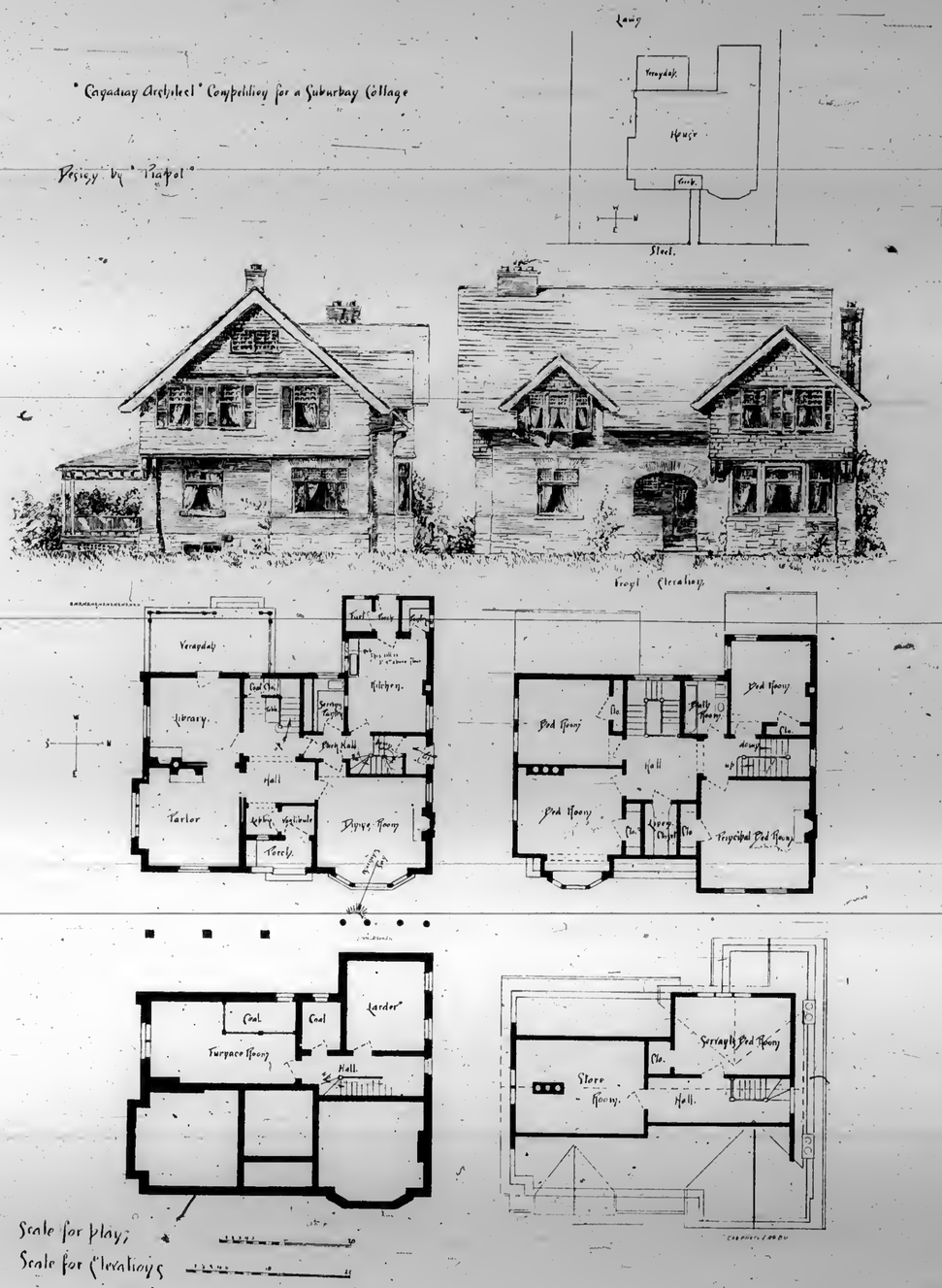
The death has taken place since our last issue, of Mr. John T. Stokes, engineer of the County of York. Mr. Stokes held this position for twenty-five or thirty years. His life was one of great activity and usefulness, and the integrity and kindliness of his character caused him to be deservedly esteemed.

The friends of Mr. Ernest Wilby, formerly a member of the Toronto Architectural Sketch Club, who went to England early in the year with the object of prosecuting the study of his profession, will be pleased to learn that since March he has been employed in the office of Mr. Calcutt, a prominent London architect.

RESIDENCE ON MADISON AVENUE, TORONTO

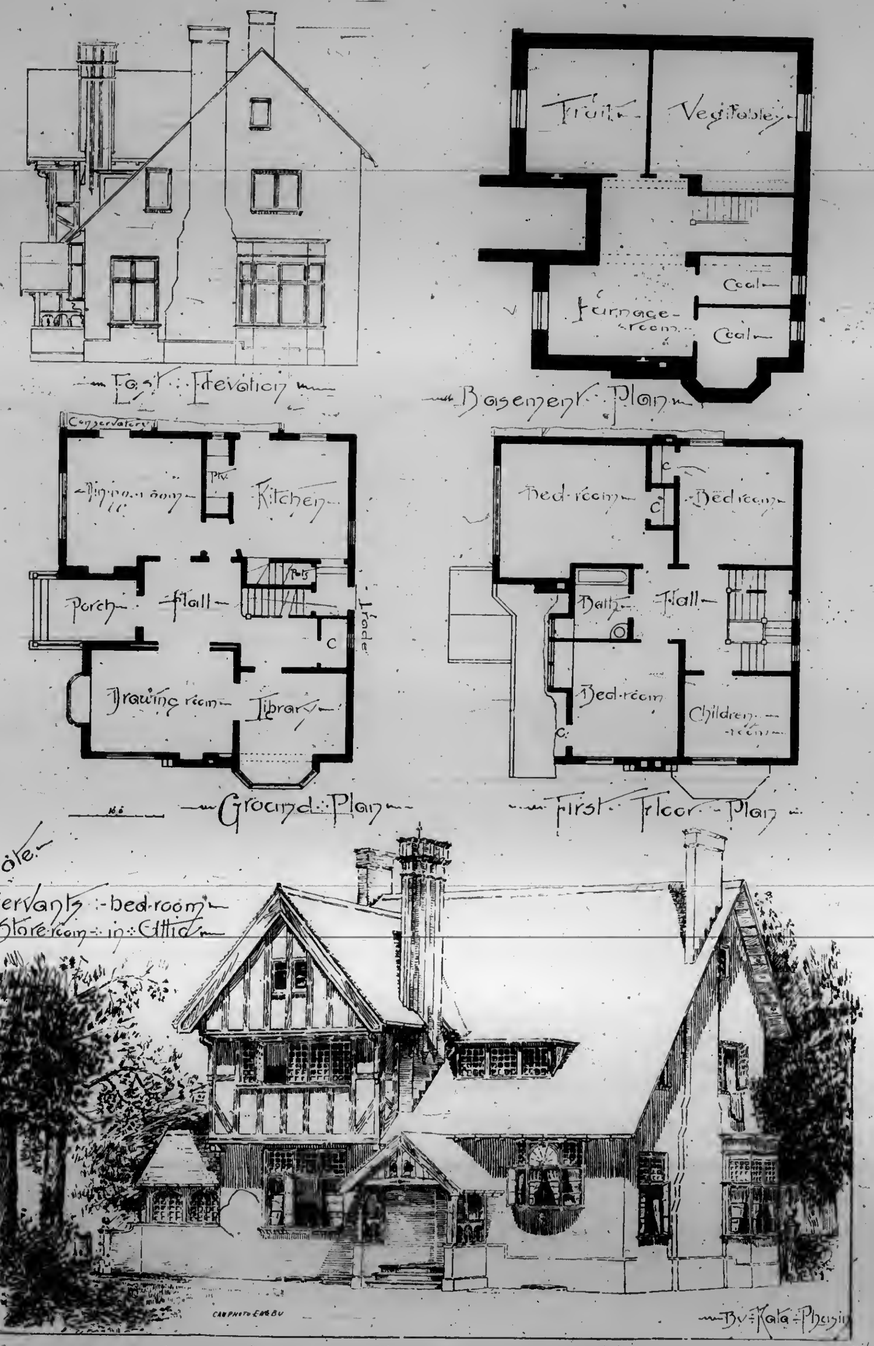
E. J. LENNOX ARCHITECT TORONTO

SUPPLEMENT TO CANADIAN ARCHITECT AND BUILDER VOL. IV., No. 12



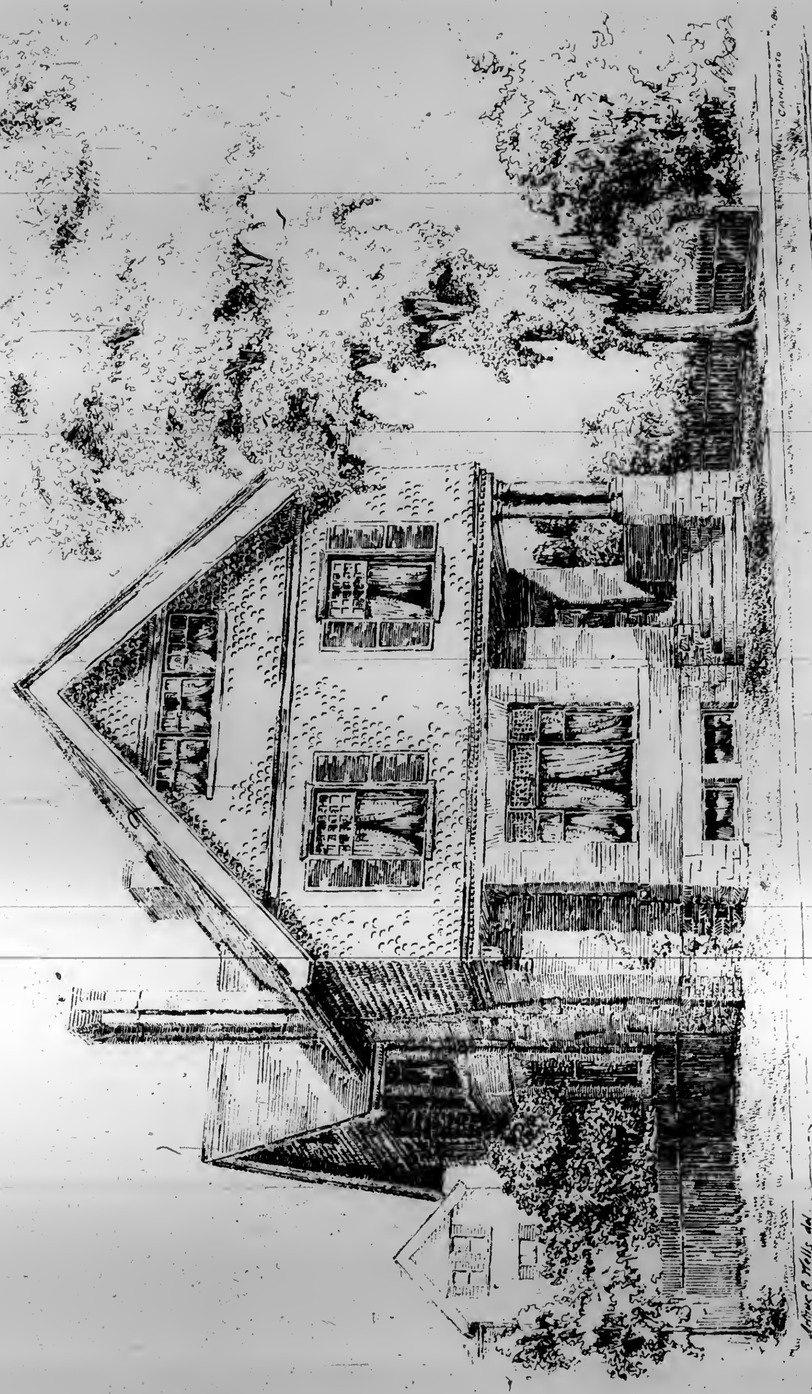
"C. A. & B." COMPETITION FOR A SUBURBAN COTTAGE.

DESIGN BY "PIAFOL" (A. E. WELLS), AWARDED FIRST POSITION.



"C. A. & B." COMPETITION FOR A SUBURBAN COTTAGE.

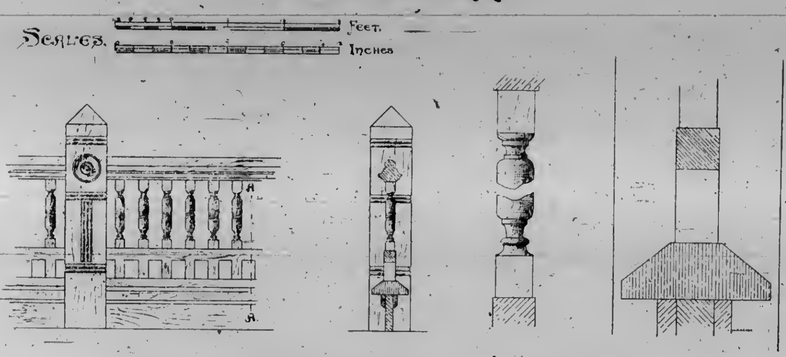
DESIGN BY "KATA PHUSIN" (W. LAWRENCE MUNRO), AWARDED SECOND POSITION.



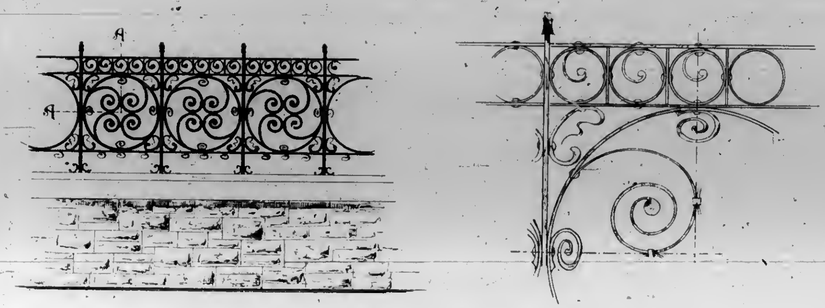
Residence of Mrs. Jas. Hedley, St. Joseph St., Toronto.
S. H. Townsend, Architect.

Three Designs for Front Fence.

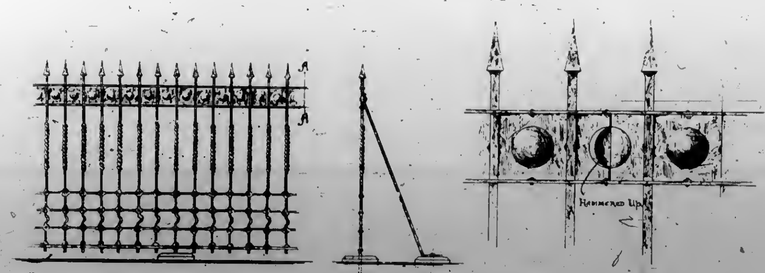
By "Arm and Hammer."



Elevation. Wood Fence. Section. Details A-A.



Elevation. Iron and Stone Fence. Details A-A.



Elevation. Iron Fence. Section. Details A-A.

"C. A. & B." Competition for "Front Fence."

Design by "Arm and Hammer" (A. Ewart), Awarded Second Position

tect
and builder

THE LATE W. G. STORM, R.C.A.

SUPPLEMENT TO
CANADIAN ARCHITECT AND BUILDER
VOL. V., NO. 8.

CANADIAN ARCHITECT AND BUILDER

VOL. V.

1892:
C. H. MORTIMER, PUBLISHER,
TORONTO CANADA.

INDEX

A

	Page
Advertising, Points on	39
Amateur Architects, Blunders of	66
American Institute of Architects	87
Architectural Style, Characteristics of	56, 119
Architectural Competition, Suggestions for	70
Architectural Ability, Public Recognition of	75
Architectural Exhibit, Canadian at the World's Fair	75
Architect and Contractor	79
Architect, the, as a Business Man and Artist	111
Architecture, Some Notes on the Relation and Application of the Sister Arts, Painting and Sculpture, to	112
Artistic Houses, Lack of in Toronto	66
Art Exhibit, Canadian at the World's Fair	105
Australia, Architects' Registration Law in	76

B

Boiler Explosions	96
Building Construction, Elements of Structural Ironwork	28, 67
Building Conditions	36, 46, 76
Building Law, Boston	86
Building Inspection	4
Builders' Exchange, Toronto	40, 78, 102
Builders, a Word of Advice to	117
Brick Manufacturers' Association, Toronto	45
Brick, Note on Compressive Resistance of	84
Brick, Quality of	92
Brickmaking and Brickbuilding in Nova Scotia	124
Brickwork, a Plea for Perfection in	78
British Columbia Institute of Architects	116, 118
British Columbia Woods at the World's Fair	36
Bicycles, Provision for Storing of	65

C

Canals, Value of Canadian	66
Cements	3, 7, 36, 43, 54, 63, 84, 93.
Cement, Testing of	12, 25
City Engineers, H. N. Ruttan	6
A. O. Graydon	21
Hurd Peters	27
F. W. W. Doane	48
City Engineer, Toronto	11, 66
City House, C. A. & B. Competition for	110, 120
City Clerk, Appointment of in Montreal	45
Classic Architecture in Relation to Detail	104
Climate, Effect of on Building Construction in Quebec	95
Coloring, Methods in	10
Commission, Case of Illicit	48
Competitions	25, 45, 56, 66, 85, 95, 105, 106, 110, 116, 118, 120.
Concrete Building	No. ix
Concrete	86, 95.
Contracts, Conditions of	91
Contract Labor Law, U. S.	56
Country House, How to Select Site for	39
Court Case, a Singular, at Watford	26
Correspondence, Hamilton	91, 104 110
Correspondence, Montreal	3, 41, 48, 88, 107, 110, 120

D

Decorating, Amateur	27
Decoration	73
Decoration, Developments in	83
Decorative Purposes, Brass for	94
Defective Buildings, Liability of Owners and Architects	116
Defective Construction, Liability for	86
Derricks, Breaking of	85
Designs for World's Fair Monuments	5
Designing a House	68
Dictionary of Architecture	55
Drains, Sanitary House	3
Drains, House	84
Drill Shed, Toronto, Cut Stone Work on	11, 36

E

Efflorescence on Brickwork, removal of	86
Electric Wiring in Montreal	66
Escape from Buildings in Case of Fire	122
Endowments to Public Institutions	55
Errata	63

F

Fire Losses in the United States	1
Fire Escapes for Public Buildings	88
Fees, Architects'	No. 9-ix, 107
Fraudulent Conveyance, Contractors	103
Frost, Its Effect on Building	41

G

Granite Architecture	37
Granite, Customs Regulations on	46
Granolithoes, a new Building Material	41
Glass, Substitute for in Roofs	196

H

Hardware, Only	37
Hardware, to put on	68
Heating Apparatus, Care of	115
Heating, Electricity for	86
Heating and Ventilation	30
Heating, Electric	93
Heavy Timbering, New Methods in	82
Hours of Labor	86
Hodson, W. H. the late	100
How to Estimate	1, 22, 33, 49, 61, 69, 105

I

Interior of a house	108
Iron, Rustless, a Possibility	No. 9-ix
Insurance of Building Workmen in Australia	36
Insecurity of old Buildings	76
Iron and Steel Skeletons for Buildings	85

K

Kennedy, John	30

L

Legal Decisions	101, 124
Library, Public in Chicago	1
Lime, Amalgamation of Manufacturers of	25
Land Surveyors, Association of	25
Largest Building on Earth	86

M

Manufactures and Materials	72
Manufactories, Need of in Toronto	95
Mantel, 6,000 years old	103
Mouldings, Arrangement of	42
Mechanics' Lien Act	56, 45
Metal Beams, Effect of Strains upon	2
Montreal and Toronto, a Comparison	116
Montreal, Building Operations in	25
Montreal Street Railway Extension	109

O

O. A. A. Exams.	57
Obituary	41, 118
Odds and Ends	88, 122
Ontario Society of Artists	37
Ontario Association of Architects	1, 2, 12, 13, 25, 26, 46, 48, 107, 115, 117
Ornament in Architecture	30

P

Passing Events	21
Pavement, Bituminous Rock in Vancouver	25
Personals	10, 24, 29, 37, No. 5-, 78, 90, No. 10-ix, 113, No. 12-ix
Presbyterian Church Competition	3, 21, 71
Plan Designing	6
Plenum System of Ventilation as Applied to the new Surgical Buildings, General Hospital, Montreal	113
Portland Cement, Duty on	65
Province of Quebec Association of Architects	71, 77, 86, 96, 98, 105
Provincial Land Surveyors	27
Province Quebec A. A. Exams.	81
Practice, Variations in	71
Plumbing Device, a Valuable	71
Publications	5, 24, 37, 109

Q

Queries and Answers	27, 94

R

R. C. A., The	121
R. I. B. A. Examination, a Canadian Candidate at	1
"Registered Architect," use of the term	12
Root, the late J. W., Proposed Memorial Monument to	75

S

Sanitary Plumbing	38, 53
Sanitary Condition of Toronto	94
Scaffolds	55, 106, 110, 115
School Accommodation, Additional, Toronto	116
Stone Work, Tempering Steel Tools for	77
Stone, Canadian Building	11, 65, 69
Stone-cutting Machinery	2
Storm, the Late W. G., R.C.A.,	81
Structural Iron Work	28
Suggestions	No. 5-IX
St. Andrews' Church, Toronto, Removal of	56
St. Clair Tunnel, Ventilation of	106
St. Johns, Nfld., Destruction of	76, 85, 106
Strike of Granite Cutters, Effect of	85
Steel Manufacture, Hastings' Process of	75
Slow-burning Construction	1
Statue of Queen Victoria in London	11
Statue of Sir John A. Macdonald at Ottawa	35, 65

T

Tax, Professional, in Quebec	95
Technical Instruction for Artisans in Toronto	65
Terra Cotta, Porous	92
Thomas, the Late W. T.	70
Toronto Art Student's League	121
Toronto Architectural Sketch Club	41, 45, 46, 85, No. 10-ix, 108, 117
Toronto Builders' & Contractors' Association	21
Toronto Court House Difficulty	87
Toronto Technical School	101
Toronto's New City Buildings	117
Toronto Street Railway	12, 36, 66, 116
Toronto, Public Improvements in	26
Toronto Builders' Exchange	36, 46, 65, 86
Tunnel, Sub-marine, P. E. I.	75
Trade School Graduates Boycotted by Philadelphia Plasterers	1
Tile, Encaustic, Manufacture of	No. 7-ix

U

Underground Conditions, Dangerous	76
Union Station, Proposed New, Toronto	85

V

Verandah in Australian Domestic Architecture, the	89
Ventilation	50
Ventilation of Sewers in relation to Sanitation of Dwellings	56

W

Water Works, value of	21
Water and Waste Pipes	94
Woodwork in Art	103
Wiring, Incandescent	90
Water Privilege, London, Ont.	11
Wires, Underground, Dangers of	26
World's Columbian Exhibition	35, 56, 86, 105
Water Front, Toronto, Improvement of	87
Weights, Heavy, on Floors	105

Y

Yonge and King Streets, Toronto, widening intersection of	75
Young Architects, profitable work for	86

ILLUSTRATIONS.

A

Alexandria School for Girls	No. VI

B

Baptist Chapel, Walmer Road, Toronto,	No. V
Branch Bank of Montreal, Montreal, Que.	No. VIII

C

Canada Co.'s Porch, Toronto Architectural Sketch Club Competition	No II
C. A. & B. Competition, Suburban Cottage	No I
C. A. & B. Competition, Town Cottage	No. VII
Church of the Messiah, Toronto	No. III
Church of St. Joseph, St. Marys	No. IX
Church of St. Mary Magdalene, Toronto	No. X
Club House, Athletic Club, Toronto	No. IX
Cottage, Scarboro,	No. IX
Cottage, Austin Avenue	No. XI
Cottage, Lakeside Road	No. XI
Cottage, A. F. Lobb	No. XI

F

Fire Escapes, System of, by Mr. Chas. Baillairgé	No XII

H

House, Bay Street, Hamilton	No. I
House for A. R. Reid, Montreal	No. III
House, Rosedale	No. VI
House, Jamieson Avenue	No. X
Houses on Sydenham St., Toronto	No. XII
High School, Montreal	No. I
Hospital for Sick Children	No. IV

I

Interior of Hall, F. D. Monk's residence,	
Isolation Hospital, New, Toronto	No. XII

M

Mantel, Drawing Room	No. X
Mantel in Provost's Room, Glasgow Municipal Buildings	No. IX

O

O. A. A. Accepted Design for Official Seal	117
Ontario Association of Architects, Exam. in Design	No. V

P

Plenum System of Ventilation	No. IX
Presbyterian S. S. Building, Hamilton	No. IV
Public School, Gladstone Avenue, Toronto	No. II
Power House, Hamilton Electric Street Railway Co.	No. VII
Proposed House for O. G. Evans Thomas	No. VIII

R

Residence, Capt. S. Crangle, Rosedale Road, Toronto	No. I
Residence, W. H. A Massey	No. IV
Residence Hector McKenzie, Montreal	No. IV
Residence J. L. Morrison	No. XI
Residence R. B. Ross, Montleal	No. V
Residence E. A. Wills, Toronto	No. V
Residence, Dorchester Street, Montreal	

S

Sketch of Summer Residence, Toronto Island	No. III
St. Andrews Church, Toronto	No. VI
Statue of Rt. Hon. Sir John A. Macdonald, to be erected in Hamilton, Ont.	No. XII
Storm, W. G., Portrait of	No. VIII

U

Union Station, Proposed new	No. 7
United Empire Loyalist Memorial Church, Adolphustown	No. X

CANADIAN ARCHITECT AND BUILDER.

VOL. V.—No. 1. TORONTO AND MONTREAL, CANADA, JANUARY, 1892. PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

14 King Street West, - TORONTO, CANADA.

64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1891.

PRESIDENT	W. G. STORM, R.C.A., Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton.
TREASURER	D. B. DICK, Toronto.

COUNCIL:

W. A. EDWARDS	Hamilton.
EDMUND BURKE	Toronto.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
DAVID EWART	Ottawa.

REGISTRAR:

W. A. LANGTON	Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1891.

PRESIDENT	F. X. BERLINQUET, Quebec.
1ST VICE-PRESIDENT	VICTOR ROY, Montreal.
2ND VICE-PRESIDENT	J. NELSON, A.R.C.A.
SECRETARY	C. CLIFT, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. C. HUTCHISON, R.C.A.,	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
ALPH. RAZA	Montreal.
J. F. PEACHY	Quebec.

A FULL report of the proceedings of the second annual convention of the Ontario Association of Architects will be published in our next issue.

A GENTLEMAN from Toronto was a candidate at the recent examination for qualification as Associate of the Royal Institute of British Architects, and, we regret to observe, was not successful in passing.

A PUBLIC library to cost a million dollars or more is to be erected in Chicago. It is said to be the intention to ask for competitive designs, and to give $1,000 each to the authors of the five best designs. If these are the conditions, the inducements are too small to attract the efforts of men whose knowledge of the requirements of such a building could be relied upon.

THE fire losses in the United States during the year which has just closed, amounted to $125,000,000, being nearly 50 per cent. in excess of the previous year. This, despite the fact that there were no great conflagrations. The *Engineering News* points out that the expenditure of the money which thus goes up in smoke would go far towards rendering the buildings more nearly fire proof.

IT was the intention to publish in this paper drawings and specification in connection with the second of Mr. Hodson's series of articles on "How to Estimate." Some alterations in the drawings were thought necessary, however, in order that they might prove more instructive. This has made it necessary to defer their publication to the February issue. In this connection, if contractors see any way in which these articles might be made more serviceable, we shall be pleased if they will forward us their views on the subject. Any suggestion which may thus come to us will be carefully considered.

THE journeymen plasterers of Philadelphia refuse to work on the same building with graduates of the Plastering Department of the Master Builders' Trade School, of that city. The lads are desirous of completing their trade, and the master plasterers are anxious and willing to employ them. In pleasing contrast to the attitude thus assumed by the Philadelphia plasterers stands that of the Bricklayers' Union of Boston, which has arrived at the following understanding with the Master Builders' Association regarding trade schools: "Trade schools are to be established and opened evenings. Instruction therein is to be given all regularly indentured apprentices. None but regular apprentices shall be allowed to enter these schools. Instruction shall be given to pupils in the theory and science of the trade they propose to learn."

The Mansur-Tebbets warehouse in St Louis, constructed on the slow burning principle, was almost entirely destroyed by fire recently. The result is said to have been due to lack of promptness on the part of the fire department and scarcity of water, rather than to defective construction. Although the contents of the building were of a combustible nature, the fire burned for a considerable time on the two lower floors before extending to the upper stories. Mr. Edward Atkinson, the advocate of slow burning construction, referring to the destruction of this building, says: "I do not think that we shall reach the true fire-proof construction until we attain a method by which the building is constructed wholly of fire-clay, or brick and tile, without any wooden or iron members in the structure: similar to the method in which the new Boston Public Library

was constructed. I think that building comes nearer to being fire-proof than any building that I know; but such construction is, as yet, too expensive in this country to be applied to mills and commercial warehouses. It has, however, been adopted in Spain for textile manufactories, bleacheries and print works."

WHEN a metal beam or bar is subjected to a shock, there is a tendency to change the form or to bend the beam. When the load is removed or the shock is over, the beam will assume its original position unless the strain produced by the load or shock has been in excess of what is sometimes termed the elastic limit. It may be repeated an infinite number of times and yet there will be no evidence of any weakening of material, but if it be in excess of the elastic limit, it has only to be repeated a sufficient number of times to break the beam. However, there is another feature of the action of the metal which must not be overlooked. It is that the limit of elasticity is not constant throughout the succession of shocks required to break the beam. After the load has been several times applied and removed, it is found that a greater weight is required to produce the same amount of bending, that is, the limit of elasticity has been increased. It is, however, a question whether or not the safety of the beam has been increased.

A REVOLUTION is taking place in the methods of preparing stone for the various purposes which it is required to serve in building construction. In Chicago a great deal of the work formerly done by the skillful hands of the workman is now being accomplished in much less time and consequently at greatly reduced cost by improved machinery recently designed for the purpose. A gentleman who witnessed its operation states that the *modus operandi* is very similar to that to which lumber is subjected in passing through a planing mill—the material in its rough state entering at one end of the establishment and passing out at the other end in almost finished condition. Stone-cutters viewed the introduction of these machines with alarm, but the experience of the last two years is said to have shown that there is as great demand for skilled workmen as ever. The reduction in cost effected by the use of machinery has brought stone into use to a greater extent than before. There is likewise noticeable a tendency to indulge in more elaborate ornamentation. The employment of machinery would no doubt have lessened very materially the time and expense on the construction of the new Parliament, city and university buildings, Toronto.

THE difficulties incident to the erection of the Toronto Board of Trade's new building are not yet at an end. The limit set for the cost of the site and building was $350,000. The calculations regarding interest to be paid and probable revenue to be derived from tenants indicated that it would be possible to put aside annually the sum of $5,000 to establish a sinking fund for the redemption of the bonds on the building. There is little reason to doubt that had the construction of the building been entrusted to local architects, it would have cost little if anything more than the sum fixed as the limit. The secretary and Mr. H. W. Darling, a former president of the Board, were apparently very desirous that an American architect should be employed, and the upshot of the matter was that the work was given to Messrs. James & James, of New York. After a time rumors began to circulate that there were serious flaws in construction due to defects in the plans. The secretary of the Board positively denied that there was anything wrong, but eventually when this journal with the aid of sketches and figures taken from the work, printed the true facts of the case, it could no longer be concealed that blunders of a serious character had been made The architects were dismissed, and another American architect employed to complete the work, as it would never have done to have admitted that a mistake had been made in passing by competent local men. The mistake is none the less apparent in the fact, however, that the building required to a large extent to be reconstructed, and in consequence the limit of cost has been exceeded by $120,000. This extra cost has wiped out the possibility of devoting $5,000 a year to a sinking fund without increasing the fees of the members. As the only way out of the difficulty, it is now proposed to amend the by-laws to permit of doubling the amount of the annual membership fee. As a result of this proposal we have recently heard members asking one another what advantage was derived from their connection with the Board, and the answer was that the benefits to members other than those belonging to the grain section, are nil. Under these circumstances it is not surprising to hear members offering to sell out. "You will never be able to pay off the debt on that building in the world!" was the statement made by a member to one of the trustees of the Board the other day in the writer's hearing. "I know it," was the discouraging reply, and this was followed by the suggestion that it was useless to expect of economy as long as the Board had a secretary whose economic ideas were so ill-defined.

O. A. A. CONVENTION.

THE second annual convention of the Ontario Association of Architects will meet on Tuesday, the 2nd of February, at the School of Practical Science, Queen's Park, Toronto, at 2:30 o'clock, p.m. It is to be hoped that the proceedings will be of more interest than usual. We would strongly urge on every member of the Association to be present and take an active part in the proceedings.

Members who do not attend the annual meetings cannot justly make any complaint as to the manner in which the interests of the Association are conducted. If any member feels that some question which specially interests him should be considered, he should attend and bring the matter up, otherwise there may be no one present to bring it before the meeting.

This is a critical period in the existence of the Association, and it will require the assistance of every member to tide it over the next few years. If the members are loyal to the Association its success is assured. But if the members grow indifferent and careless, it will require all the energy and perseverence of its active workers to carry the Association until it has made for itself a solid foundation on the ability and loyalty of its younger members who will have come in by passing the examinations.

There are members who complain that the Association has not benefited them because they cannot obtain 5 per cent. commission, other members being prepared to work for less. The Association is unable to make rules or regulations which will bind the members except to a very limited extent, and certainly it is unable to force its members to charge any definite commission, even if such a course were advisable. When a man does not value his services at the regular rate of commission, but at a rate much lower, nothing can be done that will cause him to value his services at a higher rate. His services may not in reality be worth more than he is willing to receive, or he may be forced by circumstances to take what he can get.

It is a question if it would not be better for each man to settle for himself what his services are worth. A fixed rate of commission on all work of the same character to be paid alike to the competent or incompetent architect is unfair and unjust alike to the architect and the client. The client, if he knows what is best for him, will go to the most competent man that he can find, as he would not pay any more for his services than he would for those of an inferior man, except that a competent man will insist upon the work being thoroughly done, thus increasing the cost to the proprietor. This and similar questions could be brought up and discussed at the convention with benefit to all.

The testing machinery which has been recently erected in the School of Practical Science will be exhibited, and tests will be made of the building stones in use in the province of Ontario. Five well known members of the Association have consented to exhibit plans of houses and describe them, giving their reasons for arranging the plans as shown. These descriptions and the discussion which will follow will probably be of great interest.

There will be a number of valuable papers read, which, with the discussions upon them, should be of interest to every member. It is hoped that some members will come prepared to discuss the papers. Every member may not have the opportunity nor be able to take an active part in the work of the Association, but each member is able and should take sufficient interest in the progress of the Association to cause him to do all that may lie in his power, be it much or little, to assist and encourage those who are taking an active part. The member who does nothing to aid in the advancement of the Asssociation

but who is prepared to find fault and object to everything that is done, is not worthy of being called an architect.

The object of the Association is to advance the interests of architecture by educating its members to a knowledge of the work which as architects they are called upon to perform. By architects studying each other's work and exchanging ideas, the profession will attain to a higher standard of general proficiency which will raise its members from among the careless, ignorant, or for-gain-only architects of the present day.

The architect who follows his profession simply as a means of livelihood will see no benefit in any Association if it does not increase his income. Personal gain is his only object, and to obtain it he is prepared to erect any manner or description of building, from the most dangerous to life to the most inartistic conception that man can be guilty of designing.

The object of the Association is not to determine a tariff of fees and insist on its members maintaining them, but to work earnestly to raise the members to a higher standard of architectural knowledge, so that they may be enabled to demand and obtain just and reasonable remuneration through the fact that their services are absolutely necessary to the successful erection of every important building, if it is to serve the purpose for which it is being erected.

There are some who think that the architect who has a large practice is more interested in the success of the Association than the average member. This is far from true, for the man with a good practice is independent of any Association, and the more inferior in ability his opponents remain the better it is for him. It is the average man and the young architect who will benefit through the success of the Association and the general advancement of the profession.

Do not let any man think that he is unable to assist in the work of the convention. Every one can do something, and out of love to his profession let each member do all that lies in his power.

PRESBYTERIAN CHURCH COMPETITION.

WE write to draw the attention of our readers to this competition. The Presbyterian Church recognizes that the architecture of its churches is not creditable, and desires to bring about an improvement. The method decided upon is to issue a pamphlet with short essays upon architecture, to instruct the congregations as to what is good church architecture. To do this, thoroughly good designs are absolutely necessary for illustration, and such can only be obtained from architects.

The church can not afford to pay for designs for publication in the pamphlet in the usual way, so it was decided to ask the assistance of the architects. This assistance is now asked, and it is hoped a hearty response will be made by the architectural profession. The profession is interested in this movement, and should give it reasonable assistance and support.

There are many architects who are not any too busy at present, who should be able to send in good and suitable designs. Some may say that they will not do so because they will not receive any recompense. Well, such is a fact, but have they not in very many instances to the injury of the profession persisted in preparing designs and forcing them upon prospective clients when they were not asked to do so in the hope of being able to obtain a commission? Now in this instance, the preparing of a design may lead to a commission, possibly to many commissions, and there is nothing small nor lowering in the transaction, but the opposite, as the Presbyterian Church will be assisted in their effort to improve the church architecture of this country, and the competitor will have the pleasure of feeling that he did what he could.

There are many young men, and for that matter draughtsmen in offices, who could enter this competition with advantage to themselves and very probably with advantage to the object of the competition. Young men should seize this opportunity to find out just how they stand in comparison with their confrerés.

We strongly urge upon all architects and draughtsmen to render every assistance that may lie in their power to make this effort on the part of the Presbyterian Church a success.

A GOOD CEMENT.—For a glass-metal cement insoluble in carbon bi-sulphide, alcohol, water, etc., dissolve gelatine in water, add a small percentage of glycerine, and also a small quantity of potassic bichromate.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

THE hardware manufacturers and dealers of this city have started the circulation of a petition to the Government asking that a uniform appraisement of articles charged duty under the same clauses of the tariff at various ports of entry throughout the Dominion be arranged. The complaint is made that much inconsistency is shown by appraisers, and that in consequence of imperfect knowledge on the part of appraisers, imports at small ports enter at lower rates than in the cities.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The semi-annual examination for admission to study and for registration of the Province of Quebec Association of Architects, will be held at the Parliament Buildings, Quebec, on Monday, 25th January, at 10 a. m. Intending candidates are required to give one month's notice to the secretary, Mr. Chris. Clift, accompanied by the necessary fees: For admission to study, $10; for registration, $25.

A meeting of the Council of the Association was held on the 7th inst., the president, Mr. Berlinquet, presiding. It was decided to have a printed list of the names of all registered architects sent to members, that reasonable time should be allowed members to pay their fees, and should any fail to pay arrears within the specified time, their names will be struck from the roll.

In compliance with a request received from the Ontario Association of Architects, a Committee was appointed to arrange for the reading of a paper by a member of the Quebec Association at the approaching annual Convention of the Ontario Association.

It was agreed that all monies paid into the Association by students should be used directly for their benefit.

The Committee on tariff legislation reported that on account of the unsettled state of political affairs in the province at present, action by the Government had been delayed, but the indications are that if the tariff is not fixed too high, it will receive the sanction of the legislature.

Messrs. Dunlop and Maxwell have now a class of twenty-one students. It is the intention when the students are sufficiently advanced to take them out on sketching tours.

A paper was to have been read by Mr. Hayes, but the author found himself unable to prepare it before the next meeting.

BOARD OF TRADE BUILDING.

The sum of $200,000 has been subscribed towards the erection of the Board of Trade building. This is less than half the amount required, and judging by the difficulty experienced in obtaining it, considerable effort will be required to secure the balance. In a wealthy commercial centre like Montreal, money should be freely forthcoming for an enterprise of this kind. The methods of the Building Committee resembling so closely those of the Toronto Board of Trade, it may be that like results are expected to follow, which may possibly account in some measure for the tardiness with which the subscriptions have come in.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

The annual meeting of the above society took place on the 13th and 14th inst. Time forbids more than a brief outline of the proceedings.

The question of co-operating with American societies in entertaining members of foreign engineering societies at the World's Fair was not favorably regarded, but was left in the hands of the council.

Mr. D. H. Keely's paper on "Developments in Telegraphy" was awarded the Gzowski gold medal.

A committee was appointed to consider and report upon the standard system of testing, and also the tests upon Canadian and foreign cement, and report at the next annual meeting.

The election of officers resulted as follows:—President, John Kennedy, Montreal; Vice-Presidents, P. A. Peterson, Montreal; W. T. Jennings, Toronto; Thomas Munro, Coteau; Treasurer, Herbert Wallis, Montreal; Secretary, Clement H. McLeod, Montreal; Librarian, Wm. McNab, Montreal; members of the Council: H. T. Bovey, Montreal; J. Jobson, Hamilton; H. G. C. Ketchum, Fredericton, N.B.; H. N. Ruttan, Winnipeg; P. W. St. George, Montreal; C. E. W. Dodwell, Halifax, N.S.; H. J. Cambie, Vancouver, B.C.; K. W. Blackwell, Montreal; C. H. Keefer, Toronto; H. D. Lumsden, Toronto; F. W. Gisborne, Ottawa; A. McDougall, Toronto; J. D. Barnett, Stafford; F. C. Gamble, Victoria, B.C.; E. A. Hoare, Quebec.

SANITARY HOUSE DRAINS.

IN dealing with the question as to the proper size of drainage pipes for houses, Col. George E. Waring expresses a decided preference for soil pipes of small bore, his own dwelling being furnished with a soil iron pipe from above the roof to outside the building line, of three-inch diameter, this being connected with the street or main sewer by a three-inch earthen sewer from the building line; there is a fall of nearly half an inch to the foot, the distance outside from the house to the main sewer being 110 feet; on this three-inch line with its two water closets, bath tub and kitchen sink, there have been during ten years' use not more than five or six obstructions, mainly due to the presence of the running trap on the main drain. In proving to his own satisfaction the inability of a three-inch soil pipe and house drain to carry off the sewage and waste matter of a private dwelling of average size, Colonel Waring does not recommend the use of three-inch pipe, but considers that a four-inch soil and drain pipe is sufficient for all dwelling houses, a four-inch being able to carry nearly 80 per cent. more than a three-inch pipe. In the same manner he declares in favor of a six-inch pipe for street sewers, though circumstances may exist where a larger pipe should be used.

BUILDING INSPECTION.

The following paper on "Building Inspection" was read last month by Mr. W. E. Doran, at a meeting of architects and students in the city of Montreal:

I will first treat of this question in its social aspect, as it is one, legislation upon which must necessarily be of a socialistic character; that is, it must be such as will control the actions of individuals in the interest of the public at large, and even in the interests of the individuals directly affected.

It is conceded that all matters affecting the safety and prolongation of life are proper subjects wherein the liberty of the individual is to be made subject to the interests of society. That man should live in healthy and safe habitations, and that the public buildings and places he frequents should be equally healthy and safe, is now an admitted axiom. In rural localities, self interest usually prompts the individuals building to in some measure attend to these points. The conditions of life, and the pure atmosphere in a great measure supply for any artificial precautions in regard to the former; and the simplicity of the construction to a certain extent ensures the latter.

It is then in cities, where the aggregation of large numbers of people, their overcrowding in particular localities and the consequent artificial modes of life therein adopted, render it incumbent that authority of some kind interfere as regards the habitations of men and their places of public resort. Thus building and sanitary precautions are to a large extent regulated by the state to civic control, and the power to legislate thereon delegated to municipal bodies. I may be considered as not keeping within the proper scope of my subject when I refer to sanitary matters; but having given the principles upon which cities affect to control building operations within their limits, I hold that a system of building inspection should be devised, which would be at once comprehensive of all the points upon which civic legislation is necessary, and which would secure as far as possible the best legislation be thoroughly enforced.

What is the first consideration in regard to a building? Site. Is it healthy? Is the soil capable of sustaining the structure to be placed upon it? If the answer to both these questions be "yes," then the work may proceed. If to both or either the answer be negative, then competent authority should say "The defects must be remedied or no building shall be erected." Here then I claim is the first matter which a building by-law should govern, and the first question for a competent building inspector to decide.

In connection with this I will add, even at the risk of digression, that no street should be built upon until the drainage therein is as perfect as engineering science can make it, and further, that at the time of constructing a public sewer, a connection should be made to each lot. Thus the soil would have some chance of being drained, rendering the site salubrious, and at the same time frequently converting bad into good building ground.

There is a good deal of attention paid now to the carrying off of sewage, to my mind mis-called "drainage"; whilst soil drainage is almost universally neglected. Though from a sanitary point of view the latter is at least as necessary as the former. Provision should also be made for completely excluding ground air from dwellings, whenever it might in the slightest degree prove injurious; also an enactment requiring the introduction of damp-proof courses in all walls.

2nd. *Light and Air.* The object for which the building is to be erected must determine the amount of [illegible] free space which it should be imperative to adjoin it on the public [illegible] street and on the property of the individual; all this should have a new by-street and on the property of the individual; all this should be provided for in a model by-law, and it should be the duty of the building inspector to see that its provisions were complied with before granting any permit to build.

3rd. *Materials and Modes of Construction.* It is universally admitted that the fundamental parts of construction should be of fire-proof material, or at least of such materials as would tend to retard the progress of conflagration. In fact the first idea of civic building inspection was founded on the prevention of fire, but as the cities progressed in wealth and opulence on the one hand, and unfortunately in poverty and degradation on the other, it has become necessary to guard against such errors of construction in the more ambitious buildings as would render them insecure, not only as regards accidents by fire, but as regards cupidity of human nature from forcing the poor to herd in unwholesome, ill-built, and ill ventilated tenements, which might at any time become fire-traps or sources of pestilence.

How can a law be framed that will cover the various and multitudinous matters that must naturally have to be decided on by the building inspector? Let it be borne in mind that no matter how competent that officer may be, to a certain extent his usefulness is marred unless the law which he is called on to administer be clear, explicit, and clothes him with sufficient authority. It is evident that to meet the requirements of our modern cities, classification of buildings must be resorted to, and for different classes, certain matters of detail must be more carefully attended to than for others. For instance: For an ordinary self-contained dwelling or small tenement, it might be sufficient that after the nature of site, light and air had been satisfactorily attended to, that a general description of the building, with details of manner and materials of construction, drainage and plumber's fixtures should be deposited with the building inspector, and that the owner should be held to notify that officer at stated periods of the work, say at its commencement, when building should be ready for plastering, and again on completion, so that officer might see that everything was in compliance with the law. More important buildings should be graded according to their future uses, their altitude, and so forth, and for these the complete plans should be deposited in the building bureau, and any details as to calculations, etc., required by the inspector should be furnished. These should be verified and if satisfactory, a permit should be issued in which it should be mentioned the various stages at which the department would have to be notified, so that the work would be properly inspected. No deviation should be allowed from the plans without the sanction of the building bureau, and further, a very important point, no building should be used for any purpose which would require a higher classification than that for which it was built, but in justice to the designers and builders, and in deference to public safety, a building should not be overloaded after a few years by the erection of additional stories, or if designed for an ordinary store, or for light manufacturing purposes, should not be exposed to the danger of caving in, or of being converted into a warehouse of the first class, or collapsing from the vibrations of heavy machinery.

In no particular should building inspection be more stringent and severe than in the matter of alterations and additions to old buildings, and if the details of the buildings to be raised or altered do not exist, and unless it can be clearly shown that the possibility of such alterations and additions was provided for in the original construction; careful examination, and if necessary, tests, should be made before the proposed improvements should be sanctioned, and in no case should the factor of safety be diminished.

Special provision should also be made as to public buildings in case of fire, modes of egress, etc., etc. These in fact are pretty generally attended to, but there is one point that is generally neglected, viz., provision to enforce proper systems of ventilation, particularly in school buildings, where children are often found to breathe for hours a vitiated atmosphere. To this cause may be traced many diseases, the origin of which oftimes puzzles physicians.

And the modern tall building, does it not call for some special attention? Is it to be allowed to tower above the reach of fire apparatus, unless constructed altogether and absolutely fireproof? Are elevators to be allowed to daily carry up and down precious loads of humanity without frequent inspection and tests? A prompt mode of dealing with existing structures which may become dangerous is also much needed, so that no one could defy the law, and one would not read as we often do after a disaster, "that the structure was condemned some years ago by the building inspector, but was nevertheless suffered to exist."

A building law should provide carefully for all these and many other details. Now how is such a law to be framed? Certainly not by a committee of aldermen with no technical knowledge, aided by an attorney of more or less legal ability, with a medical gentleman thrown in for the health points; after sitting down and making one or a half dozen conflicting by-laws on the subject, accepting such suggestions as they may think fit from their inspector. Can they hold that gentleman responsible for anything that may occur in any building, old or new, through the length and breadth of a great city, whether he had any notice of his attention being wanted in a particular locality or not, or the authority to interfere if he is aware that certain structures are dangerous? On the contrary, such a law would need long and careful study from competent men, and in its framing, our profession should certainly be consulted. I have purposely avoided anything savoring of local criticism, but I cannot resist the temptation of recording the fact that in one so-called by-law to regulate the construction of buildings in a certain city (you all know what city) no reference is made to the existence of an architect; it is altogether the owner and the builder whom the inspector is to deal with and ask for explanations. The authorities of the same city consulted the plumbers about a proposed sanitary by-law, but not the architects, who are supposed and expected to govern the former. I do not know if the same implied contempt for architects exists elsewhere, but I think I can safely assert that only with their assistance can a practical by-law be framed, which men of ability could accept, and which would be of service to those who wish to build honestly. It would also intimidate those willing to risk the lives of their fellow citizens for the sake of a slight saving of materials or labor, as it should be a penal offence to disregard in building anything which might be injurious to health or dangerous to life.

As to the officials of the building bureau, large cities should be districted, and an inspector appointed for each, who should be a thoroughly trained and experienced architect. All the accessories of building, both for sanitation and for safety should, I claim, be under one bureau, and though the details of interior drainage might be left to special inspectors, still these should be subordinates of the building inspector, and under his control. The latter should be an official in the city engineer's department. All matters relating to building, such as the giving of lines, levels, permits, etc., should be attended to at the one office, so that information or plans once given by intending builders should serve for all these purposes.

I have said that building inspection as a general rule comes under civic control, but there is properly one exception. The state must necessarily exercise a supervision over factories, and in fact should cover all public buildings where no local inspectors exist. However, in cities and towns possessing building inspectors, all general laws should be enforced by them, and the provincial or county inspectors should deal with the public only through them.

There is one point which I wish to emphasize, that is the public should not suppose that the building inspector is an architect employed by a paternal government, to take the place of the regular practitioner, and that he was obliged to give his services gratis to any one too mean to employ an architect. It should be clearly understood that the duty of a building inspector is to examine plans submitted to him, not to prepare, or give instructions for preparing them; that he has to approve or condemn, not to suggest or instruct. It is true when reviewing plans wherein some minor defects would be apparent, he might point these out, and suggest some alterations, but this should be entirely at his own discretion. Again, it would be ridiculous to suppose that the examination of a building inspector at stated times of a structure, to see that vital points were attended to, could take the place of the regular and watchful supervision of the professional architect. I would not be in favor of seeking any legislation in order to compel people to employ architects whether they desire it or not, but I think with suitable and rigid inspection those building would perceive that it was to their own interest to have the services of a competent architect.

There is one more consideration which might possibly become a subject for legislation, but it is a very difficult matter to deal with. I refer to building regulations from an æsthetic point of view. Of course it would be impossible to establish a censorship over plans, and reject those which were considered ugly. Only autocratic power, joined to absolute good taste could do this. Still when a corporation at the public expense proceeds to beautify a city with parks and squares these improve the property in their immediate vicinity, and the public has a right to exact from the owners thus benefitted, that they shall not mar what has been done. If canons of good taste cannot be made law, at least it is possible to prevent mean buildings from being erected in such localities. It seems to me that the city should have power to regulate the minimum, or even in places where it would be desirable, the uniform height of buildings in parts specially favored, even if the favors consisted only of a better class of paving and sidewalks than were possessed by the city at large.

As to erections permitted in public property, such as our own Mount Royal Park, the plans should certainly be submitted to a competent commission to decide not only if they possessed merit of themselves, but also if they were in harmony with the scene, so that man might not mar the beauty which God created.

DESIGNS FOR WORLD'S FAIR MONUMENT.

QUEBEC, Jan. 5th, 1892.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—Through being of French descent, I might be supposed to incline to the compliment of having the Effiel tower repeated at Chicago, and as having myself been one of the competing architects for the proposed London tower, I may be supposed to have somewhat maturely considered the subject. I fully agree with the editors of the *Scientific American*, and have no doubt the general consensus of opinion will bear them out in deploring the fact that any imitation of the Effiel tower is contemplated at the Columbian exhibition. The proposed structure, an engraving of which appears in their last issue, is, or will be looked upon, as they aptly foresee, as a servile and awkward imitation of its prototype, while without any of the elegance of the latter. It is, however, satisfactory to know, if they are certain they are rightly informed, that the structure is not to be fostered by the promoters of the exhibition, but to be merely a side show for penny purposes.

If the tower must be built, let us by all means have some alteration in its outline which will give it an air of originality, be it a cone or a pyramid, or the freestums of an elongated cone, or better still, a series of superposed cylinders, decreasing in diameter, and thus leaving at each successive offset the breadth of a gallery with railing of sufficient height for security, and a floor at, say, every 100 feet, supposing this to be the height of section, with stairways and elevators around a central nucleus to reach the top—something, in a word, after the design submitted by me for the London tower. (See design No. 5 of the illustrated catalogue of the sixty eight competitive designs for the great tower for London, edited by F. C. Lynde, M. I. C. E., St. Stephens Chambers, Westminster, London, 1890). But best of all, why not carry out that grand, that novel, that almost sublime conception illustrated last year in the same journal, of a sphere surmounted by a fac-simile of the vessel in which Columbus sailed on his voyage of discovery. Then would the Columbian exhibition be truly unique and grandiose, and unlike anything the world has seen before. And with what simplicity of construction could not this be carried out, where all the parts can be made to one and the same model, if a perfect square, which it may be for simplicity and rapidity of construction, as the extra time and trouble of making the globe spheroidal, would hardly be warranted under the circumstances: the flattening at the poles being only one 300th (3¼ ft. in 1,000), an inequality between the polar and equatorial diameters which no human eye, however well tutored, could detect. And this again a form, the construction of which is so facile where the Divine architect comes to our aid in the suggestion afforded by the component ungulæ or sections of an orange.

An erect globe, while not uncomplimentary to visitors from the southern hemisphere, the equator and the tropics, as less impartial to the ideas of middle-latitudinarians, would no doubt have some popular advantages, as, in such case, the polar axis pointing to the zenith, would allow of all visitors seeing their respective meridians and the hour circles in a plane vertical or perpendicular to the horizon, as when, from any point on the earth's surface, looking towards the poles of the heavens; and this arrangement would, moreover, afford the opportunity of having the horizontal outer galleries to concord with the parallels of latitude, and, therefore, also with the arctic and ant-arctic circles, the equator, the tropics and the zones. These galleries could be easily reached from the interior by radiating footways from the aerial line, around the solid or well-like nucleus of which a double spiral stairway might extend from ground level to the top, the one ascending, the other downwards to avoid confusion, or by two or more hoists or elevators stopping on their way up and down at the several 10 degrees parallels of latitudes (87½ ft. apart as measured on a meridian), or both stairs and hoists might be used at pleasure. Nevertheless, the bulk of mankind being in the northern hemisphere, and all, or nearly all, in or near middle latitude or about half way between the equator and the pole, and as the erect globe would either place Columbus and his crew and craft, to crown the whole, in the Arctic Sea, if such there be, or lower and tilt his vessel to the latitude of the Atlantic, which would look awkward and unmonumental; it may therefore on the whole be considered best, and so that Columbus may be the crowning figure at the summit, to tilt the axis of the tiny world to true parallelism with the axis of the earth, thus pointing to the opposite poles of the heavens. With this arrangement, the stairs and elevators having to be vertical, as in the former case, would come out at top under the hulk of the vessel, and the outer galleries, if any, would, as they must naturally be horizontal, cut the parallels of latitude and other circles at an angle or inclination to the horizon equal to the latitude or elevation of the pole. And should this scheme on the scale proposed—a globe of a diameter of 1,000 ft.,—be considered too gigantic, too costly in view of the advantages to be derived, let the diameter be reduced to 500 ft., and even at this figure would the proposed sphere have a cubical capacity of some 66 millions of feet, that is, greater by about 6,000,000 than that of the greatest of the far famed pyramids of Egypt. This decrease in the total height of the structure, from 1,235 to say 617 ft., would still leave it the greatest monument of the earth, bring its features of land and sea within easier distance of the eye and more at command of the search lights from the surrounding 250 ft. towers or observatories. The interior, I suppose, would be done in imitation of the starry firmament, with incandescent lights of varied candle power to give an idea of the varied brilliancy of the stars or planets.

Yours truly,

CHAS. BAILLAIRGE,
Architect and Engineer.

PUBLICATIONS.

The announcement that Mr. Howells will leave *Harper's Magazine*, to take editorial charge of the *Cosmopolitan*, on March 1st, calls attention to the process of building up the staff of a great magazine. Mr. Howells, who is recognized universally as the foremost American of letters, upon the expiration of his contract with Harper Brothers, on the first of March will take in hand the destinies of a magazine which promises to exercise a share of influence with the reading classes of the United States. His entire services will be given to the *Cosmopolitan*, and everything he writes will appear in that magazine during the continuance of his editorship.

Messrs. Merchant & Co., of Philadelphia, have published a book entitled "What Visitors will be shown at the World's Fair by Merchant & Co.'s Brownies." In a series of excrutiatingly funny engravings, representatives of every clime are portrayed as coming to the World's Fair, where they view with amazement and much delight, Merchants & Co.'s various exhibits, consisting of roofing plates, star ventilators, sheet copper, seamless tubing, electrical supplies, spiral rivetted pipe, solders and type metals, anti friction metals, etc. After observing their various useful applications, and witnessing the prize of merit being bestowed upon them, the visitors depart for home bearing with them as souvenirs samples of the materials mentioned, and also no doubt an appreciative opinion of the ability of a firm which succeeds in combining instruction enjoyment and business profit in so happy a manner.

The Barnum Wire & Iron Co., of Toronto Junction, have found it necessary to make an assignment for the benefit of their creditors. The liabilities are estimated at $50,000, and the assets at about half that amount. A difficulty with the town authorities concerning a bonus which was promised the company but which for some cause, was never paid to them, has had much to do with the present unfortunate result.

CANADIAN CITY ENGINEERS.

III.

MR. Henry Norlands Ruttan (member Institution of Civil Engineers, member Canadian Society Civil Engineers), City Engineer of Winnipeg, Man., commenced the study of engineering on the Grand Trunk Railway in 1867.

From 1869 to 1874 he was employed on the engineering staff of the Intercolonial railway—for the latter portion of that time, as engineer in charge of section 6 on the Baie Chaleur.

In the winter of 1873 he made an extensive survey of Shippigan Harbor in connection with the proposed short line across the Atlantic.

In 1874 he was employed on exploritory surveys on the north shore of Lake Superior, on the line now occupied by the Canadian Pacific Railway between the Pic and Nepigon rivers.

In 1875-6, as engineer in charge, he made the connecting surveys and location of the proposed line of the Canadian Pacific Railway between Edmonton and the Yellow Head Pass of the Rocky Mountains.

On the beginning of construction of the Canadian Pacific Railway between the Lake of the Woods and the Red river, Mr. Ruttan was engaged by the contractor of section 15, Mr. Jos. Whitehead, as contractor's engineer, where he remained until the work was practically completed and taken over by the Government in 1880, after which he took up his permanent residence in Winnipeg and practiced his profession as civil engineer and contractor.

MR. H. N. RUTTAN, CITY ENGINEER, WINNIPEG.

The first bridge over the Red river in Canadian territory, at Emerson, was designed and built by him. The first 50 miles of the Manitoba South Western Railway was constructed for the Oregon Transcontinental Company by his firm. The first 45 miles of the Manitoba North-western Railway was constructed by him as engineer and contractor.

In 1885 Mr. Ruttan was appointed City Engineer of Winnipeg. The duties of City Engineer in a new place like Winnipeg are not very well defined; they embrace all ordinary descriptions of engineering and architectural construction, as well as the care and maintenance of all streets and public buildings and other property of the city. The most important works are the sewers. The system now contains about 20 miles, and is being extended at the rate of about 3 to 5 miles per annum. The combined system is used. In the construction the most approved modern practice is followed. All sewer connections and plumbing are regulated by by-law and carefully inspected. Pending the adoption of more permanent pavements, cedar blocks are now used.

The city bridges, two iron and one combination, over the Red and Assiniboine rivers, the city buildings, city hall, fire halls, etc., are maintained by the City Engineer's department.

The importance of a good water system being fully realized by the city council, all matters in connection with the construction and operation of waterworks and their relation to the city have engaged the attention of the council, and exhaustive examinations and reports have been made on the subject. The council has also caused investigations to be made by the City Engineer into the merits of the several systems of electric traction for street railways, and are now endeavoring to have an extensive system established in the city.

Outside the ordinary duties of City Engineer, Mr. Ruttan has made reports and estimates of cost of the drainage and development of the lands surrounding the city; on the improvement of the navigation of the Red river between Lake Winnipeg and the city; and on the utilization of the water power of the Assiniboine river—three projects which, if carried out, will add materially to the wealth and population of the city.

PLAN DESIGNING.

THE best instruction in plan design is that of examining a number of designs for any kind of building, such as we meet with in a competition. By comparing the good and the inferior plans, we begin to discover what the strong points are in the good and the weak points in the mediocre plans. We shall find invariably that the poor plans are distinguished by looseness; that they are rambling and straggling; the corridors are long and crooked; the apartments thrown here and there without any connection. The salient mark of the good plan is invariably compactness and coherency. Again we look further. We find a method in the clever plan. If there are principal rooms or departments they have been consigned to positions having some distinct relation to the site; they are prominently located along some axis, or brought to play an important part in the general design. The inferior plan has no such method or principle apparent. Comparing again the plans, we find a waste of ground in the inferior set. Here there is a large space wasted in a corridor or area; but perhaps the entrance is cramped. If the site is irregular, it is ten chances to one the author has lost space along the curved or oblique boundary, that the blocks are made to follow the boundaries, and that the angles are not at right angles. The expert plannist has taken care to make his main frontages, if possible, square, so that the main walls should be parallel, and this he does because he knows the bad effect of crooked roofs and towers if their sides appear so on main facades.

Wasteful arrangements of corridors and offices are common, and so are areas for light. But the principle of economy is only learned after some experience, and depends mainly on the principle of compactness. Much space is lost in dealing with irregular boundaries. The novice is an adept at making crooked corners and leaving spaces. He generally places his blocks parallel to the oblique sides, and in thus disposing of them creates an irregular area in the centre, spoiling the interior of perhaps a hall or some apartment. The contrary process is the course resorted to by the skilful artist. The economical designer boldly makes his main blocks parallel to one principal street or boundary of the site, or assuming an axis, to which they are made parallel. The irregular corners left between the main building and the raking boundaries are thrown out on a rear or inferior side of the area, are filled up by subordinate offices, and are left simply as areas of triangular form for light and air.

Direct and easy access, well lighted corridors, suitable proportions of apartments, and that architectural finesse which distinguishes the masterly from the crude attempt, are other characteristic elements of a clever plan, to each of which we may refer; but these are details which follow from attention to the foregoing principles.—*Building News.*

The stone for the new Toronto drill hall will come from the Deschambault quarries, near Portneuf, Quebec.

The Toronto Radiator Mfg. Co. have recently opened a branch warehouse at Victoria, B.C., in charge of Messrs. Muir & Boyd.

The Deseronto Company has been incorporated at Montreal with a capital stock of 50,000, to manufacture fire-proofing, fire brick, drain pipes, etc.

Joseph H. Farr and John M. Sparrow, of Toronto, have been granted a patent for a roofing composition consisting of petroleum tar mixed while hot with pine pitch, resin, or any other gummy substance, with or without slaked or powdered lime.

The National Brick Manufacturers' Association of the United States has appointed a committee of five to secure an international exhibition of clayworking machinery for the World's Fair. The committee have issued an address inviting the views of the trade.

HYDRAULIC CEMENTS.

THE following instructive paper, by Mr. Edward F. Ball, was read before the members of the Toronto Architectural Sketch Club, at their meeting on the 4th inst:

MR. PRESIDENT AND GENTLEMEN,—It is a popular belief that the cements used by the ancient Romans in the construction of their roads, aqueducts and other public works was superior to any in use at the present time, and that the process of its manufacture is a lost art. It may seem somewhat startling, however, to state the fact that with all the advantages they have had in hardening slowly from two to three thousand years, probably none of them is equal in strength to good Portland cement mortar made of one part cement and two parts sand *one week old*. On the shores of the Bay of Naples cement is made and used at the present day in substantially the same manner as described 2000 years ago by the old architect Vitruvius.

In remote antiquity, before the Roman era, the builders of ancient cities all over the world depended for strength and durability upon the extreme accuracy with which they dressed the surfaces of the large stones which were to be placed in contact, and also upon the bronze dowels used in uniting them. With the Romans, beside accurate stone cutting, two kinds of mortar were used. In situations where it would not be exposed to the dissolving action of the water carefully prepared lime mortar was employed, while for quay walls, aqueducts, drains, cisterns, etc., hydraulic cement was used. As is well known, ordinary lime mortar will not set under water, but if lime be mixed with clay and burned at a high temperature, a substance is formed which sets and continues to harden indefinitely, even when immersed.

The purest limes, sometimes called rich or fat limes, when freshly burned combine readily with water, which process is termed slaking. In so doing they expand, evolve great heat, and fall to powder.

Impure limes, sometimes called poor limes, do not slake so readily.

Hydraulic limes, containing a considerable quantity of clay, scarcely slake at all, and possess the property of hardening under water.

Hydraulic cements do not slake at all, and will set and harden under water.

The particles of lime have greater adhesive than cohesive force, *i. e.*, they will adhere to other substances more strongly than to each other. In hardening, mortar made from lime alone changes volume, and for these two reasons, as well as for economy, sand is used in all mortar made from lime. Good hydraulic cement does not change its volume in setting or hardening, and its cohesive strength is greater than its adhesive, so that sand is used with cement simply for economy.

Cements are divided into two classes, Portland and Natural or Rosendale.

Portland cement was first invented or discovered in 1824 by Mr. Aspdin, of Leeds, England, while experimenting with some of the over-burned clinkers of artificial cement which was then being manufactured. After pulverizing and wetting up into cakes or blocks, it became very hard and in color resembled a limestone that was being quarried for building purposes on the Isle of Portland. In taking out a patent for the new product it was named "Portland." In certain localities natural deposits of rock are found, from which Portland cement may be manufactured, but fully nineteen-twentieths of the Portland used in the United States is artificial. It is made by thoroughly mixing together in suitable proportions clay and finely pulverized carbonate of lime (either chalk, marl, or compact limestone), burning the mixture in kilns at a high temperature, and then grinding the burnt product to fine powder between ordinary millstones. In England the ingredients of the cement are mixed together with a large quantity of water and afterwards dried, burned and ground. This is called the wet process. In Germany the ingredients are mixed dry. It is very important that the ingredients be correctly proportioned, finely ground and thoroughly mixed. No substance coarser than the one-thirtieth of an inch will make cement, and the finer the ingredients are ground the better. Thorough mixing is even more important than correct proportioning, as the temperature in the kiln is not allowed to rise high enough to liquify the mass, and in order that the chemical changes may take place, the particles of lime and clay must be in close contact with each other, otherwise uncombined or "free" lime or clay will be left. In the wet way of mixing, the chalk and clay being of different specific gravities, are liable to become deposited irregularly, even under the most careful supervision. In the dry method, when the water necessary to form the mass into bricks is added, the ingredients are liable to become separated unless the water is added carefully. The first chemical change which occurs in burning is the expulsion of chemically combined water and carbon dioxide; thus calcium carbonate $Ca\,C\,O_3$ is converted into lime $Ca\,O$. The silica $Si\,O_2$ which is present as silicate of alumina in the clay, is partly transferred to the lime, forming a double silicate of lime and alumina. A high temperature is necessary for the production of this double silicate, but at a lower temperature the alumina which was present in the clay as a base plays the part of an acid, and combining with the lime, forms a tri-calcium aluminate, $Ca_3\,Al_2\,O_6$, or as it may be written $Al_2\,O_3\,3Ca\,O$. If the temperature be too high, a lime glass is formed which has no hydraulic properties, and if the burning be continued at this temperature, a solid crystallization between the silicate and aluminates of lime is formed, which does not set.

SETTING OF CEMENT.

The setting of cement is a complex process, partly chemical, partly mechanical. The chemical reactions give use to substances which as soon as formed combine with water and constitute the true cementaceous material. The tri-calcium aluminate $Ca_3\,Al_2\,O_6$ is soluble in 3000 parts of water, and in the act of setting first dissolves and then begins to separate as a mass of felted needles, consisting of calcium aluminum hydrate, which extend in every direction and are directly the cause of the first setting of the cement. At the same time an action begins which requires a much longer time for its completion, and which probably consists in a combination of the first formed aluminum hydrate with the tri-calcium aluminate and the water forming a mineral of the probable composition $H_{10}\,Ca_2\,Al_2\,Si_3\,O_{17}$. This substance crystallizes out as it forms, and this continues to add to the solidity and tenacity of the cement for long periods subsequent to the first setting. Some experiments made by the writer seem to confirm the theory that aluminum plays an important part in the first setting of the cement, and also that this is dependent in a measure upon the solubility of some of the ingredients. The experiments are as follows: Aluminum, in the form of alum (either raw or burned) added to cement and moistened, causes the mass to rise greatly in temperature, showing that a chemical change is taking place, probably the formation of tri-calcium aluminate before referred to; a sample of Improved Union cement mixed neat with water, set in 20 minutes; a sample of the same cement with two per cent. of burnt alum added, set in 8 minutes; same with 4 per cent., set in 7 minutes; same with 6 per cent., set in 7 minutes. A solution of aluminium hydrate in caustic potash produced the same effects, but in a less marked degree. It is a well known fact among cement testers that in order to get the full strength of the cement it must be thoroughly mixed and kneaded or stirred after the water has been added. This seems to indicate the presence of a soluble constituent which it is necessary to diffuse throughout the mass in order to obtain the maximum strength. If dry cement be forced into moulds under a pressure of say 70 lbs. per sq. inch, and then allowed to absorb water, a very dense, hard briquette will be formed, but it will be very weak in strength, and also very uncertain. If sufficient water be added to dry cement to properly moisten it, and if the mass be stirred just sufficiently to ensure thorough and complete moistening, and the briquette put into the moulds in the usual way, it will not be so dense or compact as if made in the way described, but will be much stronger. If, instead of slightly stirring the moistened cement, it be thoroughly turned and kneaded as long as possible before setting begins, the best and strongest briquette may be made. All this, in the opinion of the writer, points to the existence of a soluble constituent as before remarked.

IMPURITIES.

If by reason of imperfect proportioning, grinding or mixing, any portion of the lime fails to combine chemically with the silica or alumina of the clay, this is known as "free lime," and when the cement is fresh, is in the form of $Ca\,O$. Upon exposure to the air it absorbs moisture and becomes slaked, thus: $Ca\,O + H_2\,O = Ca\,(OH)_2$. Upon still further exposure it slowly absorbs carbon dioxide, and returns to its original composition before being burnt, viz., carbonate of lime: $Ca\,(OH)_2 + C\,O_2 = Ca\,C_3\,O + H_2\,O$. When present in the unslaked form, ($Ca\,O$), free lime is one of the most dangerous impurities in cement, as upon the addition of water it slakes and expands, thereby disturbing the setting of the cement. This slaking is not rapid like that of rich or fat limes, and often its effects are not apparent for the first day. It frequently happens that samples of cement will stand a good tensile strain at the end of 24 hours, while at the end of seven days the strength will hardly be greater than the 24 hours test—sometimes even below it. This generally indicates free lime, and in such a case the sample should be exposed to the air for a week and a second test made. If this test comes up to the standard, the trouble is due to the presence of free lime, and the cement may be accepted provided the other tests are satisfactory, on condition that it be spread out and exposed to the air for a week or more before use. If the lime have sufficient activity, thin cakes of the cement immersed in water for a week will become cracked, but if the lime is not present in sufficient quantity or has not the necessary activity, no cracks may appear. In order to render this test more effective, the cakes or pats may be exposed as soon as they are hard to a high temperature saturated with moisture for about three hours, and then boiled for twenty-four hours. Two per cent. should be the limit of this impurity, especially if the cement be for use under water; for use in air the presence of free lime is not so injurious, provided, of course, that it is slaked. Free lime retards the setting of cement and impairs its hydraulicity. When present in considerable quantity the cement will disintegrate on immersion, unless first allowed to become quite hard in air. In determining the amount of free lime in cement by chemical analysis, it is customary to find the amount of $C\,O_2$ on the supposition that the free lime is all in the form of carbonate, and then calculate the amount of $Ca\,O$—1 per cent. of $C\,O_2$, indicating 1.3 per cent. of $Ca\,O$. This, however, is a very unreliable method, as the lime must first be hydrated and then carbonated. This requires a long time if exposure to the air is relied upon to effect the change, as is usually the case. Hydrogen Sulphide, $H_2\,S$, is often evolved with the carbon dioxide, and this also affects the accuracy of the test.

Magnesia (in the free state) is another dangerous impurity. It may not prevent the cement from setting and becoming apparently as hard as though it were absent. For a long time it may remain inert, and perhaps for months there may be no apparent change. The magnesia, however, has an affinity for water; every two pounds of magnesia in becoming hydrated, takes up and solidifies one pound of 27.7 cubic inches of water, and in bulk every ton of magnesia would have to find room for about 16 cubic feet of water. In finding room for this water the mortar becomes disintegrated. The action continues whether in air or in water, and is especially disastrous in concrete work. Instances are recorded where concrete works have failed although built in the usual manner with cement that had stood the ordinary mechanical tests. The concrete set as hard as usual; but after a time expansion set in. In one case, a vertical wall about 35 feet high was lifted about 2½ inches, in another, a mass of concrete 16 feet thick was lifted from ½ to 1¼ inches. In both cases a white substance of the consistency of cream was seen in the concrete. On being analyzed, this substance was found to contain 80 per cent. of magnesian hydrate, consisting of about ⅔ magnesian oxide and ⅓ water. The writer made some experiments with five per cent. by weight of calcined magnesia added to Improved Union cement. The magnesia was found to render the paste very plastic and easily worked. It retarded the setting from twenty minutes to two hours, and greatly decreased the strength of the cement, as follows:

Neat cement, 1 day old, tens. strength	= 45	lbs. per square inch.
" " 1 week old, "	= 74	" "
Cement with 5% mag., 1 day old, tens. strength,	= 8	" "
" " 1 week old, "	= 19	" "
" " 2 " "	= 36	" "

At the end of one week the pats were very soft; the outside was light-grey and the interior the usual color. Good Portland cement should in no case contain more than one per cent. of magnesia.

By the rules of the "Ecole Nationale" of Paris, if the amount of sulphuric acid exceeds 1½ per cent., the cement is rejected on the chemical analysis alone.

When Portland cement is properly burned, it forms a very hard clinker, which is expensive to grind to the fineness now demanded by engineers, as the machinery requires constant repair. To render the grinding easier, iron slag meal is sometimes added to the cement clinker. This slag cement may be recognized by its lighter specific gravity (2.60) and by its color, which is a mauve tint in powder, while the inside of the water pat when broken is deep indigo. Its presence when mixed with Portland may be detected as follows: To a gill of water, add about 80 drops of sulphuric acid. Into this drop 25 grains of the cement and stir rapidly with a glass rod, and while still stirring, pour in drop by drop, a solution of Condy's fluid (64 grains of permanganate of potash to one pint of water) until the red color remains permanent. Genuine Portland will require only to to 15 drops of the permanganate solution, whilst an adulterated cement will take considerably more—30 to 60—and a cement made from slag over 200 drops. The principle of this test is as follows: Solid permanganate of potash is at once decomposed by the addition of strong acids, but in water solution this decompsition does not at once take place except by contact with oxidizable substances. This action is apparent by the change of color, the deep purple being rendered colorless. All Portland cements contain a small quantity of iron; thus with unadulterated cements a certain amount of the permanganate will be bleached, but cements containing iron in undue proportions will bleach a much greater quantity of the solution. A simple test for the same purpose is as follows: Place upon a clean silver coin a thin layer of cement, and drop on it a small quantity of dilute sulphuric acid (one acid to seven water) and afterwards rinse with water. If the cement be genuine Portland, the treatment will only slightly affect the color of the silver, but if slag be present in any notable proportion, a dark brown stain will be produced. Slag cement has been for some time manufactured in Germany, and works

have also been established for its production in England. Being a mechanical mixture of iron slag with slaked lime, it is very different in its constitution from Portland cement, which is a true chemical combination. It is stated by its inventors to be fully equal in quality to Portland cement; this, however, is not admitted by the highest authorities. Cement adulterated with slag and slag cement will be found finer ground and quicker setting than Portland, and it will attain its maximum strength in a shorter time than the best Portland, but retrogression then takes place which is most treacherous in its nature. The failure of the concrete construction of the Aberdeen harbor works is now attributed to the use of cement which was not true Portland, although at first it was considered that the action of the sea water was the cause, but examinations of similar constructions built with good Portland cement many years previously proved, that when the proper material is employed and due care exercised in construction, permanency is assured.

Salt is often added to the water used in mixing mortar in cold weather, to prevent the mortar from freezing before it has set. Authorities differ regarding the effect of salt. The most reliable information is probably contained in the report of the tests made at Governor's Island, New York harbor, by Mr. John Gartland for Col. D. C. Houston, U. S. engineer, and also of tests at the Cairo bridge. In the first mentioned tests, sea water was used, and was found to increase the strength of the cement from 1 to 80 per cent., except in the case of Hoffman Rosendale two months old. At three and six months, this same cement gave higher tests with sea water. About 330 briquettes from 8 brands of cement were tested, so the results seem entirely reliable. In the tests at the Cairo bridge the mortars were mixed in the proportion of 1 volume of cement to 2 volumes of sand. The tests were made in the manner recommended by the American Society of Civil Engineers. Each result is the mean obtained from 10 briquettes at the age of six months. The general opinion of engineers that sea water decreases the strength of cement is probably based on Gillmore's experiments, which were not nearly so comprehensive as the above.

TABLE SHOWING RESULTS OF TESTS WITH SALT AND FRESH WATER, MADE BY MR. JOHN GARTLAND, GOVERNOR ISLAND, NEW YORK HARBOR.

BRAND.	1 DAY		1 WEEK		1 MONTH		2 MONTHS		3 MONTHS		6 MONTHS	
	Fresh	Salt	Fresh	Salt	Fresh	Salt	Fresh	Salt	Fresh	Salt	Fresh	Salt
Rosendale, old	50	81	166	163	218	—	—	—	264	278	292	372
" Hoffman	—	—	—	—	—	—	—	—	—	—	—	—
Lawrence Cem. Co.	—	—	151	101	216	—	—	—	—	—	—	—
Rosendale, "Improved"	—	—	142	—	—	—	—	—	—	—	—	—
Catasiqua (Am.)	292	351	—	—	—	—	—	—	769	721	776	855
Newark Co.	—	—	—	—	—	—	—	—	871	691	822	869
Alsen's Portland	345	348	568	527	612	584	665	530	334	291	399	797
Hercules Portland	—	—	—	—	—	—	—	—	270	232	222	772
									684	758	776	

TABLES SHOWING THE RESULT OF TESTS MADE AT THE CAIRO BRIDGE.

BRAND OF CEMENT	FINENESS		TENSILE STRENGTH, LBS. PER SQUARE INCH				
	% passing No. 50 sieve	% passing No. 100 sieve	0% salt	2% salt	4% salt	8% salt	12% salt
Portland, Alsen's, Louisville	99.2	87.0	201	213	223	215	245
Falls City Mills,	92.4	83.5	176	179	172	146	156

Sugar added to mortar has the same effect in preventing freezing that salt has. It also combines chemically with the lime, forming a sucrate of lime, which is a detriment to cement mortar, but increases the strength of lime mortar, especially in the heart of thick walls, where lime would not harden under ordinary conditions. An excess of clay in cement is said by some to make the mortar more easily affected by frost. Over clayed cements, if underburned, set quickly and give a high test, but they are liable to injury during calcination by changes of temperature, while cement containing a slight excess of lime is not easily injured thereby.

REQUISITES FOR GOOD PORTLAND.

Good Portland should be burned at a high temperature, which is indicated by high specific gravity (95 lbs. per cubic foot) and slowness in setting (2 hours or longer). The color indicates but little, since it is chiefly due to the oxides of iron and manganese. Gray or greenish gray is considered best; bluish gray indicates a probable excess of lime; brown, an excess of clay. A mauve tint indicates adulteration with iron slag, and an undue proportion of underburned material is generally indicated by a yellowish shade, with a marked difference between the color of the hard burned ungrounf particles retained by a fine sieve and the finer cement which passes through the sieve. The fineness should be such, that 90 per cent. by weight will pass through a sieve of 2,500 meshes per square inch made of No. 40 wire (Stubb's wire gauge). Made into cakes or pats about 2½ inches square and ⅜ inch thick and immersed in water immediately after setting, it should show no cracks at the end of a week. The tensile strength of Portland cement should be about as follows, a very high strength within four weeks generally indicating an unsound cement:

COMPOSITION NEAT OR SAND	TENSILE STRENGTH LBS. PER SQ. INCH.			
	24 hours.	1 week	1 month	1 year.
Neat cement	100 to 140	250 to 550	350 to 700	450 to 800
3 parts sand to 1 part cement	——	80 to 125	100 to 200	200 to 350

It should not contain impurities in excess of the following quantities: Magnesia, 1 per cent.; free lime, 2 per cent.; sulphuric acid, 1½ per cent.; ferric oxide, 4 per cent.

ANALYSIS OF CEMENT.

Theoretically the ratio of the lime and alumina (together) to the silica should be as 265 to 100.

Combining weight of lime Ca O = 238.5
" " alumina Al_2O_3 = 26.5
265.0
" " silica $Si O_2$ = 100.0

Following are two analysis of good Portland cements, Josson and Burham:—

	JOSSON.	BURHAM.
Lime Ca O	63.60 %	61.04 %
Silica $Si O_2$	22.60	22.45
Alumina Al_2O_3	6.72	6.91
Oxide of iron Fe_2O_3	1.69	3.62
Magnesia Mg O	0.97	1.18
Potash K_2O	1.62	1.86
Soda Na_2O	——	——
Sulphate of lime Ca SO_4	——	——
Water H_2O	——	——
Sulphuric acid	1.30	1.44
Carbonic acid	1.50	1.50
	100.00	100.00

NATURAL CEMENTS.

By Natural cements are meant those which are obtained from natural stone containing lime and clay burned at a comparatively low temperature. This cement rock is usually found in several layers, containing various proportions of clay, lime, etc., and it is only by a judicious mixture of stone from the different layers that a good cement is formed. The rock is quarried, broken into pieces and burned in a kiln. The burnt cement is then crushed into small fragments and ground between ordinary millstones.

The description of impurities in Portland cement is applicable to Natural cements, except the part relating to magnesia. Free magnesia is objectionable in Natural cement as in Portland, but the greater part of natural cement rocks are argillo-magnesian limestones. In burning, a triple silicate of lime, alumina and magnesia is formed which makes a good cement, but any free magnesia will absorb water and expand as in Portland. Natural cement is generally light colored and quick setting, and is especially adapted to sewer work and places where the mortar is exposed to running water before setting. The requirements for good Natural cement are the same as Portland, except as regards color, weight, tensile strength and the presence of magnesia. The tensile strength should be about as follows:

COMPOSITION NEAT OR SAND	TENSILE STRENGTH	LBS. PER SQ. INCH.		
	24 hours.	1 week.	1 month.	1 year.
Neat cement	40 to 80	60 to 100	100 to 150	300 to 400
1 part cement to 1 part sand	——	30 to 50.	50 to 80	200 to 300

IMPROVED CEMENTS.

This name is given to Natural cements mixed with Portland. The Natural cements are usually light colored and the Portland dark, so that color of the mixture is of some value in determining the quality. It is advisable to obtain samples of the natural or "unimproved" cement, and also of the Portland used in the mixture. By comparing samples of the improved cement with these, a fair idea of its quality may be obtained.

The following tests of "Improved Anchor" cement made at the Chief Engineer's Office, Lehigh Valley Railway, will give a fair idea of the tensile strength of a good "Improved" cement:

COMPOSITION NEAT OR SAND	TENSILE STRENGTH LBS. PER SQ. INCH			
	24 hours	1 week	1 month	1 year
Neat cement	100	140	220	420
1 cement to 2 sand	——	30	75	275

Improved cements eventually attain great strength and hardness, and are but little inferior to the lower grades of Portland.

TESTING CEMENT.

On June 21st, 1885, a Committee of the American Society of Civil Engineers recommended a system of testing cement of which the following is a brief synopsis:

"It is recommended that tests for hydraulic cement be confined to methods for determining fineness, liability to checking or cracking and tensile strength; and for the latter, for tests of 7 days and upward, that a mixture of 1 part of cement to 1 part of sand for Natural cements, and 3 parts of sand for Portland cements, be used, in addition to trials of neat cement. The quantities used in the mixture should be determined by weight. Usually, when cement has a good reputation and is used in large masses, the testing of every fifth barrel seems to be sufficient; but in very important work where the strength of each barrel may in a great measure determine the strength of that portion of the work where it is used, or in the thin walls of sewers, etc., every barrel should be tested. In selecting the cement for experimental purposes, take the sample from the interior of the original packages at sufficient depth to ensure a fair exponent of the quality, and store the same in tightly closed receptacles, impervious to light or dampness, until required for manipulation, when each sample of cement should

be so thoroughly mixed, by sifting or otherwise, that it shall be uniform in character throughout its mass.

The test for checking or cracking is an important one, and though simple, should never be omitted. It is as follows:—Make two cakes of neat cement 2 or 3 inches in diameter, about ½ inch thick, with thin edges. Note the time that these cakes, when mixed with mortar to the consistency of a stiff plastic mortar, take to set hard enough to bear a one-twelfth inch diameter wire loaded with ¼ pound, and a one-twenty-fourth inch wire loaded with 1 pound. One of these cakes, when hard enough, should be put in water and examined from day to day to see if it becomes contorted or if cracks show themselves at the edges, such contortions or cracks indicating that the cement is unfit for use at that time. In some cases the tendency to crack, if caused by the presence of too much unslaked lime, will disappear with age. The remaining cake should be kept in air and its color observed, which for a good cement should be uniform throughout, yellowish blotches indicating a poor quality, the Portland cements being of a bluish gray and the Natural cements being light or dark according to the character of the rock of which they are made. The color of the cements when left in the air indicates the quality much better than when they are put in water.

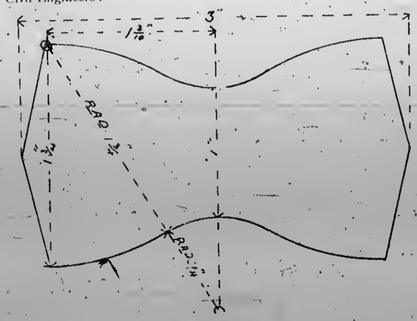
The strength of a cement depends greatly upon the fineness to which it is ground, especially when mixed with a large dose of sand. Cement of the better grades is now usually ground so fine that only from 5 to 10 per cent. is rejected by a sieve of 2500 meshes per square inch, and it has been made so fine that only from 3 to 10 per cent. is rejected by a sieve of 3,200 meshes per square inch. The finer the cement, if otherwise good, the larger the dose of sand it will take and the greater its value. Following is a table showing the results of tests made at the Cairo Bridge:

BRAND OF CEMENT.	Proportion of sand	Tensile strength, lbs. per square inch for different degrees of fineness No. 100 sieve.				
		100%	90%	80%	70%	60%
Louisville 6 months old.	Cement 1 Sand 0	320	335	318	305	349
	Cement 1 Sand 1	283	298	299	280	249
	Cement 1 Sand 2	199	192	184	173	161
Portland 6 months old.	Cement 1 Sand 0	620	621	659	692	712
	Cement 1 Sand 1	478	459	436	391	352
	Cement 1 Sand 2	322	299	263	249	224

The tests should be applied to the cements as offered for sale. If satisfactory results are obtained with a full dose of sand, the trials need go no further. If not, the coarser particles should first be excluded by using a No. 100 sieve, in order to determine approximately the grade the cement would take if ground fine, for fineness is always attainable, while inherent merit may not be. The question of a standard sand seems one of great importance, for it has been found that sands looking alike and sifted through the same sieves, give results varying within wide limits. The material that seems likely to give the best results is the crushed quartz used in the manufacture of sand paper, being both clean and sharp. The degree of fineness should be such that it will all pass a No. 20 sieve, and be caught on a No. 30 sieve. The proportions of cement, sand and water, should be carefully determined by weight, the sand and cement mixed dry and all the water added at once. The mixing must be rapid and thorough, and the mortar, which should be stiff and plastic, should be firmly pressed into the moulds with the trowel, without ramming, and struck off level; the moulds in each instance, while being charged and manipulated, to be laid directly on glass, slate, or some other non-absorbent material. The moulding must be completed before incipient setting begins. As soon as the briquettes are hard enough to bear it, they should be taken from the moulds and be kept covered with a damp cloth until they are immersed. For the sake of uniformity, the briquettes, both of neat cement and those containing sand, should be immersed in water at the end of 24 hours, except in the case of one day tests. Ordinary fresh, clean water, having a temperature between 60 and 70 degrees F., should be used for the water of mixing and immersion of samples. The proportion of water required varies with the fineness, age or other conditions of the cement, and the temperature of the air, but is approximately as follows:

For briquettes of neat cement, Portland, about 25 %
" " " " Natural, " 30 %
For briquettes of 1 part cement and 1 part sand, about 15 % of the total weight of sand and cement.
For briquettes of 1 part cement and 3 parts sand, about 12 % of the total weight of sand and cement.

The object is to produce the plasticity of rather stiff plasterer's mortar. An average of 5 briquettes may be made for each test, only those breaking at the smallest section to be taken. The briquettes should always be put in the testing machine and broken immediately after being taken out of the water, and the temperature of the briquettes and of the testing room should be constant between 60 and 70 degrees F. The following figure shows the form of briquette recommended by the Committee of the American Society of Civil Engineers:



SCALE, FULL SIZE.

GERMAN METHOD OF TESTING PORTLAND CEMENT.

In November, 1878, the Prussian Minister of Public Works issued a series of standard rules for testing Portland cement, which were adopted by nearly all the architectural and engineering associations in Germany, and subsequently served as a basis for standard rules in several adjoining countries. At the instance of the Association of German Cement Manufacturers, these rules have now been altered and several important modifications introduced. The amended rules were published by the Prussian Minister of Public Works in July, 1887, and differ from the rules previously in force as follows: The time of setting of a slow-setting cement is now fixed at two hours instead of half an hour. In testing for expansion, the cake of cement is allowed to set for 24 hours before immersing in water, during which period it is to be kept moist and in the shade. The cement must be ground so finely that not more than 10 residue remains upon a sieve of 900 meshes per square millimetre (5,800 meshes per square inch) and made of wire the thickness of which is one-half the width of the mesh; 100 grams (0.22 lbs.) of the cement is to be used for each test. The strength is ascertained by tensile and compressive tests; the cement in both cases being mixed with three times its weight of sand of a definite size of grain. The breaking area of the tensile briquette is 5 square centimetres (0.775 square inches), and the compression tests are made with cubes of 50 square centimetres (7.75 square inches). The minimum tensile strength of a mixture of 1 part by weight of slow-setting cement mixed with 3 parts by weight of standard sand, after hardening 1 day in air and 27 days under water, is 16 kilogrammes per square centimetre (227.5 pounds per square inch). The crushing strength is 160 kilogrammes per square centimetre (2275.6 pounds per square inch). The standard sand is obtained by sifting clean quartz sand first through a sieve of 50 meshes per square centimetre (387 meshes per square inch), made of wire 0.38 millimetre (0.0146 inch) diameter, then through a sieve of 120 meshes per square centimetre (774 meshes per square inch), made of wire 0.32 millimetre (0.0123 inch) diameter. The sand which remains upon the finer sieve is that which is to be used for the tests. For each series of tests ten briquettes at least must be broken; the average of the ten numbers obtained being taken as the strength of the cement. In making each five briquettes for the tensile test, 250 grammes (0.55 pound) of cement is mixed with 750 grammes (1.65 pound) of standard sand and 100 grammes (0.22 pound) of fresh water, the whole mass being well mixed for five minutes. The mortar is beaten into the moulds for one minute with a spatula weighing about 250 grammes (0.55 pound) until water begins to rise. When the surface has been smoothed with a knife, the mould is carefully removed and the briquette placed in a covered zinc-lined box for 24 hours. It is then immersed in water for the remainder of the hardening period. In making these briquettes by machinery, Dr. Bohme's apparatus is used; 180 grammes of the mortar is placed in the mould and subjected to 150 blows of a hammer weighing 2 kilogrammes (4.4 pounds). For crushing tests, Dr. Bohme's machine alone is prescribed; the proportion of water and number of blows of the hammer being the same as for tensile briquettes. All the briquettes must be tested immediately they are removed from the water. In breaking the tensile briquettes, the weight must be added at the rate of 100 grams (0.22 pound) per second. It may be mentioned that the amount of water prescribed by the German rules makes the mortar about the consistency of moist earth.

And now, gentlemen, having discussed at considerable length a very dry and dusty subject, let us enquire how it is that every manufacturer produces the best cement on the market. The reason is somewhat as follows: One of the smaller towns in Canada or the States, let us suppose, has risen to the dignity of a city, with a board of works and a duly appointed engineer, who, we hope, is a graduate of the Ontario School of Practical Science, and who is alive to the importance of carefully examining all cement used on public works. Some engineering structure of unusual importance is about to be built, and tenders for materials are asked, among other things, cement. Then up comes the great unwashed army of cement manufacturers, who, unlike their German brethren, have not awakened to the advantages to be derived from a trade union, and each deposits his tender accompanied by circulars showing that large quantities of his particular brand have been used on important works all over the country. In due time the tenders are opened, and, as usual, the figures are all closely bunched. The cement men get uneasy and anxious; but not so with our engineer. We notice an unusual gleam in his eye, and with a sardonic smile he vouchsafes the blood-curdling information that the board has ordered a testing machine. After the tests are made the contract is awarded to Mr. A., as his cement stood the highest in the tests. Then another town advertises, and the same performance is reported, and Mr. B. gets the contract, and so on from A to Z. Thus all the manufacturers are satisfied, for each has found a place where his cement stood the highest test, proving conclusively that it is the best in the market.

DISCUSSION.

During the discussion which followed, Mr. Barrett pointed out that in hot summer weather considerable quantities of sand and cement were sometimes mixed dry and stored away ready for wetting up into mortar, but this should never be tolerated, as the sand, although apparently perfectly dry, contains sufficient moisture to cause incipient setting in the cement, thereby detracting from its strength.

Mr. Wells: Why are not 24-hour tests made of mixtures of sand and cement, the same as with neat cement?

Mr. Ball: Although 24-hour tests of neat cement are useful either in themselves or in comparison with the 7-day tests, 24-hour tests of a mixture of sand and cement are of no value. 24-hour tests of neat cement, in themselves, give little or no indication of the ultimate strength which that cement will attain, but such tests are useful where a quick setting cement is required, as for sewers, in running water, &c., where quick setting is desirable, or where a considerable strain will be brought to bear soon after the cement is in place; they are also useful when compared with 7-day tests, as before mentioned. Sand does not diminish the ultimate strength of cement so much as it retards its setting and hardening, as will be seen by a comparison of the strengths of neat cement and of mortar at the ages of 7-days and one year. Mortar made with cement and sand at the age of 24-hours would possess very little strength, and would give no indication of the ultimate strength.

Mr. Johnson: I would like to ask the speaker's opinion on the practice of specifying the best quality of cement for first class masonry, and allowing inferior grades in third or second class masonry.

Mr. Ball: This is a very common mistake. Stones accurately

cut and fitted will stand without cement, as may be seen in ruins of ancient buildings, and first class masonry; with carefully laid courses, well bonded and joints dressed to half an inch for ten inches back approximates to this. But in second or third class masonry, the courses are not so carefully arranged nor the joints so accurately dressed, and more irregular pieces, such as spalls, &c., are allowed in the heart of the wall, in consequence of which the bond is not so strong as in first class, and there is more dependence on the binding power of the cement. Take concrete—where the stones in themselves have absolutely no bond at all—the very best cement is required; so, in my opinion, if any difference in the quality of cement is permissible in different classes of masonry, the best cement should be placed in that class in which the bond of the stones is least able to afford sufficient strength.

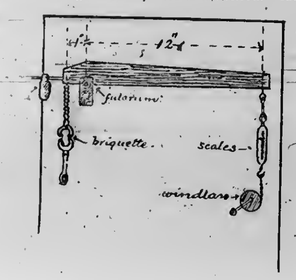
Mr. Barrett: Why are tests made of the tensile strength of cement instead of the compressive strength, which is the principal requirement in work?

Mr. Ball: It has been found by experiment that the tensile strength of cement bears a nearly constant ratio to its compressive strength—about 1-10. A very large and strong machine would be required to make compressive tests, beside which it is difficult to say at what particular weight a cube is crushed, as it splits up into smaller pieces and breaks gradually, whereas tensile briquettes break instantly.

Mr. Woolnough also pointed out that in specifying the weight per struck bushel of Portland cement it was necessary to test a whole bushel filled from a hopper placed at a certain specified height above the measure. A half or quarter bushel filled in the same manner would not be a half or a quarter of the weight of the whole bushel.

Mr. Ball stated that he did not place much value on this test, as it required a large quantity of the cement, was troublesome to make, and was only useful in indicating whether the cement was well burned or not, which could be ascertained by methods before described.

Mr. Virgil G. Marani gave an illustration of a very practical and easily constructed cement testing machine. A lever of wood is constructed, at one end of which, 1" from fulcrum, the appliance for holding the briquette is attached. At a distance,



say 12" on other side of fulcrum, an ordinary spring scales is hooked, the strain being produced by a small windlass. Therefore when scales, 12" from fulcrum, register 10 lbs. a time of fracture of briquette, the cement has stood a test of $12 \times 10 = 120$ lbs. Before making test, the weight of scales is counterbalanced by a sliding weight at *a*. This, although not an absolutely accurate method, gives very satisfactory results.

PERSONAL.

Mr. J. A. Pearson, President of the Toronto Architectural Sketch Club, is visiting parents and friends in England.

Mr. M. B. Aylesworth, architect, Toronto, is making a tour of Europe, in search of architectural knowledge.

Mr. Geo. W. Gouinlock, architect, Toronto, has recently entered into partnership with Mr. Garland, the firm name being Gouinlock & Garland.

Mr. Willis Chipman, C. E., proposes to visit Europe shortly. One object he has in view is to witness the effect of cold weather upon the operation of sewage farms in Germany.

The Hon. J. A. Ouimet has been appointed Minister of Public Works for the Dominion, and the Hon. John Haggart has been placed at the head of the Department of Railways and Canals.

The partnership recently entered into between Messrs. Smith & Gemmell and Mr. E. B. Jarvis, architects, of Toronto, has been dissolved. Mr. Jarvis has again opened offices in the Traders' Bank building.

Mr. John Galt, C. E., Toronto, has patented a steam or water heating furnace consisting of sections, with means for uniting them and providing circulation of water or steam from section to section, said sections being provided with a fire-chamber in the upper part thereof, with a stratum of water above and around the same, and flues situated beneath said chambers for conducting heated products of combustion therefrom through said section to the outlet.

OUR ILLUSTRATIONS.

NEW HIGH SCHOOL, MONTREAL.—ALEX. C. HUTCHISON, ARCHITECT.

This building occupies a block of land lying between Peel and Metcalfe streets, formerly the site of the High School building destroyed by fire over a year ago. It has a frontage on each street of about 250 feet by a depth of about 216 feet, and a height of two stories above the basement.

The basement contains the Smead-Dowd heating apparatus, coal rooms, play rooms, janitor's apartments, chemical and physical laboratories, with lecture and work rooms attached, and manual training room. The main and second storey floors contain thirty-two large and eight small class rooms, offices for superintendent, treasurer, principals, board room, &c.

The central portion of the building fronting on Metcalfe street contains a drill hall, 90' 8" × 56' 0", while the second storey of the central portion of the building, fronting on Peel street, contains an assembly hall capable of seating about 1300 persons. The building is wired throughout for electric lighting, and all the class rooms, lecture rooms, &c., are in telephone connection with the principal's room.

The elevations of the building are faced with pressed brick with trimmings of olive green New Brunswick sand stone.

HOUSES ON BAY ST. SOUTH, HAMILTON, ONT.—JAS. BALFOUR, ARCHITECT, HAMILTON.

The corner house is a reconstruction, having formerly been a cottage.

RESIDENCE OF CAPT. S. CRANGLE, ROSEDALE ROAD, TORONTO.—GORDON & HELLIWELL, ARCHITECTS, TORONTO.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION FOR A SUBURBAN COTTAGE—DESIGN BY "JACK PLANE" (J. W. SIDDALL), TORONTO, AWARDED THIRD POSITION.

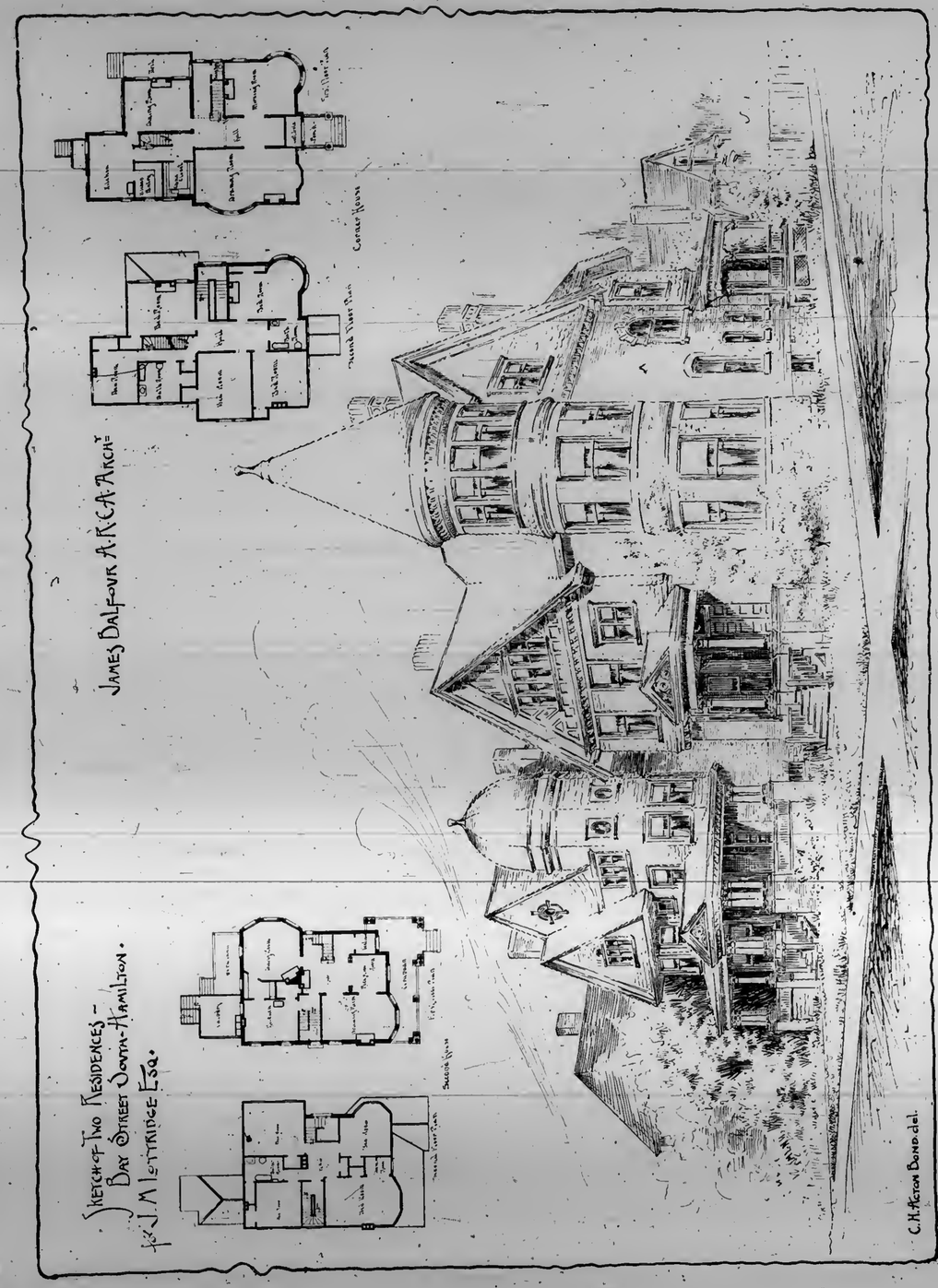
"METHODS IN COLORING."

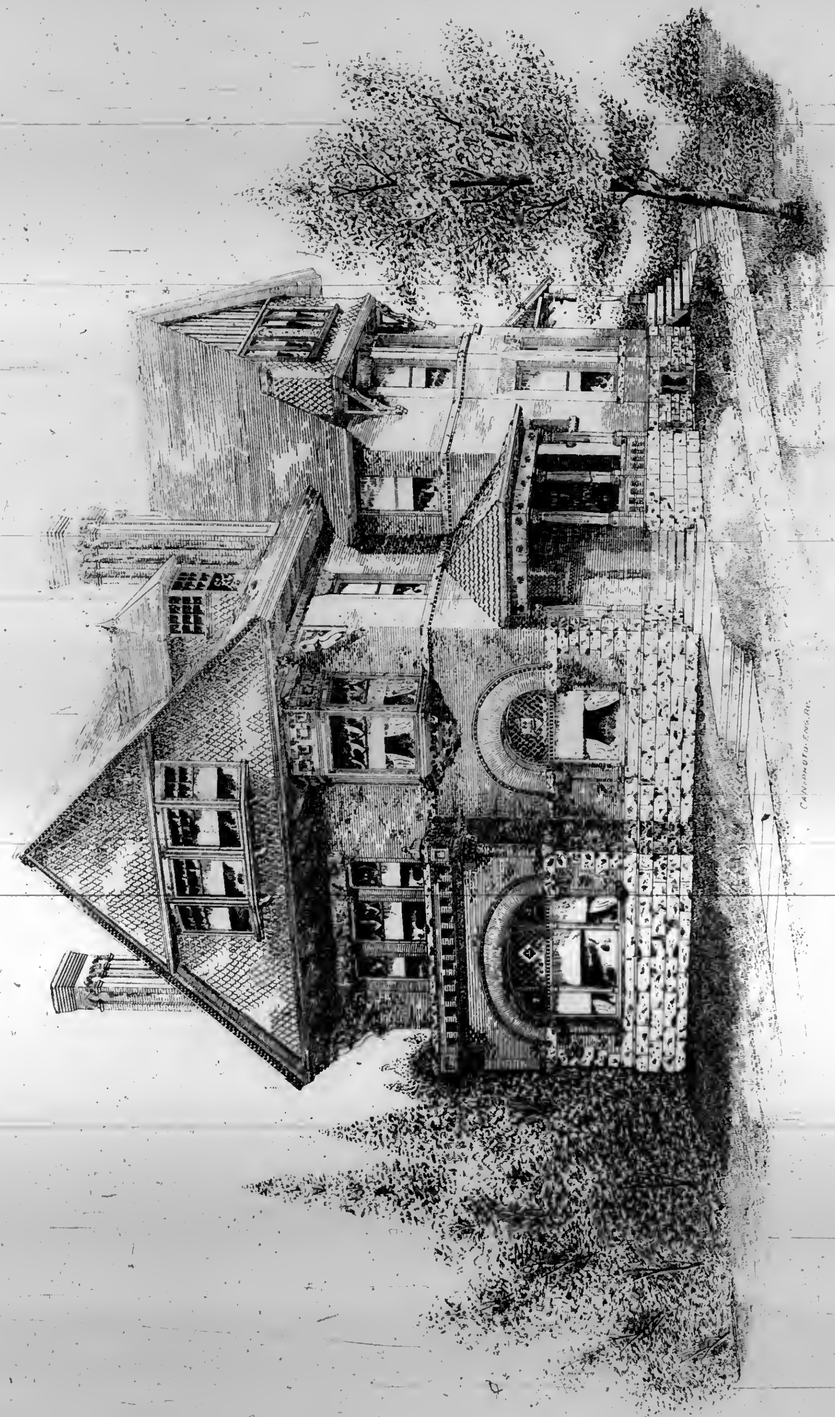
Mr. Scott Morton recently read a paper before the Architectural Association on "Methods in Coloring" and commenced with the statement that "the true color-feeling is a rare thing." This talented lecturer gave in his paper a few color laws as follows: Different tones of the same color tell well beside each other or in the same composition. Take, for example, all the tints on a piece of self-colored velvet or silk. There are unending gradations of these. Much interesting work has been done on this idea on the lowest scale of color, viz., that of greys. Mr. Waterhouse expresses his predilections for pearly greys and drabs, including ivory, red or green, with very small points of delicate turquoise blue. Omitting the red or green meantime, his predilections for the pearly greys and drabs, including ivory, are well worthy of being kept constantly in mind, as these are in sympathy with the general greyness of our climate or surroundings, but it will strike all colorists that unless these tints are handled in a masterly way, there is the danger of insipidity. Mr. Scott Morton says that light is an important element in color work. If there is a direct sky light falling into the room, the reflection from the floor, which may be carpeted, counts for much, as its influence is felt on the ceiling and parts of walls not reached by direct light. He suggests for working out a color scheme, the mixing of a pot of what might be termed the dominant or key-color, and from that pot take more or less color for harmonizing and contrasting every tint employed.

One of the chief reasons for the failure of cheap houses to look well is the fact that they are overloaded with ornament. If those who wish to build cheaply would be content to build plainly, the result would be more satisfactory to the eye. The same fault is noticed in cheap furniture. It is always disfigured with fancy turns and machine carvings, while to find a piece of plain, substantial finish, one must look at the high priced goods. Too many men only able to build a cottage, load it with weak imitations of the palace, and the result is thoroughly inharmonious. In the cheap house let plainness of construction reign from foundation to gable. Let the ornamentation be, not in the wood-work, but in the painting. Then the effect may be whatever desired, and may be changed at the pleasure of the owner. —*Ex.*

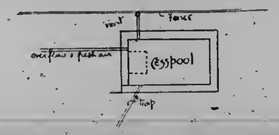
American manufacturers of radiators are reported to have arrived at an understanding by which competition will be restricted.

VOL. V.] The Canadian Architect and Builder. [No. 1.

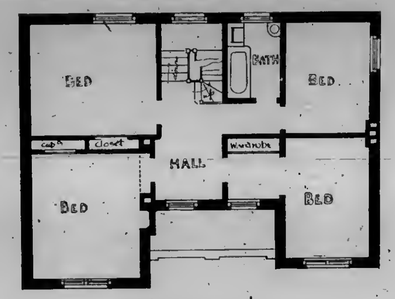




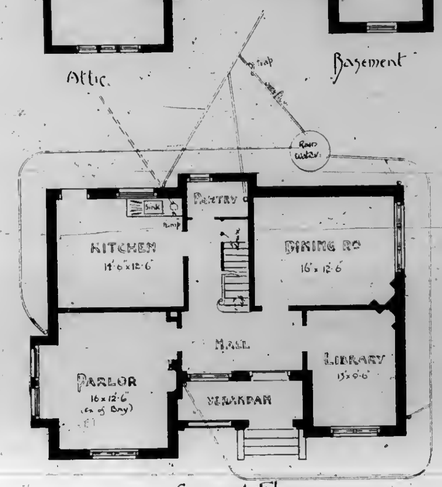
Residence of Capt. S. Crangle, Rosedale Road, Toronto.
Gorden & Helliwell, Architects, Toronto.



Attic. Basement.



Chamber Floor.



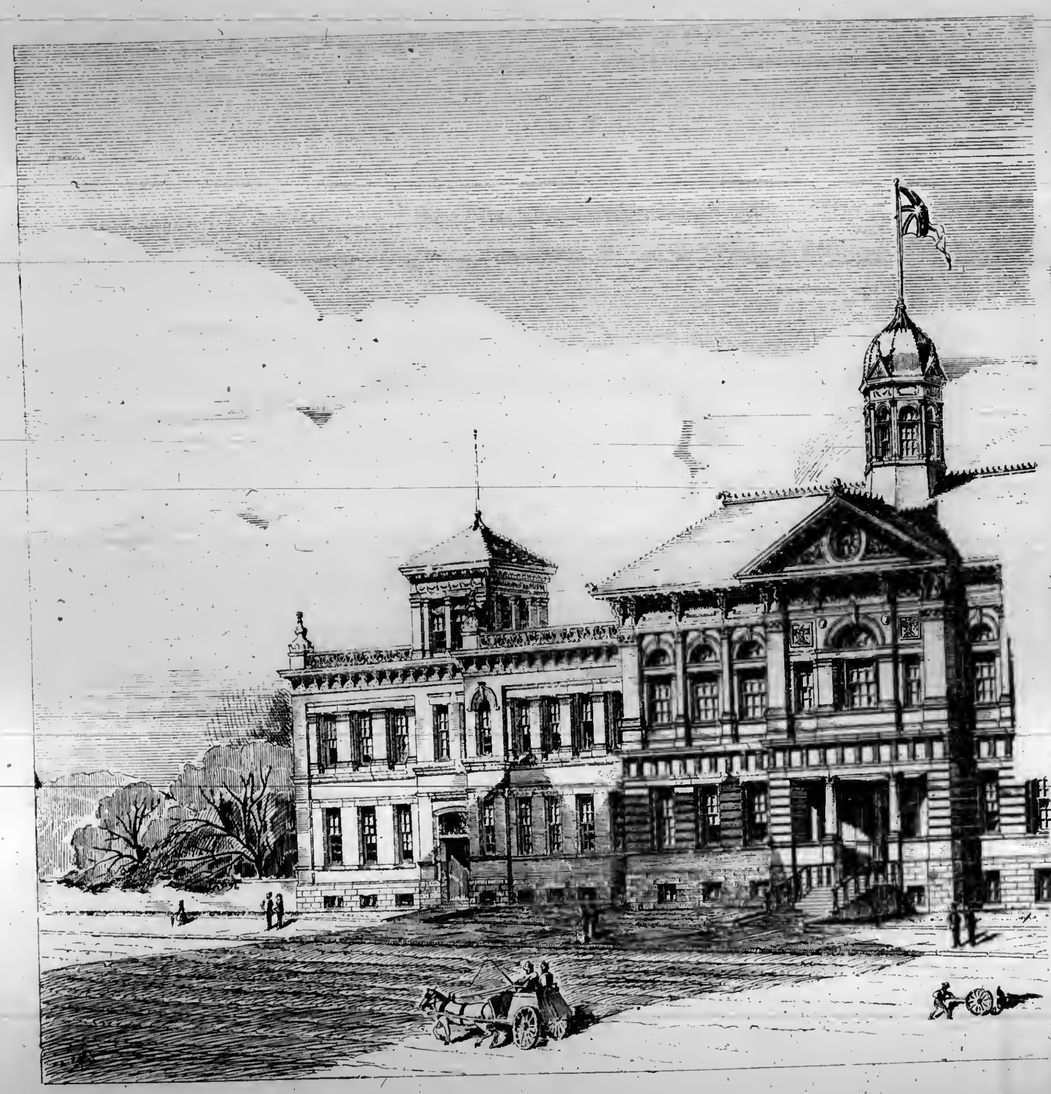
Ground Floor

Elevation.

Design by "Jack Plane"

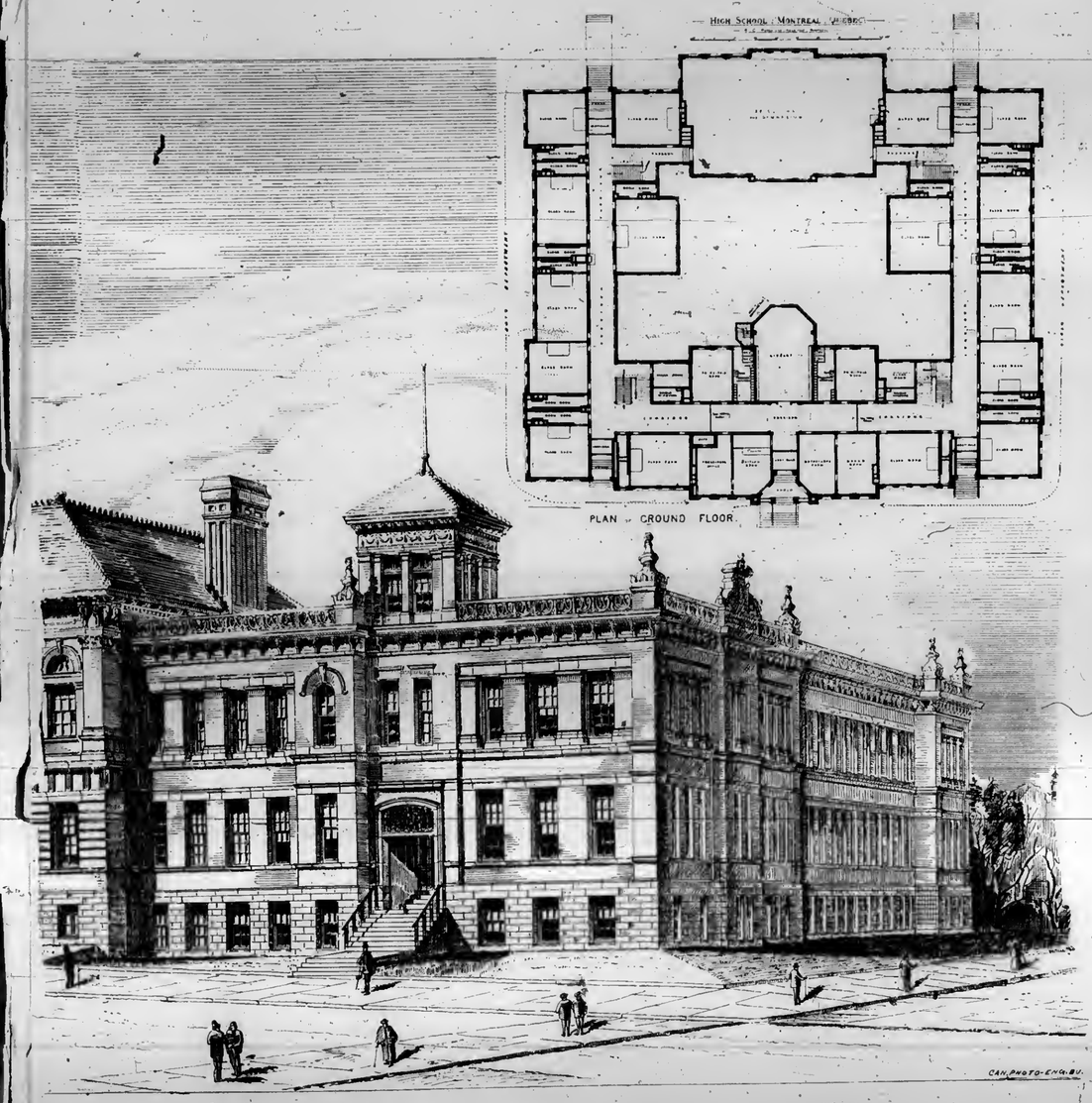
Canadian Architect & Builder Competition

"C. A. & B." Competition for "A Suburban Cottage."
Design by "Jack Plane" (J. W. Siddall), Toronto. Awarded Third Position.



NEW HIGH SCH

ALEX. C. HUTCHI



OL, MONTREAL, QUE.

ARCHITECT, MONTREAL.

ceased to flow and have continued dry till the present. The mill owner is now seeking for redress, but so far without success, as the Board did not enter upon any property owned by him, and did not divert any natural water course as defined by statute. Very frequently municipal corporations are mulcted in large damages for trivial acts of neglect or for expropriating property. An instance in which fortune favored the municipality is so exceptional as to be a matter of special remark and congratulation.

THE astonishment of the architects assembled at the recent convention at finding a member speaking in favor of the obnoxious term, "Registered Architect," seems to have hindered their seeing clearly that the discussion was one of words merely. Mr. Billings wanted to retain the title as being a distinctive title for the trained and educated architect. Surely the name "Architect" should be this distinctive name, as it is already in the language with honorable association as the proper title of a man who is skilled in the art of architecture. It would be a pity to leave this name by Act of Parliament to practitioners who it is generally understood are not architects in the proper sense of the term, while the man who is truly an architect can only use the title with a qualifying addition. When Bonnelleschi proved that he could build the dome of Florence and Oghiberti could not, would he have thanked the Florentines if they had for that obliged him to give up the name "Architect" to Oghiberti, and call himself a "Registered Architect"?

UNDER present conditions it seems to be a difficult matter to determine the strength of the various brands of cement on the Canadian market. The same brand will give the widest possible variation in results when tested by different individuals. In consequence differences have arisen between architects and dealers. The architect specifies that the cement shall come up to a certain standard. The dealer's tests show that the required standard has been reached. In the hands of the architect or of his clerk of works it perhaps falls short fifty or one hundred per cent. Under such circumstances we have known the dealer to request the architect to call in a disinterested third party to determine the strength of the material, but the request was refused. The honest dealer in such a case finds himself in a very unenviable position. He may have every confidence in the merits of his material to withstand a properly conducted test, but the means are not afforded him of proving his case. He is therefore under the necessity of endeavoring to procure other material in hope that it may meet with the approval of the architect, or of bringing legal action against the architect for refusing to accept material which he has reason to believe would fill the requirements if properly treated. He well knows that such a step would be likely to debar him for the future from being given the opportunity of supplying material required by that particular architect in his practice. In view of the varying behaviour of cements when subjected to tests at the hands of different individuals and by means of different methods, it has become highly desirable that there should be established by the Government one or more testing laboratories, where by payment of a reasonable fee, an authoritative test of the quality of cement and other materials could be had. We trust that full facilities for such tests will ere long be available at the School of Practical Science, Toronto, and at McGill University, Montreal.

WHEN the Toronto city council was called on a few months ago to conclude negotiations for the lease of the street railway franchise to a syndicate for a period of thirty years, it took the precaution of employing the services of legal gentlemen of high professional standing to assist in framing an agreement which should protect the city's interests. It is a singular fact that in the agreement which, as the result of this precaution, was drawn up and ratified by the Council, no provision was made for compelling the company leasing the road to adopt any improvement in methods of propulsion by electricity which in the future might be found to be more desirable than the overhead trolley. The agreement provides that the style of motor to be adopted by the company must be approved of by the City Engineer. This we take it applies to the system to be adopted when the change from horses to electricity is first made. Those familiar with the progress achieved in the application of electricity to the operation of street railways are aware, that the only satisfactory method of propulsion at present is that of the overhead trolley. It is by no means unlikely, however, that within the long period of thirty years this system will be superseded by one very much better. Care should therefore have been taken that in the event of such an improvement taking place, the city would not be under the necessity of putting up with an inferior system until the term of the lease would expire. While the terms might not have been quite so favorable to the city as at present had the council insisted that the agreement must contain a clause compelling when necessary a change of system, much better terms could have been secured before the ratification of the agreement than can be obtained now. The company is urging the Council to give its consent to the use of the overhead trolley system, and intimate that they are willing to enter into an agreement to change the system when necessary, on condition that the city will indemnify them against all loss consequent upon the change. Should the city consent to this, it is safe to say that the amoun of the indemnity which will have to be paid will be infinitely greater than the sum which would have been sufficient to effect the change prior to the signing of the agreement. The company's letter on the subject contains the significant clause that their "tender was based on an electrical system, and not on the continuation of a horse railway, and the city will fairly be responsible, not only for loss of revenue to the purchasers, but for many other items of damages incident to the unreasonable delay," should it longer delay its consent to the change being proceeded with. In short, the city is compelled either to commit the citizens to the use of the trolley for the next thirty years, or accept the company's terms for a change of system when required. That it should find itself thus situated does no credit to the discernment of those who had a hand in consummating the agreement, and least of all to their distinguished legal advisers.

THE second annual convention of the Ontario Association of Architects held in the School of Practical Science, Toronto, was a very interesting one, and in many respects was as successful as could be desired. The present number of the CANADIAN ARCHITECT AND BUILDER is largely devoted to a full report of the proceedings, with the exception of the papers and discussions thereon, which will be printed in subsequent issues. Were it not for the publication of this report, many of the members of the Association, not having been present, would be able to obtain but a very imperfect conception of the variety and importance of the business transacted. It is a matter of regret that so many of the members are unwilling to devote the small amount of time and money necessary to meet once a year with their professional brethren for the consideration of questions affecting in an important degree the welfare of architecture in this country. The architects of the city of Hamilton, although only forty miles distant, were with one exception conspicuous by their absence. It would be interesting to know what excuse they have to offer for non-attendance. Still more deserving of censure are those members of the Association resident in Toronto who did not sufficiently interest themselves in the event to put in an appearance at the meetings. Their conduct bears unfavorable comparison to that of members residing in Kingston and Ottawa. From each of these cities there were present two representatives. It was also the subject of special satisfaction to see present Messrs. Hutchison and Clift, representing the sister Association of the Province of Quebec. The interest attaching to the occasion was enhanced considerably by the harmonious character of the surroundings. Professor Galbraith, the principal, and Mr. Wright, professor of Architecture in the School of Science, spared no effort to make the visit of the architects one of pleasure and profit. The tests of materials in the laboratory were themselves a feature of much interest and value. There was also quite an extensive exhibition of drawings, which though including little with which Toronto members were not familiar, was of much interest to those from outside places.

The annual dinner at Webb's was remarkable for the variety and excellence of the speeches which the occasion called forth. The remarks of the visitors from the Province of Quebec were felt to be well considered and timely. Mr. Hutchison's suggestion regarding the formation of a Dominion Association evidently met the sympathies of a number of the members of the Ontario Society. While the majority may feel that the efforts of the two provincial organizations for some time to come will be required to be directed to strengthening their positions and putting in the way of fulfilmeot the important objects for which they were organized, it is the hope of all that eventually a Dominion Association will exist, and be the means of achieving greater things on behalf of the interests of the profession than can be accomplished by means of the present organizations. Professor Galbraith's remarks, especially relating to the strength of materials, were very instructive and valuable, while Mr. Gordon's references to the injustice done Canadian architects by the failure of the customs authorities to see that the protection designed by the tariff to be given to Canadian architects is actually afforded them, were timely and should serve to call the attention of the public as well as the Government to this important matter. From the social standpoint the dinner would have been more enjoyable had provision been made for a brief program of vocal and instrumental music. In all other respects it was a most successful affair.

Mr. W. G. Storm, who has filled the position of President since the organization of the Association, bears with him in his retirement the highest esteem of his associates. His administration has been marked by the deepest interest in everything calculated to uplift the profession, strict fidelity to duty, and the utmost courtesy towards every member of the Association. Mr. S. G. Curry, who has been appointed as his successor, has been a leading spirit in the Association from its inception, and has spared no effort to advance its interests. As President of the Association his enthusiasm and energy will no doubt continually prompt him to promote in every possible way its prosperity, and in so doing we hope he will receive the hearty co-operation of every member.

ONTARIO ASSOCIATION OF ARCHITECTS' CONVENTION.

THE second annual convention of the Association, held under the Act of Incorporation assembled in the School of Practical Science, Toronto, on Tuesday and Wednesday, the 2nd and 3rd inst. The following members were present:

Messrs. Storm, Langton, Curry, Price, Jas. Smith, Jos. W. Power, Wagner, Helliwell, Gambier-Bousfield, Gregg, Jarvis, Wickson, J. A. Ellis, Willmott, Law, McBride, Burke, Maycock, Jas. Adams, Belcher, Billings, Townsend, Whitehead, W. A. Edwards, Darling, Moore, Sproatt, Edwards, Webster, Kinsey, Gordon, Langley, Gemmell, Symons, E. J. Lennox, McCallum, Bowman, and Kennedy. Among the visitors present were Hon. G. W. Ross, and Messrr. Hutchison and Clift, of Montreal.

THE President of the Association, Mr. W. G. Storm, took the chair at 3 p.m. He regretted the fact that a large number of members had written to him expressing their inability through sickness to be present.

The minutes of the last annual convention were read by the Registrar, and after having been slightly amended, were on motion adopted.

On rising to deliver his annual address the President was received with applause. He spoke as follows:

PRESIDENT'S ADDRESS.

Gentlemen,—In opening this annual Convention of the Architectural Association of Ontario, I desire to extend the right hand of fellowship to our brethren residing at a distance from the city, to welcome them on behalf of the resident members, and to express a hope that their visit at this time may be a means of drawing us all more closely together and of promoting the interests of our noble profession. This meeting is the second held under the authority of the Act of the Ontario Legislature, which became law on the 7th of April, 1890, but the fourth since our first organization as an Association, and now that we are fully organized with a statutory constitution, it is to be hoped that our annual meetings may increasingly stimulate enthusiasm and energy, and afford profit and instruction to the older as well as the younger members of the profession, for we must never forget that, irrespective of age, we all are, or ought to be, students to the last.

Architectural students of the present day, and especially in this city, are to be congratulated on the educational advantages they possess. In addition to the carefully prepared curriculum of this Association, there are the benefits to be derived from connection with the Toronto Architectural Sketch Club in the study of architectural drawing and in hearing the lectures or talks which are given from time to time on subjects intimately connected with the practice of the profession. This Club might further extend its usefulness by establishing classes for the study of structural drawing and building construction. The lectures and drawing classes conducted by Prof. C. H. C. Wright in the School of Practical Science, I have no hesitation in strongly recommending to the consideration of all students who may be able to avail themselves of them. They are, in my opinion, the st ground work for the future study of the profession in all its ls, besides saving for the student two years study in the of an architect. It will certainly be strange if architect students are not in future good draughtsmen and learned in e various subjects appertaining to their art, for it cannot be said that ample opportunities for study, or able professors and teachers, are not at their command. I venture to express the hope that architects who have pupils in their offices will in a liberal spirit afford them every possible facilty for deriving full benefit from the exceptional educational advantages to which I have referred.

In connection with the topic of students' advantages, permit me to say a few words upon a kindred subject of great interest to the profession at large, and affecting it quite as directly as any other. I am led to refer to it because the attention of the Association will shortly be directed to the first examinations of students and candidates for enrolment on the register of the Association as fully qualified architects, which examinations will be held under our new code of laws as directed by the Act of Incorporation.

There are some who say that architecture is an art, and that as it is impossible to establish any uniformity of opinion in matters of taste it is equally impossible to set up any uniform test. This is partly true; but is this a full definition of architecture? In these days of invention and demand for scientific knowledge and treatment of every requirement of human life, building has become proportionately scientific, and the architect must accordingly be a man of education in all that pertains to constructive science. Buildings in these northern climates have to exclude severe weather and to be constantly occupied, and they must be well adapted to all the conditions of comfort and health. The architect must therefore be an expert in the nature and qualities of material and also in sanitary science. Without this he is like a student of language who has never learned its grammar, and from whom we may expect nothing but blunders.

I yield to none in my appreciation of the nobility of our calling as the embodiment of the highest form of art. But architecture is more than an art. It is an rt, a science, and a profession. And what nobler or more elevatin occupation can be conceived than to design with fitness and clothe with beauty those permanent necessities of every-day life so that each in its turn may contribute to the convenience and pleasure of mankind? The unique characteristic of our calling is, that it combines such different qualifications—artistic taste, scientific knowledge, business proficiency. We have no claim to be architects in the true and full sense of the word unless we are artists—able so to dispose and clothe the materials with which we have to deal as to produce beauty of form and proportion. But we must also be scientists, so familiar with the strength and properties of materials as to combine them in sound construction. And we must, moreover, be men of business, so conversant with affairs as to be able to protect the pecuniary trusts which are committed to us. Of what good to society would be the most graceful design in architecture if it was so devoid of constructive merit as to collapse on the first test of stability? Or conversely, what claim to architectural merit has the most perfect construction unless clothed with beauty? Architecture is composed of elements, each one of which is essential to the unity of the whole, and without any one of which it would be incomplete and useless to society. There are those amongst us whose proclivities and aspirations are specially artistic; there are those whose genius is constructive; there are those who are *par excellence* men of business. The ideal architect is the man in whom these qualities are united—who is an artist, a constructor, and a man of business. It is given to few to excel in all, though there are many who, possessing a general knowledge of each, are proficient in one or the other. And is one who is distinguished by artistic taste to regard with indifference or a species of contempt others who may be less artists and more scientific? Or is one whose genius is constructive to look askance at others who are more purely artists? No! architecture is not merely an art; it is not merely a science; it is not merely a profession; it is the combination in one of the artist, the constructor, and the man of business; and those who claim that it is one only, to the detriment of the others, detract from the nobility as well as from the unique character of their calling. They vainly strive to disintegrate things which are inseparable, and which must go hand in hand. As well seek to sever cause from effect; as well assert that neither root nor stem has any part in providing the rich foliage or the delicate flowers on which the eyes of man feast with delight.

I have been led to offer these remarks upon what I consider the true standard of the profession for the reason—as you have all been informed by circular from the Registrar—it is proposed to hold in April next our first examination in preliminary subjects, intermediate and final qualifications for full membership in the Association. The subjects which have been selected for the present examinations are not of a very abtrsuse character, as it has been deemed more prudent at this time not to be too severe or exacting in the standard of qualification, inasmuch as those candidates for membership in the Association expecting to present themselves for this ordeal have not had the advantage of previous training so as to be properly fitted for a rigid examination. But as years roll on, and the students become better educated and have greater facilities for qualifying themselves in every branch of the art and science of the profession, it is expected that the standard of qualification in the several examinations will be elevated by degrees, so that in a few years, to be a member of the Architectural Association of Ontario will be a talisman into the best kindred associations in the known world.

I indulge in the anticipation, the fulfilment of which I may not live to see, that every member of this Association will be a qualified architect in the sense of having passed an examination instituted by his brethren as the necessary qualification for membership. The affix "M.O.A.A." would in such circumstances, and in the eyes of the public, mean much more than it does now, for it could then be used only by those who had passed the test of a qualifying examination. When my confident anticipation is realized some years hence, members of this Association will be proud of their proper distinguishing letters, and will take care to relegate them to no second place, because they will be acknowledged and accepted by the public as the evidence of professional qualifications which no other letters can convey. And it is to be borne in mind also, that, to retain this privilege the architect must keep himself clear on the register of the Association, which, according to the Act of Incorporation, the Registrar is directed to revise and publish annually in the month of January for the guidance of the profession as well as information for the public.

And here I might be pardoned for digressing for a moment to refer to the series of tests of building materials which through the kind courtesy of Professor Galbraith, Principal of the School of Practical Science, have for some time past been, and are now being conducted in this building, in association with the professors of the School, by a Committee of the Council of this Association, to determine the strength of our native stone, and which will be followed from time to time by the testing of all other domestic materials used in building; these tests when completed and the results properly set forth in tabulated form, will be of inestimable value to the profession, from the fact that the tables will be more reliable as a basis of calculation than those now in general use. And there can be little doubt from the information gained in the tests already made, that there are many native stones now little known to the profession which will be brought into general use, replacing the imported stones

now so much in favor, and with—what is not the least consideration—a very material saving in the cost of building.

The Council have prepared a draft of indenture for articled clerks which has met the approval of your solicitor; printed proof copies of this have been distributed on the seats throughout the room for use of all the members in attendance at this convention. The Council request your approval of this draft and your instructions as to whether it shall be printed similar to the form in your hands or neatly lithographed. The Council have also prepared a draft form of instructions to architects, which they recommend for use in all future competitions. Proof copies of this have also been distributed throughout the room.

Our Association is now fully launched before the world of scientific institutes under the most favorable auspices. As I have remarked on a former occasion, this is the first Architectural Association in any country to obtain for its incorporation the sanction of the Legislature of the land in which it is located. But all this is of little value in elevating the profession to the standard of perfection we aspire to, unless the individual members of the profession will, by their regular attendance upon our annual re-unions—even if to do so involves some considerable personal sacrifice—add each his quota to the common fund of information and contribute from his individual store of knowledge to the interest and general usefulness of the convention, and by strict attention to the severest code of professional honor and *esprit de corps* in their individual dealings one with another and with the public, endeavor to command that respect and esteem which should be inseparable from the name of architect.

And now in conclusion permit me to extend to the officers and members of the Council and of the Association my cordial thanks for their uniform kindness to me personally, and for passing over the many deficiencies I am conscious of having exhibited during the three years I have had the honor to preside over the Association. I am nevertheless sensible of the confidence reposed in me, of which I shall ever entertain the most grateful remembrances, as being one of the proudest compliments paid me during my long professional career. In taking leave of the chair, which I must in accordance with the terms of the by-laws of the Association do at the end of this session, permit me to wish you all individually and as an Association, the fullest prosperity in your business and social relations, and I pray that the Great Architect of the Universe may grant you all health, wealth, and happiness in this world, and the salutation: "Well done, good and faithful servants" on that day when we shall all be asked to render an account of the manner in which our earthly tasks have been completed. As the poet Longfellow has it:—

"All are architects of Fate,
Working in these walls of Time,
Some with massive deeds and great;
Some with ornaments of rhyme.

Nothing useless is, or low,
Each thing in its place is best;
And what seems but idle show,
Strengthens and supports the rest.

For the structure that we raise,
Time is with materials filled;
Our to-days and yesterdays
Are the blocks with which we build.

In the older days of Art,
Builders wrought with greatest care,
Each minute and unseen part;
For the gods see everywhere.

Let us do our work as well,
Both the unseen and the seen;
Make the house, where God may dwell,
Beautiful, entire, and clean."

It was decided that as Prof. Galbraith could not be present at 10 o'clock the following morning, that Mr. Curry's paper should be the first order, and that Prof. Galbraith would be heard at eleven; and as there was no paper from any member of the Quebec Association ready, one prepared by Mr. Fuller, of Ottawa, to be read by Mr. Billings, was substituted.

Mr. D. B. Dick submitted the report of the Treasurer as follows:

TREASURER'S REPORT.

Dr.		
To balance from Association at date of incorporation		$ 172.80
To cash received from S. H. Townsend as Registrar.....	$2,351.33	
To do do W. A. Langton do	551.00	2,902.33
To refund from CANADIAN ARCHITECT AND BUILDER.....		26.00
To interest on bank a/c.....		87.22
		$3,188.35
Cr.		
By cash to Registrars' for disbursements		
S. H. Townsend.....	338.65	
W. A. Langton	494.00	832.65
By CANADIAN ARCHITECT AND BUILDER a/cs.....		82.05
By Registrar's salary (W. A. Langton, six months).....		100.00
By fee for two years refunded to widows of two deceased members.....		10 50
By balance in bank		2,163.15
		$3,188.35

We have examined the books, vouchers, etc., of the Association, and certify that the above is a correct statement thereof.

HENRY LANGLEY, } Auditors.
W. I. SYMONS, }

Mr. Dick explained that owing to the change of the date of the expiry of the annual subscription consequent on the merging of the old Association into the new, that refunds had to be made to those members who paid their subscriptions to the extent of two-fifths, and that the accounts covered a period of about seventeen months. Consequently, they did not give a fair index of what the annual revenue of the Association would be in future. There would also be the expense of conducting examinations, and it was not likely that the Association would be able to retain such a large balance at its credit as it now had.

On motion by Mr. Edwards, seconded by Mr. Smith, the above was received and adopted.

The Registrar, Mr. Langton, read his report as follows:

REGISTRAR'S REPORT.

During the year since the last convention, the Association has been established in its regular course.

The by-laws were completed, printed and distributed.

The curriculum of study for the examinations was arranged and the registered students classified according to their length of service so as to require from them only those examinations which were just; that is to say, which would permit those students who had entered into articles before the passing of the Act, to proceed to practice upon the fulfilment of their articles with as little hindrance as possible.

A Board of Examiners has also been appointed who have in charge, subject to the control of the Council, the examinations of next April.

The Association library was founded by the Council at its meeting in May, but as the greater part of the books could only be got in England, the collection was not complete enough for the issue of a catalogue before September. Since then the library has been in use by both architects and students. All members of the Association and registered students have had copies of the catalogue sent to them.

A form of indenture has been drafted and approved by the Solicitor of the Association.

Conditions of competition have been drawn up, which are submitted to the convention to-day.

Tests have been made of the building stone in use in the province, and the results will be reported.

A register of draughtsmen out of employment has been started in connection with the Registrar's office. Any student who has served his time and is in search of a position, or a draughtsman out of work, may advertise his want in this way without charge, and architects can by application at the Registrar's office select from the list of applications.

By the request of Mr. Wright, of the School of Practical Science, the Council are supporting his endeavor to establish a permanent exhibition of drawings, of which the nucleus is at present in place, at the School of Practical Science. The motive of the exhibition is primarily the benefit of the students of the School, and it is intended to be a factor in their education. But it is thought that it will also be of general advantage to the profession to have a central exhibition room where the best efforts of the profession may be displayed.

The Council has made two efforts to procure a design suitable for the seal of the Association without result. So far there have been no satisfactory designs submitted. The prize offered for the successful competitor in the competition which was advertised was $25. This sum is still offered to any one who will send in a workable design which meets the approval of the Council.

The Board of the Presbyterian Church has been endeavoring to improve the type of churches built for their body by offering prizes for the best designs for churches of different classes, a schedule of which was published in the CANADIAN ARCHITECT AND BUILDER. The money prizes are small, but there is the opportunity afforded of securing work by the exhibition of ability to do it. The Association has become connected with this venture on the part of the Presbyterian Board by their request that the Council of the Association would appoint a Committee to adjudge the prizes and report upon the drawings submitted.

I would like to remind the members that there are twenty-one members of the Association who have not paid their fees, and that in accordance with the resolution passed some little time ago, these members have not the right to vote until their fees are paid.

On motion the report was received and adopted.

The President announced the next order of business to be the consideration of the report of the Committee on "Conditions of Competition," a draft of which, prepared by Messrs. Arnoldi and Curry, had been printed and distributed.

Mr. Curry suggested that the draft be read and considered clause by clause, which was agreed to.

A lively discussion ensued in which the questions of the rendering of drawings; the nature of the report to be demanded from the experts; the definition of the commissions; the possibility of the design placed exceeding unreasonably the proposed price; and many points of precision in wording were dealt with and the draft amended in some points.

Mr. Gregg thought that the circular ought to give some definite information as to what amount of money was to be divided in prizes. The average was one-half per cent. divided into three prizes, and there should be some note bearing on this point at the end of the clause.

Mr. Curry said that it was his intention to bring up the matter when they were considering clause 14; the second, third and fourth prizes should be a definite percentage on the total cost,

and then people would know just exactly how much they would have to pay. Would one-half per cent. for the second, one-third per cent. for the third, and one-fourth per cent. for the fourth be a fair and reasonable figure?

Mr. Jarvis did not think that the public would readily consent to pay such large amounts as that.

Mr. Billings did not consider that so very far out of the way; on a $50,000 building the second man would only get $250.

The chairman agreed with Mr. Curry as to the fairness of the amounts mentioned, and the latter's suggestion that the committee should be instructed to take this matter into its consideration and report to the convention to-morrow was finally adopted. At the chairman's request, Mr. Curry named Messrs. Dick, Burke, Bousfield, Billings and himself as the committee to deal with the subject.

Mr. Curry called the attention of the members of the Association to the desirability of strictly adhering to these conditions. Some seemed to think that they were prepared for the purpose of affording a little amusement for the members. They were going to enter into competitions with others with these rules as the basis; and, seeing that as a rule, the men at the top of the profession did not bother themselves with competitions, it was for the members of the Association to say whether any member should enter any competition where these rules are not the basis of the competition. The trouble with competitions in the past had been that they had never been at all fair for the architect. There never could be a competition held that would be perfectly fair for the architects without resulting in great benefit to those holding it. There was no use meeting here from time to time and laying down conditions unless it was understood that they will be rigidly adhered to by members of the Association. (Hear, hear.) If the members of the Association did not think it worth their while to stick to matters of this kind, then they had better drop out at once. It should be definitely understood that no member of the Association would enter any competition unless it was to be conducted upon this basis. The only way to build the Association up was for the members to stick to one another; not to make it a combine to injure the public, but to unite in such a way that the union would benefit the public as well as themselves. (Applause.)

After some further discussion, a vote was taken on the wish of the meeting, and it was decided that the whole report would lie over till to-morrow morning.

When the report of the Committee on "Building Materials" was called for, Mr. Townsend, the chairman, announced that he was only able to make a preliminary report, as the tests were not yet completed. Very exhaustive tests had been conducted, with the result that all samples of stone submitted that could be broken with a pressure of 100,000 lbs., had been tested. It was found, however, that half, or nearly half, of the samples sent in could not be broken with the machine that was available. Another machine was being erected with double the capacity; this machine was nearly ready, and in a short time he expected to publish, not only the tabulated results of the tests, but also a great deal of valuable information about the quarries of the Province—their location and characteristics. This would be done in such time that it would be ready for proper presentation at the next meeting of the Association. In the meantime the members would gather from the experiments to be made by Prof. Galbraith to-morrow, something of the manner in which these tests are conducted.

The chairman announced that these tests were to be continued, and that in the course of time the results would be published.

Mr. Bousfield reminded the meeting of the question of a suitable indenture awaiting consideration.

The Chairman said that for his part he thought that the two questions of the indenture and the competition were very important questions, because, when once adopted, they ought to be permanent, and not tampered with nor changed. Perhaps it would be better to defer the consideration of them until the morning. The order for to-morrow would therefore be:—First, report of committee on premiums; second, the indenture; third, Mr. Curry's paper; fourth, Prof. Galbraith's tests.

Mr. Billings read a paper prepared by Mr. Fuller, C. E., of Ottawa, on "Ventilation in Public Buildings," which, together with the discussion thereon, will appear in a subsequent issue.

SECOND DAY.

The Association was called to order at 10:30 by the President, the first order of business taken up being the report of the Committee appointed yesterday re the filling of the blanks in regard to the premiums in the conditions for competition.

Mr. Curry announced that all the members of the Committee had not met, but part of them had, and they recommended that the first prize be one-half of one per cent., the second prize one-third of one per cent., and the third prize one-fifth of one per cent. In a competition of $100,000, that would mean that the first prize would be $500, the second prize $330, and the third prize $200.

As clause 14 was still under discussion the meeting considered the question: What course of procedure was best in case the author of the best drawing did not otherwise command the entire confidence of the experts. The discussion resulted in a slight emendation of the original draft.

The conditions of competition were then adopted as a whole, as follows:

DRAFT.

1. The ..... is proposing to erect a building, the cost of which is not to exceed ....., and have appointed a Building Committee with full power to select an architect to carry out the work.

2. The Committee has appointed M ....., architect, as professional adviser, and will appoint two other architects, nominated by the Council of the Ontario Association, to act as experts with him to decide the relative merits of the designs submitted in this competition. The two experts to be nominated by the Council will be selected from men who have no knowledge of the competition other than what they may have obtained through reading these Conditions.

3. All designs are to be made in conformity with the instructions herein given, and when it is stated that a certain requirement must be placed in a certain definite position or is to be of a certain definite size, the same must be adhered to in every particular. The competitor will be allowed reasonable latitude in planning or designing when the requirements are only stated generally.

4. The drawings enumerated in clause No. 5 are to be furnished by each competitor and these only will be received and considered; but minor variations of detail and alternative arrangements may be shown on any of the drawings by means of flaps. A competitor may omit any of the drawings called for, but it will be at his own risk, in case the experts should decide that they have not sufficient information before them to fairly judge the design in competition with its competitors. The drawings must be accompanied by a brief memorandum, typewritten, explaining any points in the design not plainly shown on the drawings.

5. The drawings required are as follows:—

6. The drawings are to be executed to a uniform scale of ..... to the foot and finished in line only, without shading, with Indian ink and with the drawing pen.

7. There is to be no brush work except in finishing the windows and sections with a solid black tint. The lettering and figuring is to be plain and simple and is to be confined to the name and dimension of the rooms, written in the middle of each, without explanatory comments, which are to be put by themselves, as has been stated, in a separate memorandum. The number of square feet in each room is to be given, as well as its lineal dimensions. The drawings are to be made upon white paper, cut down to the dimensions of ..... inches.

8. If the plans of two or more storeys are identical, all but one may be omitted, and when storeys are exactly symmetrical in plan, half only may be shown. A competitor may send in alternative elevations with any set of drawings.

9. The perspective is to be set up from an ..... scale plan and is to be drawn in line only, without shading and without any accessories such as sky, trees, figures, etc. The plane of the picture is to touch the most advanced portion of the building, and the point of sight taken from a point from which the building can be seen when erected and at the level of ordinary sight.

10. Each drawing and the accompanying memorandum is to be distinguished by a motto or cypher, and no handwriting of any sort is to be put upon either. Any of the competitors may send in a second set of drawings embodying a different plan or design if he desires to do so.—In this case it must be under a different motto. No competitor is to use any motto or device which he has used on any previous occasion.

11. A sealed envelope bearing the same motto or device and containing the address of the author is to be sent to the ....

12. The drawings are not to be framed, glazed or even mounted on cardboard, but are to be sent flat in a portfolio, and are to be addressed to ..... who will hand them to the experts in the same condition in which they are received by him with seal unbroken.

13. The experts will carefully examine all the designs sent in and place the best four in order of merit. They will also make a report on the designs sent in, but especially giving their reasons for placing the four best designs in the positions assigned to them. A copy of this report will be sent to each competitor.

14. The Committee will commission the author of the design placed first, at the regular commission, to carry out the work, provided the experts decide in consultation with them that the work may be safely entrusted to him. If the experts decide that it would not be advisable to entrust the work to the author of the design placed first, the Committee will insist that some architect in whom they have confidence shall be associated with him as consulting architect.

The author of the design placed second will receive ½ of 1%; the author of the design placed third ½ of 1%; and the author of the design placed fourth 1-5 of 1%.

15. All designs will be returned to the competitors at the expense of the Building Committee as soon as the experts have made their report. No design will be shown to any competitor nor to any other party without the consent of the author. Nor shall anything shown in any of the rejected designs or otherwise suggested by an unsuccessful competitor, which is original as to this competition, be adopted and made use of in the building without the consent of the author and proper remuneration being made him, the amount thereof to be agreed upon between him and the Committee, and in case of disagreement it is to be referred to the decision of the experts, whose decision shall be final not only in regard to the amount to be paid, but also in regard to the existence of any such claim.

16. Any information which the Committee, or any member of the Committee or their professional adviser may find proper to communicate to any of the competitors in answer to questions or suggestions, will be made in print and will be simultaneously communicated to all the rest. Such questions or suggestions must be made on or before the 15th day of ..... 189.... and must be sent to .....

Mr. Curry proposed that the "Conditions" having been carried in the Association, consisting of all men claiming to be architects in the province, (certainly with very few outside of it), should bind its members not to compete under other conditions than those of the Association.

It was then moved by Mr. Curry, seconded by Mr. Joseph W. Power, "That this convention having approved of the conditions of Competition, request every member of the Association to refrain from entering any advertised competition except those conducted under the conditions adopted by the Association."

Mr. Burke said there might be some difficulty in making this a hard and fast rule. Take the case of a School Board in the country. There are two young men in the town practising.

Each of them have friends on the Board; a majority cannot be got on the Board to decide on the architect, and a competition is decided on; then if these gentlemen were honorable members of this body it would be impossible to arrange a competition, as they would be ruled out from competing. He brought this point up for the purpose of doing away with any misapprehension in the minds of any of the members.

Mr. Curry held that such a case as the one instanced by Mr. Burke would not be influenced by the proposed action of the Association. It would not interfere with a proprietor who was prepared to build going to four architects and saying I will give $100 apiece if you will prepare competitive drawings.

The President, putting the motion to the meeting, declared it carried unanimously.

Before proceeding with the discussion of the subject of Indentures of Apprentices, Mr. Curry moved: "That the Council is hereby instructed by the Association to get the word "Registered" struck out of the Ontario Architects' Act." Section 25 of the Act says that members of the Association shall be entitled to use the word "Registered Architect," and that no other party shall use the term. Nearly every architect in the Province of Ontario was entitled to use the title, so that there were practically none who could claim to be architects outside of the Association, and if the word "Registered" was struck out, and the members of the Association given the privilege of using the title "Architect," no injury would be done to any one and the members of the Association would be in a very much better position. If the Association was to proceed with the instruction of students, hold examinations and do certain work, they should have some equivalent for that work. All such work might be done for love of the profession, but at the same time the public is receiving a much greater benefit than the members of the Association; it is really the public who are going to receive the principal benefit. None of the older men of the Association would receive any benefit, but were taking means to train up young men to supplant themselves. The young men would have good educations, be thoroughly trained and instructed, and this competition must be felt by the older men. It was only right that the legislature, acting for the people, should give some encouragement more than they had done. The Act given practically says that it is for the benefit of the public that they should distinguish between qualified and unqualified men, but practically gives the Association nothing after all. If that word could be knocked out, it would help the Association very much and would cause all to work harder for the benefit of the profession. The man who studies and works and passes his examinations should have the right to use the title, and certainly not the man who is so careless, indifferent or lazy that he will not take the trouble to become proficient. The latter should have no right to use a term which the others have acquired the right to use by hard work.

Mr. Townsend, when seconding, spoke in support of the motion.

Mr. Billings (Ottawa) spoke in the interests of those outside of the Association, and thought that the members of the Association would do better to hold on to the distinctive title "Registered Architects"—that the system of men styling themselves "architect" was in existence long before the formation of the Association and that nothing should be done to injure them; in his own city of Ottawa there are architects better than some of those who have been accepted by the Association—men with better education and training. In reply to an enquiry Mr. Billings stated that these gentlemen had not stated to him their reasons for not coming into the Association. But these men would certainly object.

Mr. Curry drew the attention of the members to the fact that any man practising as an architect has the right to come into the Association, and contended that if a man did not want to avail himself of that privilege, it was his own lookout. If the Legislature, in looking after the interests of the public, hold it to be a good thing that men practising the profession of architecture shall become educated and properly qualified to do the work that is entrusted to them, it is not then infringing upon the interests of any private individual to say that men following that profession must become educated if they desire to use the title "Architect." Up to the present time any man practicing the profession can come in. The Legislature has the right to say, "You shall not follow any profession requiring certain standards of efficiency unless you are prepared to take a course of study and pass certain examinations which will show that you are capable of doing the work properly, for the benefit of the public." (Hear, hear).

Mr. Billings stated that he did not object to wanting every man to pass an examination and to have a certain degree of competency, and that no doubt those men who would become clients of architects would desire it; but that he desired that there should be some distinctive name by which the public shall know whether these men had passed examinations or not; and contended that if a man wanted to engage the services of someone who was not a registered architect, it was a matter for the client and not for the Association.

Mr. Darling held that where it was perfectly competent for the man to join the Association if he wished, if he did not do so he ought to suffer for it, as the Association is for the public good.

Mr. Curry thought that the Association having now got in such a shape that they can give the education that the Department asked for, and having put it within the range of all who wish to come into the Association on its present standing, that the Association can now claim that they have filled their part and have done all they were asked to do, that the Council should now be given very full power to obtain the full privileges that the Association should possess. Mr. Curry stated that Mr. Darling would take his place as mover of the resolution, which would now be seconded by Mr. Wagner.

The resolution as it stood was then put to the Association: "Moved by Mr. Darling, seconded by Mr. Wagner, that the Council is hereby instructed by the Association to use their best efforts to have the word registered struck out of the Ontario Act," and was declared carried unanimously.

The Association then adjourned to witness the experiments in the testing laboratory conducted by Professor Galbraith and his assistants.

After luncheon, which was served in the building, the members met again at 2:30 p.m.

AFTERNOON SESSION.

Messrs. Hutchison and Clift, of the Province of Quebec Association of Architects, having arrived during the morning, entered the Convention at the beginning of the afternoon session and were warmly welcomed by the meeting.

The first business was the consideration of the draft form of indenture for student apprentices, printed copies of which had been distributed on the previous afternoon that it might receive proper consideration before being discussed. Several members had questions to ask or suggestions to make. The indenture was finally referred again to a Committee with instructions to make certain additions and have the indenture lithographed for distribution to members of the Association.

The Hon. G. W. Ross, Minister of Education, having entered the meeting was invited to a seat beside the President. At the close of the discussion on the indenture, the President presented Mr. Ross to the meeting amid applause.

Mr. Ross expressed the pleasure he felt in meeting with an Association composed of representatives of the profession from all parts of the province of Ontario. He sympathized very heartily with the efforts of the Association in endeavoring to give the profession a higher educational status. The legislation which he had the pleasure of promoting a few sessions ago laid the foundation for the better training of the profession; and the cordial manner in which that legislation was received by the profession was a proof that they were anxious to rank with the other learned professions of the country. He referred to the establishment of a department of architecture in the School of Science, and observed that the Ontario School of Practical Science was the only institution of the kind in the Dominion of Canada that provided special instruction in this line. Some years ago he visited the leading schools of the United States, such as Cornell, Lehigh, and the Boston Technological School, and found that the Americans had provided very liberally for education of this kind; and he felt it to be his duty to place within the reach of Canadians equal facilities. He was pleased to notice the cordiality which existed between the profession and the faculty of the School of Science, and trusted that their mutual efforts in this respect would have the effect of improving the public taste in matters of architecture and all that pertains thereto. The last few years furnished abundant evidence that in this respect there was a great change. He felt honored because of their holding their meeting in the building, and trusted that nothing would occur to mar the harmony which existed at present between the Department of Education and the Association.

Mr. Storm being obliged to leave the meeting in consequence of a business engagement, called Mr. Curry to the chair. As Mr. Storm was leaving the room, his portrait was flashed upon the wall from a magic lantern which was brought into play under the direction of Mr. Wright, of the School of Practical Science, to illustrate a talk upon house planning by Messrs. Townsend, Burke and Langton, which was the next thing on the programme. Slides had been prepared of the plans which were to form the objects of criticism and were thrown on the wall as required by the lecturers.

It was moved by Mr. Edwards, of Hamilton, seconded by Mr. Kennedy, of Barrie, that the thanks of the Association be expressed to the gentlemen who had just addressed them for the effort they had made and the trouble they had taken.

Mr. Kennedy, of Barrie, brought up the matter of taking steps to prevent the stealing of plans, etc., asking for the appointment of a committee to memoralize the Government.

Mr. Townsend believed that it would be better for Mr. Kennedy to simply request that the Council should take the matter up, and he was sure the Council would do everything necessary in the matter.

Mr. Gouinlock, who seconded Mr. Kennedy's motion as first made, agreed to the change; he had now in progress an action in this matter, and would be very glad to see some action taken.

Mr. Gordon thought that the present form of contract covered everything necessary; the plans must be returned before the final certificate is given.

Mr. Gouinlock knew that, but would like to have some remedy if possible, and trusted the council would take it up as suggested.

Mr. Bowman agreed with the preceding speakers; he had had his plans traced and used in similar buildings. He thought it was a matter which the Council should consider, and hoped for definite action.

Mr. Curry stated the motion to be that the Council should take such action as they might deem necessary to protect architects' plans, specifications and details from improper use. This was put to the meeting and carried.

Mr. Gordon mentioned that there was an instruction to the Council to prepare a blank form of certificate at the last session; he was not sure whether it was in the minutes or not, as he was not present when they were read. Mr. Langton explained that it did not appear in the minutes because the discussion came to nothing; as there was no motion carried it was not put in the minutes at all.

Mr. Curry reminded the Association that they had two members of the Quebec Association present, and thought it would be well to hear from them as to what could be done to bring the Associations closer together. He first called on Mr. Hutchison to give some information with regard to the position of the Quebec Association.

Mr. Hutchison, who was received with applause, assured the members that it gave him great pleasure to meet with this Association. The Ontario Association was the first to obtain a charter from the Provincial Government, and this fact encouraged them to try to obtain a charter from the Quebec Government. The Quebec Government had followed pretty closely the example of the Ontario Government, so that the charter of the Quebec Association contained very much the same provisions as that of the Ontario Association. In the matter of a tariff for professional services in Quebec, they were formulating a tariff which is to be submitted to the Governor-General in Council; and after it gets his approval, it becomes the legal scale of charges. Their Council had taken the matter up and, after a great deal of trouble, prepared a tariff of charges which they submitted to the Quebec Government some months ago; but the recent trouble in the Government had prevented the completion of the matter. Before this trouble arose, when they were before the Government, the question was asked, "Has the Ontario Government sanctioned a tariff of charges for the Ontario Association?" They were under the impression that it had done so, and said so. This they had afterwards to correct. So it was evident that the Quebec Government were following very much in the wake of the Ontario Government in dealing with the architects, so that a great deal would depend, as far as the Quebec Association obtaining Governmental assistance is concerned, upon what the Ontario Association obtained from their Government. There seemed to be a feeling that they would not be behind in this matter. He thought that the two Associations could work together very advantageously in the matter of obtaining the imposition of a tariff upon plans coming into this country from the United States. He looked forward with a great deal of hope to the assistance that the Quebec Association would receive from the Ontario Association in this and other matters. He had great hope that the formation of these two Associations would elevate the standard of the profession generally. (Hear, hear.) This would be a matter of slow growth; but as they compel young men who enter the profession to show a high standard of education, there was no doubt that, in the course of a few years, they would certainly elevate the tone of the whole profession. So far as it was in the power of an individual member of the Association he intended to do his utmost at all times to raise the standard to the very highest. (Applause.) They had difficulties to contend with in Quebec that perhaps there would not be in this Association. They had the dual language, though he had to say their French architectural friends had shown a great deal of interest in the Association, and he hoped they would continue to do so. He was sorry that no member of the Quebec Association had time to prepare a paper to be read at this meeting, but he could give a practical talk on the application of ventilation to hospital buildings. (Hear, hear, and applause.)

The Chairman then introduced to the meeting, Mr. Clift, Sec. of the Quebec Association, who assured the convention they did not know what pleasure it gave him to be with them. He wished that more of the Quebec members had been present. The Quebec Association had only been in existence about two years, and so had not got so many members as the Ontario Association; there were only some seventy architects qualified, and a good number of students. When they saw that an Association was being formed in Ontario, it began to be talked about by the architects in Montreal whether they could not do likewise, and bye and bye they succeeded. He took the opportunity to thank the officers and members of the Ontario Association for the assistance they had rendered him in his official capacity; they had always been willing to give him any help needed. He was sure the Council and members of the Quebec Association were heartily thankful for the assistance rendered. Mr. Clift then advocated the desirability of forming a joint association for the Dominion, with headquarters in Toronto, and local associations with officers and powers as at present. He knew it was the feeling of a great many architects in the Quebec Association, and thought the sooner it was done the better. He did not think it would be a difficult matter; provincial charters had been obtained, and a Dominion charter would be given almost as a matter of course.

The Chairman expressed the pleasure the members of the Ontario Association felt in listening to Messrs. Hutchison and Clift. With reference to the proposed Dominion Association, the Chairman thought it unwise to pledge themselves to any definite action, but thought the Association would second any efforts made by the Quebec Association.

Mr. Clift desired to move a resolution, and on being assured that members of the Quebec Association were expected and had the right to take part in the proceedings of the Ontario Association, he suggested that the two Councils should form a committee to consider the probability of forming a Dominion Association.

The Chairman thought the better way would be, as the idea originated with the Quebec Association, that they should have the privilege of taking the first step.

Mr. Hutchison stated in reply to an enquiry by Mr. Bousfield that all that his Council could do would be to consult about the matter and arrange preliminaries; it would take an annual meeting to perfect the details.

Mr. Bousfield supported the proposition, but the chairman (Mr. Curry) thought it would be as well to allow this matter to stand for a while, so that it might be discussed thoroughly. There was just one thing against it at the present time; he thought it would be better to perfect the Provincial Associations, both Ontario and Quebec, and get them running in good shape, or they would be trying to cover too much ground. They certainly looked forward to a Dominion Association, but it would be better to bring to perfection the Provincial Associations first.

Mr. Jarvis brought up the question of having as a building inspector a properly qualified architect, one who could see in a moment the merits and demerits of a set of plans, and who could readily notice points in construction.

Mr. Gouinlock did not think that this was a matter for the Association, as it concerned only the Toronto architects, and further consideration was postponed.

No further business being offered, the Chairman announced the election of three members to the Council, and suggested Messrs. Hutchison and Clift as scrutineers, which proposition was received by the Association with applause. Mr. Frank Darling, and Mr. Fuller, of Ottawa—the latter at the request of Mr. Billings—and Mr. Lennox had their names withdrawn as candidates.

While the ballots were being counted, Mr. Gordon moved that it be an instruction to the Council for this coming year that they consider the advisability of formulating a blank certificate for the general use of the profession. No action was taken in this matter by the Association.

Mr. Bousfield moved a vote of thanks to the retiring President, Mr. W. G. Storm, for the trouble he had taken during his three years of office; he had not spared time or money in his efforts for the good of the Association. He understood that Mr. Storm, under the constitution, could not be elected President for two consecutive terms, and, as he had now finished his first year since reorganization, although the third in point of fact, he was obliged to vacate the chair; Mr. Bousfield considered this all the greater reason why they should tender him a hearty vote of thanks.

Mr. Power, of Kingston, seconded the motion.

The Chairman, in putting the question, which was unanimously carried, stated that he believed a great deal of the success of the Association was due to Mr. Storm's efforts. As Mr. Storm was not present, it was arranged to formally present the thanks of the Association to him at the banquet in the evening.

Upon motion by Mr. Dick, seconded by Mr. Darling, a vote of thanks was passed to the Minister of Education, the Hon. Mr. Ross, for his interest in the Association, and to Prof. Galbraith and Mr. Wright for their assistance.

The Registrar also received the thanks of the Association.

Mr. Hutchison and Mr. Clift then announced the result of the election as follows: There were thirty votes cast; Messrs. King Arnoldi, Edmund Burke and John Belcher have a majority of all the votes cast. (Applause.)

At the suggestion of Mr. Gregg, the Chairman thanked Messrs. Hutchison and Clift for their attendance at this meeting.

THE BANQUET.

On Wednesday evening a banquet was given by the Toronto members to the visitors from a distance. About seventy persons were present. Mr. W. G. Storm, President of the Association, presided. With him at the head of the table were Mr. A. C. Hutchison and Mr. C. Clift, of Montreal, representing the Province of Quebec Association of Architects; Mr. Emerson Coatsworth, jr., M.P. for East Toronto; Prof. Galbraith, of the School of Practical Science; Mr. Kivas Tully, Architect Public Works Dept., of Ontario; Mr. Jas. Bain, Public Librarian, and others.

The *menu* was of excellent character, superior in fact to that of the previous year. After proper attention had been bestowed upon it, the President arose and in a few appropriate words proposed the first toast, "The Queen," which was heartily responded to by all present singing "God Save the Queen," followed by three hearty cheers.

"Our Sister Society of Quebec, with whom we wish always to remain on the same friendly terms as at present," coupled with

the name of Mr. Hutchison, met with a most cordial reception.

Mr. Hutchison, upon rising to reply, said it gave him a great deal of pleasure to be present representing the Association in the Province of Quebec. He would have preferred had the president or some of the vice-presidents been present, but it had not been convenient for them to do so. He had been favored with prior invitations to attend the annual banquet of the Ontario Association, but had never been able to avail himself of the pleasure of a visit until the present occasion. He thanked the Association for the very hearty manner in which they had drunk the toast to the Quebec Association, and desired to reiterate the sentiment expressed that the good feeling which at present exists between these two Associations may always continue. In Quebec, before the formation of the Association, their experience had been that the architects were like the Ishmaelites of old—their hand was against every man, and every man's hand was against them. If the formation of an Association had done no other good, it had certainly tended to remove that feeling, and was bringing the members of the profession more into contact one with another, so that they were finding that they have many things in common. No doubt the experience of the members of the profession in Ontario is very much the same. The Association has had the effect of bringing the architects in the different cities into much closer fellowship than existed before, and it is hoped that that effect will increase. The speaker said that the time may come when instead of having two Associations, there shall be an amalgamated Association which will embrace the whole Dominion, with the different provinces having their own local associations for the management of local affairs. It might be years before this could be accomplished; but he for one would do his utmost to bring about that happy consummation, and he hoped that the movement would be seconded by the profession in Ontario and Quebec. The speaker said that the first time he received an invitation to the annual banquet, while not able to attend, he wrote a lengthy letter to the Secretary expressing his hope that the Ontario profession would not stop at the formation of mere Provincial Associations, but should always aim at forming a Dominion Association. The Ontario Association being the oldest and the largest, the Quebec Association would look to it for guidance and direction in many affairs. It was largely through the fact of the profession in Ontario having obtained a charter from their Provincial Government that the Quebec architects were enabled to get a similar one passed there, and it was likely that whatever was obtained by the profession in Ontario would be obtained from the Legislature in Quebec. The speaker expressed his strong desire that everything should be done to foster good fellowship between the two Associations, and that when the Quebec Association meets in its annual gathering in October (which was a very pleasant time of the year for a pleasure trip) some of the members of the Ontario Association might be seen down there to give a cheery word and help forward the work. While the older members of the profession may not gain any great benefit from the formation of these Associations, the speaker thought that those who helped in the formation of the Associations had laid such good, deep and strong foundations for the future that the rising generation of architects will certainly be brought into a better position than was occupied by the seniors. He was glad to learn that the Ontario Association had been so far helped by the Government founding the Chair of Architecture in connection with the School of Practical Science. While the Quebec Association might not be able to look for any similar help from the Legislature of the Province of Quebec, they had great hopes that before very long they would have a Chair of Architecture established in connection with the Science Department of McGill College, which, through the liberality of two or three citizens of Montreal, has been put on the very best basis for a science education. During the past two years very large and extensive buildings had been erected especially for that department, so that now they were in a position to give a thorough scientific education. If to that they could add the art education necessary to complete the education of an architect, he looked forward to the young generation of architects being fully equipped by proper training and education to carry out the work. He did not know what kind of architects the training schools might turn out, but had no doubt they would lay a proper foundation so that a young man might be able to apply himself to any one of the three classes of work—business, constructive or artistic—or, if he had the genius, he might apply himself to all three. He looked forward with great hopes to the rising generation of architects taking a higher and better position than the seniors have done. (Applause.)

Mr. Gordon, rising to propose the toast to "The Government of Canada," said he desired to propose a toast in which all would heartily join, more especially as it was coupled with the name of one whom all rejoiced to see present that evening. He rejoiced in being permitted the honor of giving the toast of our Government, and more particularly joining with it the name of Mr. Coatsworth, member for East Toronto. (Applause). All were glad that our Government was, to a limited extent, a paternal Government. While the Local Legislature had given the Association incorporation, and the aim of the local Associations should be to obtain Dominion organization, the Association could rejoice that they had such staunch friends as Mr. Coatsworth and the other representatives of this city, and representatives from other cities who have expressed their willingness and desire to do all in their power to establish the architectural profession on a higher basis. Perhaps the only thing they could grumble at was that the Government had been a little too good to them and given them a little too much title, more than they anticipated—in giving the Association a "Registered" title. Titles generally carry some privileges with them; as the Ontario Legislature had given the Association this title, they thought the Dominion Government should give something to go along with the title; that is, a little protection—not exceptional protection. They did not want class legislation. The profession in this country was ready to stand upon the same footing as ordinary citizens in that respect, but certainly they ought to have the same protection as other citizens in the pursuit of their calling, and the laws on the Statute book should be carried out and not set aside to the detriment of their profession. The speaker referred to the customs duties in reference to taxing of plans and other professional matters coming into Canada, and claimed that the way the customs duties are now levied on plans, drawings, tracings, &c., for many important buildings was a farce. While he held that any private individual has a right to employ whoever he likes, he also contended that no public corporation, and more especially a government, had any right to go outside of its own country for that which can be as well fulfilled by those who are its own citizens and are helping to support it and should have the first claim and even the preference. As possibly Mr. Coatsworth might be called upon in his official capacity, along with the other representatives of the people, to see that this matter of the customs duty is properly carried out, it might be as well that some facts should be in proper shape for both the Government and its supporters to act upon. Many thousands of dollars are lost annually to the Government through lack of system and understanding in the appraising of plans. A man can get plans from the other side for a very important building, costing perhaps $100,000, and tracings and copies can be sent from his office and appraised at a mere nominal sum. The speaker also referred to the subject of a Dominion Association. The Provincial Associations can approach the Government and urge upon them the necessary procedure with regard to the customs duties and other matters affecting the profession at large; but if there existed a Dominion Association, with these Provincial Associations in some way in affiliation, no doubt the position of the profession would be strengthened, and they could go before the Dominion Government in a much more representative capacity and would be able to voice the opinion of the profession from one end of the country to the other. (Applause). The architectural profession perhaps comes more closely into contact with the general public to-day than any other profession—certainly conduces very largely to the comfort and prosperity of the people—and as such should receive a great deal of attention from the Government. In the future, and that before Utopia will be reached, there would be a Department of Architecture in the Government.

Mr. Emerson Coatsworth, M. P., in responding congratulated the Association upon its standing, assuring them that as a professional man he sympathized with their desire to uplift their profession, not only in the Province of Ontario, but in the whole Dominion, and stated his belief that the time was coming when the professions would be elevated to a standard of professional education so high that no inferior man would be able to hold any place with others in the professions, and no outside element would be able to compete with professional men in their own country. (Hear, hear.) He sympathized very strongly with the expressions he had heard in reference to the competition which the Association had to meet, and which to his mind was a somewhat unfair competition. It was his opinion that just as good work, and possibly better work, could be had for less money from Ontario architects than was being got at the present time from foreign architects. As to the suggestions made in regard to duties, it was only fair that reasonable protection should be afforded to architects. Industries of various kinds were protected in the Dominion, and he saw no reason why the industry of the architect should not be protected as well as the industry of the mechanic; and, as he had already promised privately to one or two gentlemen that evening, so far as he personally was concerned, he was prepared to use his influence on behalf of the architects of the Province of Ontario in order that they might be able to compete with others outside on favorable and satisfactory terms, being sure it would result in just as good work, and probably better, with less cost, and would also keep the money in our own country. (Applause.) The speaker congratulated the Association on the progress which had been made in the very few years since organization. It spoke well for the genius, industry and talent in the profession that so much could be accomplished in such a short time, and that there had sprung up among the members of the profession in Ontario and Quebec such an *esprit de corps* which leads on to greater heights, as it does all men who have that feeling among them of generous rivalry, which prompts them to be the best they can in their own sphere. He believed there was as much science in architecture as there was in law or in medicine, and that, therefore, the architectural profession should stand; as far as rights and privileges were concerned, as they do in intelligence, integrity and all other good qualities, with the other professions. When the time came that the profession was ready to form a Dominion

Association, he offered his services most heartily, and would be glad to do all he could, not only in Parliament, but also with the members of the Government who have influence in these matters, to aid in the formation of the Association. Again thanking the Association for the honor of the toast so heartily and loyally drunk to the Government of the Dominion of Canada, the speaker resumed his seat amid applause.

Mr. Dick, rising to propose the toast of "Technical Education," which was coupled with the name of the principal of the School of Practical Science, said it was quite unnecessary that he should say a single word to convince any member of the Association of the necessity for technical education; perhaps there was no profession where it was so necessary that a man should be a good all-round man in order to succeed. If an architect be not a good all-round man, he must associate with himself others who would supply the branches in which he does not excel himself. There were many excellent examples in the United States of that kind of division of labor, which perhaps after all, was the very best thing which could be had at this day, for excellence in particular departments is the only sure road to success. A man may acquire the business element by rubbing up against his fellows; the artistic he would study for himself, but the technical he had to acquire. The School of Science was being gradually developed; it had not reached its full development, but it was hoped that through the liberality of our Government, and perhaps private munificence, it would yet be placed in a position to compete with the older institutions which had large endowments and were gradually being put in positions of first-class efficiency. It was not behind any of them in one respect. It had the men, if they were only provided with the means. Something had been seen to-day of what was being done in the School of Science in the matter of providing materials for forming tables of the strength of materials. Architects had been going largely upon tables which had been constructed from experiments on a small scale, and which were unsatisfactory. The first test made in the morning showed how very erroneous some of these tables were. It was on a beam, with a cross strain, a piece of pine timber 10 x 10 inches square and eleven feet long. According to the calculations made by different formulæ, in different text books, the beam ought to have stood, before breaking, from 30,000 to 40,000 pounds; while as a matter of fact, it began to give way under a strain of somewhere about 12,000 to 13,000 pounds. The rules were made by taking a piece of wood an inch square, with a certain pressure, and multiplying both by a certain number; thus saying that if a stick one inch square would stand a certain strain, a stick of twelve inches square would sustain a proportionately larger strain. The difference was largely caused by the fact that where a stick one inch by one inch was taken, it would be practically a perfect stick, free from knots, shakes, &c., while the pieces which have actually to be worked upon might have shakes and knots, but which yet might not be so bad that the piece could be rejected and actually refused. Calculations must be based not upon the excellent quality of a piece of perfect timber, but upon the timber which actually had to be dealt with; and it was only when such machines as were now being introduced in the School of Practical Science were used so that a piece of timber might be tested, that tables could be got which would be of actual value. There was no doubt many buildings were now being subjected to greater strains than their designers intended; and that many buildings which were standing, and apparently safe, might be very near to the breaking point, but nobody knows of it until the crash comes. No doubt the testing of materials was in its infancy, and the School of Science had entered upon a career which would yet result in giving a great deal of valuable information which would be the means of enabling members of the profession to know definitely what they were doing, instead of trusting to empirical rules that might fail them at some very critical point, resulting in loss of property and, perhaps unfortunately, in loss of life, on account of the failure of some structure which, according to the calculations, ought to have been perfectly safe. The School, he was happy to say, had been organized under the care of a man whom all who knew him were thoroughly satisfied was entirely qualified for the position. They did not know where to find a better, and did not want to look for any better. The only regret they felt was that it was not possible for all the young men who proposed to be architects to put themselves under his care and go through the curriculum which has been laid down in the School. Most young men were a little too old when they left school to go through a course of technical training, and then go through another course in an architect's office. A problem which the principal and his coadjutors have to solve was how they could arrange the curriculum so as to give the young men that go into the School such a training that a comparatively short time would be all that would be necessary for them to pass in an architect's office, after they left the School, to enable them to go out into the world and announce themselves as full-fledged, capable and well-qualified architects. The company present were then called upon to drink the toast "Technical Education," coupled with the name of Prof. Galbraith.

Prof. Galbraith in the course of his response said, that he had been reminded, since they had the opportunity of using the testing machine in the School of Science, of the very little that is known about the strength or elasticity of building materials. It was laid down in the curriculum as a science which could be taught and as a thing the results of which were pretty certain, much in the same way as the science of astronomy or chemistry or other sciences, whereas it was in a very different condition. In astronomy the positions of the various planets could be calculated beforehand, and in chemistry, the results might be known beforehand. But how little could be said about the strength of any member of construction! It seemed marvelous that a science so intimately connected with safety and comfort, and in which we have the experience of all the ages, should be practically no science at all. The principles that are settled in the science of materials can be summed up in a very few words. Then when they are applied you have to multiply your results by the thing called the "Factor of Safety," which has been well called the "Factor of Ignorance." Instances of that were seen this morning. According to the formulas the beam should have been twice as strong as it really was. Very few who had not seen experiments conducted on the same scale, could have said anything about it at all. So it was throughout the whole range of the science of strength of materials. When a young man begins to study the strength of materials he asks, "What is the breaking strength of a certain material?" which shows the misconception which attaches to the whole subject. When he came to look into it a little more closely he would find there was no such thing as the breaking strength of any material, in the proper sense of the word. A piece of pine or steel might be broken in an infinite number of ways, and under all sorts of strains, while the question just spoken of implied there was only one. It was known that the rods in a railroad bridge or a roof truss might last for years and then break down; that test of practical service and the test in a testing machine were entirely different. Strains can be applied to a piece twice, and a less strain will break it applied a second time, than when applied only once. Another strain could be applied three, four or ten times and be less than the strain which was applied once or twice. This could be multiplied an infinite number of times. He had no hope that the science of the strength of materials would ever be developed to such an extent as to enable them to build with the factor of safety of one, that is, that they would be able to design a piece to last under such conditions as those under which it would be intended to be used, a certain number of years and then break down. Although they knew all about the material, and had carried on the experiments that would determine the various breaking strains of the material, they were entirely ignorant of what force a structure would be subjected to after being built, so they would always have to apply the factor of safety—the factor of ignorance. They would, possibly, not be factors of ignorance at the end of a thousand years, as to the material, but would be still factors of ignorance as to the possible forces to which the material would be subjected. Machines had been invented in Germany by which repeated stresses could be applied to the same material. To give an example as to how often these repetitions take place, the speaker asked them to consider the case of one of the tie-rods in a Howe truss railway bridge. Suppose that in a bridge where, the traffic being very great, a train might cross the bridge every quarter of an hour through the whole day; that would make about 100 repteitions of that strain in the twenty-four hours, that multiplied by 300, to get the number in a year, would make 30,000 for the year; if the bridge should last twenty years then it would be 600,000 repititions of the stress. To investigate properly the strength of that piece, it ought to be subjected to at least 600,000 repetitions of the stress caused by the train passing. To do that under the proper conditions would require twenty years; life is too short for that; and the Germans had repeated this strain every minute, instead of every quarter of an hour. Even that required over a year to make the one experiment on the one rod, and then you know only the result for that kind of material and nothing else. That would give some idea of what investigation into the strength of materials meant; they would never see the end of it; those who live generations after would not see the end of it. Then it had to be remembered that there were all kinds of strains and stresses to structures. The machines which they had in the schools were only the modern development of the old-fashioned machines which determined only one kind of breaking stress, the stress which is produced by a load which is gradually increased up to the breaking point, and only applied once. They were utterly unable with their equipment to make experiments like the German experiments; they could not be done very well by steam power, because the firemen and engineers have to be at work day and night; the only possible way of doing it is where they have water power which could be set going and would not require very much attention, but would run on until the piece broke. So that although they were making great advances, they were precluded, in the School of Science, from their position, from going into the question to the extent to which they could elsewhere and under other conditions. At the same time by a judicious use of the factor of safety, they could make great use of the results, in designing. They would no doubt be able to reduce the factor of safety on some materials. The speaker was pleased to see that professional men were taking an interest in the School of Practical Science, and felt that it could be of some use to them; the only justification of the expense to which the Government had gone in fitting out

this School was that it put the architectural and engineering professions in touch with science. It was not proposed to go into it as a matter of amusement in any way. Meetings like those which had been held in the last two days strengthened the School with the Government and also did an immense amount of good to the students. Nothing would make the young men take more interest in their work than to see the older men in the profession interested in it; that was one of the greatest benefits that could be gained from meetings like the present. He had urged this upon the authorities and was happy to say that the Minister of Education, especially, had always shown himself open to argument in that respect. He had urged that the interruption to the immediate work of the School caused by these meetings was as nothing as compared with the benefits to the students. They could afford to let the work go a day or two for the sake of the stimulus and life that meetings like these put into their young men, and he hoped that meetings of all professional men connected with the work of the School would, in the course of time, be held in the School—that they would make that a gathering point. They had done that in Montreal; in McGill College the Faculty of Applied Science had done everything that they possibly could to bring the civil engineers, the mechanical engineers and the electrical engineers into connection with their school for the same reason; and that was the only true policy. It is a school that lays the scientific foundation for a practical education. They wanted this sort of thing, and to feel themselves working in the same lines, doing the work in the same lines as the professions, and helping them. After thanking the gentlemen for the kind way in which they had received the toast, the speaker resumed his seat amid applause.

Mr. Curry said he was called upon to propose the next toast, and as it was in reality to one of their guests, he would on this occasion reverse the order, because after all what they were particularly interested in was not the Public Library, but the librarian. As all were aware, Mr. Bain had taken a great deal of interest in the Architects' Association and in the profession, which interest he had shown in the trouble he had taken to place at their disposal the architectural works in the Library as far as it was in his power. He is also using his best efforts to have a room arranged, when additions are made to the Library building, where architects may freely consult the valuable professional works now in the Library. No doubt all here are aware that any member of the Association by applying to the Registrar can consult at the Registrar's office a great number of the architectural works which belong to the public library. It was not necessary that the speaker should enlarge upon the benefit this was to an architect; if he could have a work which he desired to look over, in a room by himself, with plenty of time and opportunity for the use of drawing materials, it was of very much greater benefit to him than if he had to go to a public institution where he could only work at a disadvantage. The Association was indebted, and all were personally indebted to the librarian for what he had done in that respect. The members of the Association could best show their appreciation of the efforts of the Public Librarian, Mr. Bain, by making, as far as possible, full use of the facilities which he had placed within their reach. He called upon all to drink to the health of Mr. Bain, Public Librarian.

Mr. Bain, replying, said he was very grateful to the proposer for the kind words which he had spoken. He was very deeply interested in the library, and looked on this act as an approval of his course during the last eight years and as a presage of their support for the future. He had given himself twenty years in which to make the Public Library; eight years had already gone by and he thought they had made a fair start. He had hardly realized that it had assumed the position it had until this morning when they had received from the English Government a series of papers in reference to the Duke of Clarence's funeral addressed to the "Public Library, Canada, British North America," and they were delivered to the Toronto Public Library. (Laughter and applause.) Some four years ago he had been exceedingly anxious that they should have a special architectural and fine arts room, and proposed that the room should be fitted up entirely for works of architecture and the fine arts, so that gentlemen who were anxious to examine books and large plans could do so, and have opportunities of looking at books on kindred subjects, such as stained glass, carving, etc., that would be necessary in their work. Unfortunately it required a great deal of effort to get the municipal body to move; however, two years ago he had succeeded in getting it passed, and had everything planned out for a very nice room when the matter was referred over for a few months. Plans were talked over, but just at that time, unfortunately, the people in the Argentine Republic took it into their heads to kick up a row. Messrs. Baring Bros., the people who floated the bonds for the Public Library, failed, and left them without money. He had been very pleased a short time ago at receiving a visit from Messrs. Langton and Darling to talk over the matter again, to see if it was possible to afford any room in the present building. He was afraid, owing to the pressure of books now, that it would be impossible, but he thought within twelve or eighteen months they would be able to provide it, and not only double, but treble their books on architecture. They were buying all the time, and never allowed a book, especially an expensive book, to pass. The cheaper books could be bought by architects for use in their offices day by day, but the expensive books that a man only occasionally wishes to look over, books which in many cases are the works of architects themselves, printed in small numbers and issued in their own offices. He hoped that the accumulation would be such that it would be satisfactory to the members of the Ontario Architectural Association.

Mr. Langley arose to propose a toast "To the Old Times and the New, in Architecture." He supposed that topic had been put in his hands to propose because he was considered to be getting to be one of the old heads. He accepted it as a compliment. He could look around on the company present and see many who had passed through his office—many of them now leading architects of the Province. It was a cause of sincere pleasure on his part. 38 years, lacking a month, had passed over since he went to serve his time; many changes had taken place in that period, and not the least among them was the marvellous advantages the pupils of the present day had as compared with those of thirty years ago. He was deeply gratified that two of his own sons were attending the School of Practical Science, with which Prof. Galbraith is connected, and having the advantages of the training which is to be obtained there. He had seen the profession increase in Toronto from about seven firms to nearly ten times that number. In connection with the toast he called on their friend, Mr. Kivas Tully, one very highly respected and very long in the profession, for a few words.

Mr. Tully in responding asked whether he was to represent the old times or the new. He was still in practice; he commenced serving his time 55 years ago, and it was for those present to say whether they would have the old times or the new. He should have liked to have had a young associate to support him under the great obligation of returning thanks for the new as well as he would try to do for the old. He had served his time in the old country and came here in 1844, when he found about four other architects here—Mr. Howard, the City Engineer, Mr. Thomas, Mr. Young and his (the speaker's) brother, who was serving his time in Mr. Howard's office, and himself; those were all the architects at that time in Toronto. He did not know how many there were at the present time, but he supposed about one hundred. He had to congratulate the profession upon having improved so much and having become such a promising body. He was sorry to say he was the only living representative of those five architects. He hoped that in the future the rising generation would do as good work as had been done in the past. (Applause). He had been very much pleased to hear the remarks which had been made by Mr. Dick and Prof. Galbraith upon the strength of materials. He advised the younger members not to skimp their work in any way, but to have plenty of strength.

The President called upon Mr. Clift, of Montreal, who responded with a few well chosen remarks for the "New Times."

Mr. Curry stated that he had a matter to introduce which had been postponed at the afternoon meeting. He had to inform the President that, in his absence that afternoon, while he (Mr. Curry) was occupying the chair, the Association passed a vote of thanks for the very great pains and trouble to which he had gone during the past three or four years to help forward the interests of the profession and the Association. The mover and seconder of the resolution and also several members of the Association had spoken very highly of the work which the President had done, and it was a very great pleasure for him now to also state that having been a member of the Council during the time Mr. Storm had been President, he could substantiate any statement which had been made as to the interest he had taken in the Association and the amount of work he had done on its behalf. In no particular had he shirked his duty, and had always been pleased to do all that lay within his power to assist the Association with his sympathy and also by actual work. By so doing he had benefitted the Association to a very great extent; it was work which possibly no one else could have done in as satisfactory a manner. He now desired to express to the President the thanks of the Association for what he had done in the past, and a wish that although under the by-laws and constitution of the Association, he cannot be the president for the following year, that in some other year or years he may be again at the head of the Association. (Applause). The speaker concluded by calling upon the Association to drink to the health of the retiring President and his success.

The toast was heartily responded to.

The president, responding to the toast, returned his thanks for the honor conferred and the eloquent remarks of Mr. Curry in proposing the toast and informing him of the resolution which the Association had so kindly passed after his departure from the meeting that afternoon. What little he had done to forward the interests of the Association during the past few years had been done with the greatest pleasure, and he felt that the appreciation of them was far beyond their value; what he had done would have been of no advantage to the Association had he not had with him a first-class working Council and also a first-class Registrar during the whole term. (Applause). These gentlemen were entitled to more praise than he was, for their untiring energy and devotion to the interests of the Association.

Mr. Jarvis proposed the toast to "The Ladies," coupling therewith the name of Mr. A. C. Barrett, who in graceful periods eulogized the fair sex. This brought to a fitting close a thoroughly enjoyable evening.

CANADIAN CITY ENGINEERS.

III.

AQUILLA Ormsby Graydon, City Engineer of London, Ont., also claims that city as his birth-place, having been born there in July, 1854. He is the eldest son of the late Simpson Hackett Graydon, B.A., T.C.D., of Dublin, Ireland, but practising barister in London, Ont., since 1853.

The subject of our sketch was educated at the public and grammar schools of London. In 1870 he entered the Merchants' Bank of Canada, having filled the positions of junior ledger-keeper, teller and accountant. He left the Bank in 1874 to become paymaster for Mr. Wm. Hendrie, contractor, of Hamilton, Ont., in connection with his contract for building the Wellington, Grey and Bruce railway from Listowel to Kincardine, and was in his service for four years, until all his railway contracts were completed, when he returned to London and articled himself to Messrs. Robinson & Tracy, both former City Engineers of that city. He studied engineering and architecture with them for four years, taking the degree of P.L.S. in his third year (1881).

Mr. Graydon was engaged on the construction of the London waterworks during 1882, and in 1883 opened an office for himself. He was appointed engineer of the townships of London, Delaware, Dorchester, East and West Nissouri and Biddulph, also of the London Provincial Line Road Co. Subsequently he laid out the Brampton, Ont., waterworks, and supervised the construction thereof until nearly completed.

In 1888 he was appointed Assistant City Engineer of London, and received the appointment of City Engineer in July, 1891, on the resignation of Lieut.-Col. T. H. Tracy, who was offered and accepted the City Engineership of Vancouver, B. C.

MR. A. O. GRAYDON, CITY ENGINEER, LONDON, ONT.

TORONTO BUILDERS' AND CONTRACTORS' ASSOCIATION.

A VERY enjoyable time was spent at the second annual dinner of the above Association, held at Webb's restaurant on the evening of the 11th inst. Nearly one hundred members and invited guests were present.

Mr. Geo. Wright, President of the Association, occupied the chair, being supported on his right and left by the Mayor and Mr. Joseph Tait, M.P.P. The vice-chairs were occupied by Mr. J. Lester Nicholls and Mr. David Williams.

Letters of regret at their inability to be present were read from Mr. E. F. Clarke, ex-Mayor, and Mr. John Webb, President of the Builders' Association of Hamilton.

The usual loyal and patriotic toasts were duly honored, Mr. Tait responding in happy style to "Our Legislators," and the Mayor to "The City Council." The latter took occasion to remark, that considering the importance of the building interests, and the frequent introduction of legislation in the City Council affecting these interests, he was surprised that the Association did not, as other organizations had done, appoint a committee to watch the proceedings of the Council.

"The Old Association" was responded to by Mr. John Lucas, and Mr. Wm. Booth, President of the first Association organized by the builders of the city some twenty years ago, and ex-Alderman Farquhar.

Messrs. John Aldridge and M. Murphy replied on behalf of "The New Association," and Messrs. Moir and Goddard on behalf of "Kindred Institutions."

Excellent songs were sung by Messrs. J. Lester Nicholls, R. G. Kirby, H. M. Blight and F. Self, while Messrs. H. K. Cockin and O. A. Smiley favored the company with well-rendered recitations.

Credit for the success of the gathering is largely due to the committee of management, Messrs. Geo. Wright, D. Williams, J. Aldridge, J. Claxton, J. Goddard, J. Crang, J. Lester Nicholls and F. Powell.

It is understood that the Association is to some extent being reorganized on an improved basis. The annual meeting will take place next month.

OUR ILLUSTRATIONS.

TORONTO ARCHITECTURAL SKETCH CLUB MEASURED DRAWINGS COMPETITION FOR "CANADA COMPANY'S PORCH"—DRAWING BY "VOLUTE" (MR. W. P. OVER), AWARDED FIRST POSITION.

PUBLIC SCHOOL, GLADSTONE AVENUE, TORONTO.—STRICKLAND & SYMONS, ARCHITECTS, TORONTO.

PASSING EVENTS.

I heard a sermon recently from the text "Build yourselves up in your most holy faith." On the whole the subject may be said to have been well handled. After pointing out that every man is the builder of his own moral structure, the speaker proceeded to describe some of the requisites of a good building, such as a good design, a good plan, a good foundation, good materials, etc. Having sately got this far, he was tempted to go farther and illustrate his subject by directing the attention of his hearers to a building embracing all the requisites of good architecture. He pointed to his ideal in language somewhat like the following: "Take, for example, the new Parliament buildings in Queen's Park. As we enter them a glance at the long halls, large assembly rooms, etc., shows their adaptability to their purpose, while as we view their exterior we are lead to exclaim, 'Our sense of beauty is fully satisfied.'" I am charitable enough to presume that the preacher's religious ideals are of a higher order than is his artistic perception.

What resident of Toronto is not ready to express his gratification at seeing the sum of $20,000 placed in the estimates of the Parks and Gardens Committee of the Council for the improvement of the approaches to Queen's Park? I would like to entertain the hope that stone—artificial or otherwise—and asphalt will shortly take the place of the dilapidated cement sidewalk and macadam roadway which for the past decade have marred the beauty of Queen's Avenue. It is to be hoped the newly installed Council's anxiety for retrenchment will not lead them to apply the knife to this very necessary appropriation.

PASSERBY.

VALUE OF WATER WORKS.

From the Eighteenth Annual Report of the city of Grand Rapids, Mich., some insight into the financial value of water works can be gained. The report says:

"No credit has ever been given to the water works system for fire protection, which makes it appear at the first sight that the water system does not make a good financial showing. But taking into consideration the reduction of insurance rates on the residences, manufacturing plants, and all property liable to destruction by fire, it clearly shows that a water plant is the best paying investment that any muncipality can make. To illustrate: Information from insurance headquarters shows that the amount of property insured in this city is from $20,000,000 to $22,000,000. The rates of insurance are from one-fourth of one per cent. to five per cent. per annum. Before the establishment of the present efficient fire department and the existence of our water system rates of insurance were from one per cent. to ten per cent. per annum. From the same source we learn that the amount of property insured is equally divided between low and high rates, and that the average in insurance is fully two per cent., in consequence of the facilities for extinguishing fire. This would make a saving to our citizens of at least $40,000 per annum from this source alone during the past year."

PRESBYTERIAN CHURCH COMPETITION.

FOR the benefit of draughtsmen who are occupied before April upon the work of the Association examinations, the time for rending in drawings for this competition will be extended to May 21st next. All drawings must be marked by a motto or cypher, and the name and address of the designer enclosed in envelope bearing the same mark.

Dr. A. M. Rosebrugh, of Toronto, has patented a "Combined window ornament and ventilator," which consists of a short supplemental sash secured to upper window sash. This presents a direct draft over this upper sash when the same is lowered a few inches and provides for an indirect draft through the syphon-like space formed by the overlapping of the upper and lower sashes. This fans a gentle current upwards towards the ceiling and promotes the diffusion of fresh air without perceptible draughts. The supplemental sash may be plain glass, colored glass or bevel plate, and may be adapted to any building, new or old. When secured to the outside stops they do not interfere either with outside shutters or with winter sash. A company is being formed to operate the patent.

Subscribe for the CANADIAN ARCHITECT AND BUILDER.

HOW TO ESTIMATE.

By W. H. Hodson.

FOLLOWING is a portion of the specification and bills of quantities accompanying the drawings of Public School on Gladstone Avenue, Toronto, appearing in this number. The balance of specification and quantities will be printed in next issue.

EXCAVATION, &C.

Do all excavation required for the basement and foundation of building to the dimensions shown and figured on the drawings, making the same 12' clear of the outside of footings of all outside walls. The excavation for basement and foundation walls, &c., to be taken out to the depth required, and level in all directions for footings and floor. The spaces outside of the outer walls to be kept clear of earth until the masonry has been properly pointed up and inspected and passed by the architects. The spaces around the outside of walls when directed by the architects are to be filled in with earth and the same well rammed and consolidated. The surface of ground around the building is to be cut and filled to the grade lines laid down by the architects, and in all cases so as to give a fall of at least 3 ins. in every 12 ft. outwards. The whole surface of lot as shown per block plan is to be cut and filled and graded to an uniform grade throughout, the earth arising from the excavations and cuttings being used for that purpose, so far as may be required, and the surplus earth (if any) carted from the premises.

DRAINAGE.

Provide and lay down all drainage as shown by the foundation plan, and in the most thorough and workmanlike manner, complete in all respects. Provide for and pay for 9 in. sewer connection from street sewer to street line. Provide and lay down 9 in. drain from point shown on plan to sewer connection, and provide and lay down 4 in. and 6 in. drains from the points shown on plans connecting with the 9 in. main drain, and with all proper Ys, bends, elbows and junctions and traps, &c., complete. Provide and lay down 3 x 4 in. common or weeping tile drains under basement floor, and connect same to the leading drain from basement. The drains are to be laid with best quality of American salt-glazed or Scotch vitrified drain piping, with socket joints connected with Portland cement, and to be laid with an uniform and sufficient fall, in no case less than ½ in. per foot run of pipe. Care must be taken that every pipe is firmly bedded and packed so as to prevent settlement after the grade is fixed. The drains from water leaders are to turn up within 2 ft. of the surface to receive the same, and to be firmly packed in position and the mouth covered until the conductor pipes from roof are connected. Weeping drains are to be carefully laid in trenches prepared for same, and when laid to be packed around with fine broken brick and coarse gravel, and to have all connections made in the most careful and thorough manner. No drain is to be covered up until inspected and approved by the architects.

MASONRY.

The stone for footing courses and rubble masonry is to be of best quality of large sized Lake and Humber stone, in about equal quantities, and the "coursing" above grade lines to be built with Credit Valley grey stone. The mortar is to be composed of the very best quality of fresh burnt stone lime and clean coarse sharp grit sand in the proportion of 2½ parts of sand to one of lime, mixed with a proper quantity of clean water, and all well and thoroughly incorporated and tempered together. No "soft" or "loamy" sand will be allowed in the work. Lay the footing courses as shown and figured on sections with selected large flake stone thoroughly bonded and bedded firmly in mortar. Build up the foundation walls in good rubble masonry from top of footings to level of basement ceiling, to be 16 in. in thickness, built to a line on both sides and in 15 in. courses, in height corresponding to five courses of brickwork, and so as to bond with the inside brick lining to same as shown per plans and sections. The masonry is to be thoroughly bedded and bonded, each and every stone laid on its natural bed and "through-bonds" built in every 5 ft. on each course. The masonry is to be built plumb, square and true, on both sides of every wall, and to a fair face, and to be thoroughly flushed in at all beds and joints, and neatly pointed with the trowel. The outside face of *all outside* walls is to be plastered with a heavy coat of "cement mortar," composed of one part of best Portland cement to two parts of coarse and clean grit sand, properly tempered with water and laid on fresh as required, and not less than one-half inch in thickness, laid on evenly. The foundation walls above grade line will be faced with Credit Valley grey coursing of selected large stones, built in random coursed work in four courses of one foot each for the large blocks and the random work made up in front two to three stories. Each and every stone to have picked beds and joints, and to have a bed of not less than once and a half its vertical height. Every stone in the coursed work to have a clean and fresh rock face, free from all stains, flaws and other defects, to be hammer dressed to reveals of all windows, doors and other openings to same, and to have an inch margin draft of tooled work on all corners. The coursed work is to be pointed with cement mortar composed of Portland cement, Smith's ashes and lamp-black, and each and every joint to be well cut and weathered and finished in very best manner. The foundations to two large vent and smoke stacks are to be laid with Dimension stone in two courses of eight inches in thickness, each properly bedded in mortar and thoroughly bonded, no stone being less than 4 square feet. Provide and lay *two* footing courses of 6 in. thickness under all internal brick partition walls, and one thickness of same under the brickwork of all "brick-setting" to heating apparatus and flues, as shown per plans, all built in the most substantial manner. Also lay one course of similar footings under the outside area entrance ways and steps, &c., all complete and as above described. The whole of the masonry is to be built with the best of materials called for, and in the most substantial and workmanlike manner, complete in all respects.

CARPENTER AND JOINER WORK.

All the wood work used throughout the building, play sheds and fencing (except otherwise specified) is to be of the best quality and description of white pine, free from sap, shakes, dead, loose and large knots, wane and other defects, and to hold to the dimension specified and figured on drawings, and to be well seasoned. Immediately the contract is awarded, the contractor will proceed to and procure all joisting and other dimension stuff, and have same on the ground ready prepared for the building as the works progress. In same manner all door and window frames are to be prepared in proper time and made ready for setting in the work as the same progresses. All window sash to be made and fitted at same time as frames are made, and then delivered to the glazier at his shop for glazing, who at the proper time will deliver the same at the building ready for carpenter to hang. All doors are to be got out loosely knocked together and stacked away in a drying house until required in the building, when they are to be properly cramped up, wedged and glued, fitted and hung to all in best manner. All doors, sash wainscoting, stairs, and other finished stuff throughout the building, including all door and window frames, etc., is to be of the best quality and description of clear and thoroughly kiln dried pine, all well cleaned up after passing through the machines, and when fitted, to be left clean and in thoroughly good order to receive the painting. Ground and first floor joists to be 14" x 2" set 16" centres, the corridor and attic joists to be 12" x 2" set 16" centres. Provide and fix three sets of chain joists to the floors of the four upper class rooms (12 in all), built of two 14" x 2" joists with 1⅛" packing piece between, all well spiked together and with 1⅛" iron straining rod, 6"x8"x¼" end plates, and well threaded nuts and washers complete. These joists to be bolted together with ¾" iron screw bolts, with nuts and washers, 12 bolts to each chain joist. Trim for stair wells, ventilating stacks and hot air flue, with double 14" and 12" x 2" joists double tusk frames and spiked together, and for stairwells to be strengthened at the corner with 2 in. x ½ in. stirrup pins. Provide and fix wrought iron anchors to ends of chain joists, also to attic joists directly over the same, to be 2 in. x ½ in. x 3 ft. in length, turned up 6 in. at one end and built into brickwork, and the other end bolted to joists with two ¾ in. screw bolts. There will be 48 of these anchors required. Trim the attic joists for manhole in same over the ceiling of teachers room, and provide and fix 2 in. frame in same, 26 in. x 30 in. rebated and fitted with 1¾ framed and panelled door, hinged on top with 4 in. butts and secured with ½ in. iron stay-hook 3 ft. long. Provide neat dressed step ladder of 1¼ in. strings and 2¼ in. steps strongly made for access to above manhole. The joists throughout to be laid level for floors and ceiling, and to have not less than 4 in. bearing on walls, and well spiked to bond timber in wall. The basement and ground floor ceilings will be counter ceiled with 2 in. x 3 in. and 2 in. x 2 in. strapping, set 16 in. centres and properly levelled for ceilings of same and well spiked to under side of joists with 4 in. spike to each joist in the most secure manner. Provide and fix 4 in. x 2½ in. well seasoned bond timbers to receive floor joists, also across under all window openings and for basement do. to be dressed on the face and set fair with the brickwork. Provide and set 6 in. x 8 in. well seasoned pine lintels to all windows and door openings in outer walls except to basement windows which will have double lintel same size dressed on the under face and soffet. The doors in partition walls will have double 6 in. x 6 in. lintels, and in basement to be 6 in. x 6 in. and 6 in. x 8 in. laid together and dressed on the face and soffit to finish fair with face of brickwork. Provide and set 2½ x ½ well seasoned bond strip to all outer walls every 6th course in height for strapping and grounds, also provide and build in 9 in. x 14 in. x 3 in. well seasoned jamb blocks to all door openings, 8 to each opening. Provide and set well seasoned wood bricks of 3 in. stuff to all window openings except basement. Provide and strap all outer walls except in basement with 2 x 2½ in. well seasoned pine strapping set 16 in. centres and well spiked to bond strips in walls, the strapping to be set true and plumb to line on the face to receive the lathing. The sliding door between the two upper class rooms to have a 10 in. x 14 in. well seasoned and dressed pine lintel over same and trussed on top with 4 in. x 8 in. Queen truss with inch foot and suspension rods, with nuts and washers, etc., all complete. Provide and set 3 in. x 12 in. solid and moulded door frames to the front and rear entrance with 3 in. oak weathered sill rebated and fitted for 2½ in. thick raised panelled and bolection moulded doors. The rear entrance ground floor door to have 4 x 6 in. moulded transom bar and 2¾ in. moulded transom esoh, basement entrance doors to have upper half fitted for glass as shown per elevation with 1¼ in. sash base. The inside doors to front porches to be 2¼ thick and as described for the front entrance doors. Provide and fix 2 in. x 15 in. solid and moulded door jambs with moulded transoms and transom sash, and 1¾ in. thick panelled and solid moulded doors complete. The front entrance doors to be 4 ft. x 8 ft. in 6 panels, hinged with three 8 in. square wrot. iron black japanned butts and fastened with heavy and neat forged iron latches with twisted ring shambles bolted on and secured with 6 in. carpenter's locks, and held open with ¾ in. round iron hook and staple all complete. (For sample of above latches, see those on Ryerson and Given St. schools.) The ground floor rear entrance door will be same size and hinged and fastened as above described. Basement entrance doors to be 6 ft. 8 in. x 3 ft. 6 each and 2¼ in. thick, panelled and moulded in the solid on stile and rails, and fitted for glass, to be hinged with two 6 in. wrought iron butts and fastened with 6 in. carpenter's lock with 2½ in. black japanned or brass knobs, and to have hold back hooks as described for front doors. All class room doors to be 7 ft. 6 in. x 3 ft. 4 in. x 1⅝ in. thick, six panelled and moulded in the solid on stile and rails, to be hinged with 6 in. square wrot. iron black japanned butts and fastened with heavy mortice locks (Griffith's gravity locks per sample in office) and fitted with 2½ in. finished brass knobs complete. These doors will have 1¾ in. moulded transom sash over same fitted with two lights of glass 18 in. x 24 in., to be hung on vertical centre pin sitting and secured with a steel spring catch, and to be fitted with a counter sunk finger plate. Provide and fix 2¾ thick framed and panelled sliding door between closet rooms, as shown per drawings, to be formed in 12 panels having 8 in. wide outside stiles, 6 in. wide intermediate stile, 8 in. wide top and middle rails and 12 in. wide bottom rail; the three centre vertical stiles are to be 1½ in. thick, only the centre panels being counter sunk as one large panel 15 ft. x 3 ft. 6 in. high to receive the blackboard, and when same are set to be held in by small hardwood stop ¾ in. thick, set flush with the stile and rail, and fastened with round head screws. This sliding door to have ¾ in. half round metal rail screwed to floor and extending across the corridor and to be fitted with two best pattern 6 in. turned sliding door wheels with turned steel axle and bushings, and screwed and counter sunk into bottom rail all complete. Provide and fix 2 in. jambs to sliding door opening and to sliding door slit in corridor, well moulded, etc., and provide and fix 2 in. x 6 in. moulded pine boxing to one side of sliding door opening to side and head of same. The doors into privy closet rooms in basement, also into coal rooms and furnace rooms, six in number, will have 6 in. x 3 in. chamfered and rebated frames and 2 in. oak sills, fitted with 4 in. transom bars and 1¾ in. transom sash, to have 1¾ in. x 3 ft., 6 ft. 8 in. doors hinged with 5 in. wrot. iron black japanned butts and fastened with 6 in. x 4 in. carpenter's locks and 2½ in. brass knobs, same as to class room doors. The two lunch rooms in basement will not have any door frames or doors. Provide and fix 2 in. door frames and 1¼ matched and cleted doors 5 ft. x 2 ft. 3 in. to four air chamber in privy rooms, also similar frames and doors to ventilating stacks, frames to be 6 in. x 2 in. chamfered. Also provide similar frames and doors to upper part of ventilating stacks above attic floor, and provide and hang same with 10 in. T hinge, and fasten with 6 in. barred bolts. Provide and fix 6 in. x 3 in. solid and chamfered frames and 1¼ moulded sash to all basement windows, the sash to be hinged on top with 4 in. butts and fastened with 6 in. barrel bolts, two to each sash, and to have stout pulley cord, and plumb bob balance weight fastened to ceiling to open and shut same. Provide and fix borrowed light frame 8 in. x 3 in. with ¾ in. vertical iron bars 4 in. apart in same to corridors in basement where shown on plans, four in number complete, to be 3 ft. 6 in. and 4 ft. Provide and fix boxed frames to all class rooms and corridor, windows, grooved and toqued together, with 2½ in. beads and sills and fitted with double hung 1¾ in. moulded sash fitted for 6 lights, 14 in. x 24 in. to each sash or 12 lights to each window. The corridor windows to have 18 x 24 glass. All the above mentioned sashes to be double hung with best Silver Lake braided cotton sash line, iron weights 2½ in. solid axle turned pulleys, and each sash to have two metal lifts and one metal counter sunk pull down fitting; and one good heavy metal sash lock. Provide eight brass pull down hooks, fitted to

light ash poles, one for each class room complete. Provide large half-circle window frame of 6 in. x 3 in. stuff, with 4 in. x 4 in. mullion bars. And 1¾ moulded sash to gable window with inside stop, etc., complete. Also similar circular frames to porch and rear gable windows, the former to have inside inch bead planted around the cural. Provide and construct the roof to building and porches, etc., as shown per elevations and sections. The main roof is to have 12 in. x 3 in. wall plates, 8 in. x 2 in. rafters, 10 in. x 2 in. hip rafters, and double 10 in. x 2 in. valley rafters well spiked together with 4 in. spikes. The rafters will be 18 in. centres, notched down on to will plate and ridge and deck plates and well spiked to same with 4 in. spikes. The deck roof to be supported with framed "Bents," as per sections 12 in. x 6 in. x 4 ft. templates bedded on top of corridor walls, and upon same the framed "Bents" to rest, having 8 in. x 8 in. sill and head piece, 8 in. x 8 in. posts, 6 in. x 6 in. streets, and 6 in. x 8 in. purlins, also 8 in. x 2 in. cross ties, the latter spiked to side of posts and common rafters with 5 in. spikes, the common rafter being doubled opposite each "Bent," the bents also to be braced with 6 in. x 4 in. braces and to leave 8 in. x 8 in. plates extending along from bent to bent and bolted and spiked to same with ¾ in. iron bolts and 4 in. spikes, to receive the ends of rafters. These "Bents" are to be mortised and tenoned and pinned and spiked together in the most substantial manner, and where necessary, the head pieces to extend out far enough beyond the post to give support to valley and hip rafters. The roof to be covered with good sound and seasoned grooved and tongued flooring 1¼ in. thick all well nailed, and breaking joints every 6th board, the flooring to be 6 in. wide and laid close at joints, and to be free from large, loose and dead knots. Trim and line the ends of rafters to receive the roof cornice, and provide and put ⅞ in. faced to same, and ⅞ in. x 10 in. matched soffit lining and 6 in. moulded bed moulding and 6 in. crown moulding and 1½ in. core moulding under crown and gutter moulding of 9,000 sound and well seasoned stuff, all well dressed, fitted and nailed and laid in first-class order for painter. Provide and fix role pieces of ⅞ in. and 6 in. stuff and 3 in. round and rebated ridge rolls all well spiked on and all dressed for painting, also provide and fix ½ in. thick by 4 in. slate grounds, bevelled tilting pieces to vallies and eaves as may be required by slater. Construct gables as shown, with moulded cornice to same, also gablets at open of main roof, next to ventilating stacks, with moulded cornice, etc., complete. Provide and construct roof to belfry as shown, to have 6 in. x 3 in. plate and 6 in. x 2 in. rafters, and ⅞ in. grooved and tongued boarding, and shaped brackets to receive the galvanized iron moulded cornice, all well spiked together, and fitted and secured to brickwork. Provide and construct stair from ground to first floor, as shown per drawing, to have 2¼ in. thick moulded strings and three 6 in. x 4 in. carriage pieces. Steps of 1⅛ in. pine risers and 1⅛ in. oak treads housed at ends into well and wall strings and well wedged and glued, etc., and to be well blocked to carriage pieces. The rise of tops to be 6½ inches and treads 10½ in. with ¾ in. fall or pitch to latter, and to have rounded and moulded risings. The balustrading at side of stairs to consist of ⅞ in. by alternate 3 and 4½ in. grooved and toqued and bevel jointed sheeting nailed to the side of well string and capped with a 6 in. x 4 in. oval backed oak hand rail ploughed out to receive the ends of sheeting and to have quarter round moulding planted along under same. The balustrading around the well at top of stairs to be constructed in same manner, the sheeting to be nailed to side of well trimmer joists and finished on the inside and at ceiling line with ⅞ in. ogee moulded plinth, also to floor line in same manner and to correspond with the wall wainscoting, with quarter round moulded shoe strip, etc., all well nailed. Construct rest-landing to stairs as shown per plans, with 10 in. x 2 in. joists built into corridor wall and floored with ⅞ in. oak flooring with 1¾ in. moulded nosing of same corresponding to tread of stairs. Post 6 in. x 6 in. chamfered on angles to be placed to support the landing, extending floor up to same. Enclose the spandril of stairs with ⅞ in. sheeting nailed to side of string and to 2 in. x 4 in. floor clete, and to have ⅞ in. ogee moulded hose with shoe strip same as to balustrading, and to have moulded capping same as to wainscotting all complete. Stair newels to be of oak 8 in. square and turned, with turned mitre cap to same. The basement stairs to be constructed, as shown per drawings and as described for main stairs, with sheeted balustrading and newel posts in same manner all complete. Provide and construct steps to front and rear entrances, as shown per drawings, to have 2½ strings and 4 in. carriage pieces, 1¼ in. oak risers and 2 in. x 2 in. slatted treads of oak laid with ¾ in. space between, and well spiked and screwed down, the nails and screws to be counter sunk 3-16 of an inch. The platforms to front steps to be constructed with oak slats in same manner and to have 8 in. x 2 in. bearers under same built into main and parapet walls. Build oak coping to parapets of front steps with 2½ in. x 12 in. oak plank, chamfered on edges and spiked to 2 in. pine plank bolted down to brick parapet with ⅛ in. bolts, as called for in bricklayer's specification, and plank on 3 in. moulding of oak under oak coping. Platform to rear entrance steps to be built of 2 in. x 2 in. oak plank, grooved and tongued together, resting on bond timber built into main wall and at outer end on 6 in. x 8 in. timber built into parapet walls of entrance steps, to be neatly dressed and rounded on the nosing, and to have a fall outwards of one inch. The rear entrance steps up to ground floor level and down into basement will be constructed in same manner as described for front entrance steps. The coping will consist of 9 in. x 3 in. stuff chamfered on edges and bolted down to parapet walls as provided in bricklayer's specifications, the bolt nuts to be counter sunk and a 2½ in. round oak roll planted on top of same as shown per marginal diagrams. The walls at side of basement area steps to have pine coping 14 in. x 3 in. dressed on top and face and chamfered on edge, and to be coal tarred on the under side and outer edge and bolted down by ¾ in. anchor bolts provided and built in by bricklayer. Provide and construct "roof over rear and basement entrance steps, to have 6 in. x 6 in. dressed and chamfered posts tenoned into and spiked to parapet coping and to have 6 in. x 6 in. plates and cross bearers, and covered with ⅞ in. x 4 in. grooved and toqued sheeting laid double on 6 in. x 2 in. dressed rafters with ⅞ in. facia and crown moulding and fillet on sides and bottom. The posts are to be braced with 6 in. x 4 in. chamfered braces as shown per elevations, etc. The basement entrance to be covered with double ⅞ in. x 4 in. stuff resting on parapet coping and wall clete and battened on top with 2 in. x ¼ in. moulded battens, the upper steps roof to be battened in same manner. All the stuff for above mentioned roof to be of good, sound, clean and well seasoned pine, and all left in good order for the painter, complete in all respects. Provide and fix wainscotting to all closet rooms and corridors (except in basement), to be 3 in. x 6 in. in height with moulded capping and ⅞ in. x 8 in. moulded plinth and 1¾ in. moulded shoe strip, the wainscotting to be composed of alternate 2½ and 4 in. x ⅞ grooved and tongued and jointed sheeting of clear, seasoned, kiln-dried stuff, put together and blind nailed in most substantial manner. Provide and fix openings for exhaust ventilators in the base of wainscotting under all windows in class rooms, and two extra, making six in each class room, and provide and fix screens of galv. wire cloth to same with neat moulded frame around each, and provide and connect same down to the span formed by the counter ceiling. Provide and fix ⅛ in. jamb lining and soffit to all windows except in basement, also 1⅛ in. stools finished same level and forming part of wainscotting capping, the lining to be tongued into frames, and provided with ⅞ x 12 in. ventilating boards cut in between and held by neat moulded cletes. Provide and fix 6 in. x 1⅛ in. well seasoned and kiln-dried clear pine architraves to all windows and doors except in basement, all nailed to ⅞ in. x 3 in. grounds, well nailed to wall strips, etc., in walls. Provide and lay ⅞ in. x 10 in. thickness, sound and seasoned common flooring, ground and first floor throughout all well nailed down to every joist with two 3 in. nails, and after all plastering and trimmings are on and the building cleaned up, lay down best quality of ⅞ in. x 3 in. thoroughly kiln-dried white maple flooring, grooved and tongued and blind nailed and finished up smooth and close jointed throughout, and have the same clean and in thorough order for oiling. Put 1⅛ oak nosing boards to all well holes and properly fit and scribe to all walls and other parts. The carpenter will lock up each room as the floors are laid and until the painter is ready to oil the floors. Construct teacher's platforms at end of each class room, as shown to be 6½ high laid on 6 in. x 2 in. bearers, 18 in. centres, and floored with ⅞ in. x 3 in. maple flooring with 1⅛ in. nosing to same, and ⅞ in. pine riser rounded and moulded complete. Provide and fit up privy closets in basement as shown per basement plans and details. The floor to be laid with 6 in. x 2 in. bearers laid upon the finished cement floor, 18 in. centres, and floored with ⅞ in. x 3 in. maple flooring, same as other floors and with 1⅛ in. nosing to same. The seats to have ⅞ x 4 in. grooved and tongued sheeting for risers well nailed to trimmer bearer, and to have 1¼ quarter round planted in angle next to floor, and 1¼ in. x 3 in. clete along the top under seat. The seats to be made out of 1¼ in. stuff, with rounded nosing and perforated with graduated seat holes, 6 in. x 9 in. to 7 in. x 11 in. as shall be directed. Enclose the closets with 1¼ in. x 4 in. grooved and tongued matched sheeting 6 ft. 6 in. high with 2 in. x 3 in. capping chamfered on edges and ploughed to receive the ends of sheeting, also floor cletes in same manner. The doors to have 3 in. x 3 in. chamfered posts, rebated for 1¾ doors but without doors. Provide and fit up screen along the front of each range of closets and urinal as shown per plans and as described for privy enclosure, and in both cases extend the posts up to the ceiling and well spike and tenon the same into a 2 in. x 3 in. ceiling clete planted on to receive the same. The seats are to have 1¼ flaps or covers to the holes with 2 in. x 1½ cletes tenoned on to same and to be hinged with 6 in. wrot. T hinges put on with screws. Provide and fix 1¼ in. x 15 in. dressed board at back of urinal. Provide and fix grounds, boards and casing to plumber's piping, and all cutting and notching for same in the best and most substantial manner and as shall be directed. All woodwork for the above closets and screens to be of best seasoned stuff. The carpenter will provide and set all centres for bricklayer and provide and stay all frames and case in all cut stone work when necessary and as may be decided by the architect. The carpenter will attend on other trades and as may be necessary for the proper carrying out of the works. The core of the building will rest with the carpenter who will provide all necessary temporary doors and fastners to same, and will provide keys for the other trades to gain access to the building at all proper working hours, and will see that the building is properly closed in at nights and during Sundays. Provide and fix 1¼ in. iron hand rail at each side of main stairs made of 1¼ in. gaspiping secured to the side of stairway with wrot. iron brackets and finished to newels with iron socket flanges screwed on. These iron rails to be the same as those in Given St. and Ryerson schools. Provide and fix black japanned metal clothes hooks in each class room, screwed with four ¾ in. screws to the wainscotting and to be per sample in our office. There will be sixty of these hooks in each class room and 12 in teacher's room at end of corridor, and eight elsewhere directed by the architect, making 500 in all. Provide and fit up in each class room, and where recess in walls will be left for same, small cupboards 30 in. wide x 36 in. high and 9 in. deep, to have 1¼ in. side and front and 1⅛ in. flock panelled doors in two boxes hinged with 3 in. butts and fastened with good cupboard lock and to have metal knobs 2⅜ in. moulded stool and moulded cornice, and to project about 4 in. from face of plaster work on walls. These cupboards will have three ¾ in. shelves to same on neat moulded clete.

(To be Continued in March Number.)

BILL OF QUANTITIES.

EXCAVATION AND DRAINAGE.

	$	c.
1340 cubic yards of excavation, includes filling and ramming, etc., complete		
Cutting and grading around the building, complete		
Cutting, filling and grading the lot to uniform grade throughout, and carting away surplus earth		
Provide 9 in. sewer connection from street sewer to street line, at per lineal yard, complete		
Provide 9 in. continuation drain from sewer connections to point shown on plan, at per lineal yard		
58 lineal yards of 6 in. vitrified tile drains, includes Y's, bends, elbows, junctions and traps, etc., complete		
102 lineal yards of 4 in. vitrified tile drains, includes Y's, bends, elbows, junctions and traps, etc , complete		
80⅔ lineal yards of 3 in. x 4 in. weeping drain, includes packing with broken brick and coarse gravel, complete		

NOTE.—Excavations are measured "cube," that is, length, breadth and depth, thus: 54 ft. 9 in. x 22 ft. 6 in. x 5 ft. 6 in., equal to 6775 ft. 4 in., divided by 27, the number of feet in a cubic yard, gives 251 cubic yards, less 11 ft. 8 in). Tile drains are measured lineal, that is, running measure, as indicated in above items.

MASONRY.

93¼ toise masonry (86 ft. cube English measure) in foundation walls, pointed in cement mortar outside, complete		
2 toise masonry in vent, foundation, (Dimension stone)		
995 supl. ft. of Credit Valley stone, random coursed work above surface, inch draft and hammered dressed reveals; pointed in cement, complete		

NOTE.—Masonry is measured cube, and the totals of dimensions added together, divided by 86, the number of cubic feet in a toise. The French measure per toise being 6 ft. x 6 ft. x 2 ft., equivalent to 6 ft. 4½ in. x 6 ft. 4½ in. x 2 ft. 1½ in. English measure, the French foot being ¾ of an inch longer than one foot English.

PERSONAL.

In the CANADIAN ARCHITECT AND BUILDER for January the statement was made that Mr. Geo. Gouinlock, architect, Toronto, had entered into partnership with Mr. Garland. We regret that this statement was made without authority and under a misapprehension as to the facts. It has since been learned that the arrangement Mr. Garland had with Mr. Gouinlock, was only a temporary one, and that it has since been dissolved.

News has been received of the death at Hanford, Cal., of Mr. Jas. R. Bowes, architect, late of Ottawa, Ont. Mr. Bowes death resulted from injuries sustained by jumping from the second story window of a burning hotel.

Mr. Wm. Gregg, Jr., representing the Toronto Radiator Mfg. Co., at Winnipeg, Man., paid a visit to Ontario last month. He reports the building outlook for Winnipeg and the Northwest to be encouraging, and business in his particular line extending.

PUBLICATIONS.

Sir Edwin Arnold, who has been enjoying an interesting trip through the United States, has made a careful study of the conditions which govern the family in Japan and embodies his ideas in a paper called "Love and Marriage in Japan" in the February number of *The Cosmopolitan*. The article is illustrated by the quaintest possible Japanese sketches running down the sides and across the bottom of each page.

We have been favored by the publisher with a copy of a practical treatise by Mr. Owen B. Maginnis on the practice of centering arches in building construction in the United States. The book contains 65 illustrations, is well bound in cloth, and is sold at the price of $1.50. Wm. T. Comstock, New York, is the publisher.

B. H. CARNOVSKY,

INTERIOR CABINET DECORATIONS

AND ALL KINDS OF FURNITURE MADE TO ORDER.

Church Work a Specialty.

128 and 130 Ontario Street, - KINGSTON, ONT.

PORTLAND CEMENT, FIRE BRICKS,

FIRE CLAY, SEWER PIPES, SEWER INVERTS.

ADAMANT WALL PLASTER.

McRAE & CO.,

98 Esplanade St., - TORONTO.

OTTAWA OFFICE: 16 METCALFE ST.

Electric Light Supplies

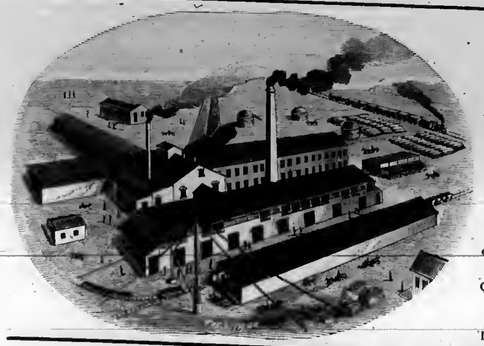
Covered Wire, Insulators, Cleats, Soldering Salts, Tape, Cut-outs, Switches, Sockets, and Shades.

Alternating and Direct Current Dynamos, Converters, and Meters. Repairs prompt and reasonable.

TORONTO ELECTRICAL WORKS

35 Adelaide Street West, - - TORONTO.

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with advertisers.



ESTABLISHED 1870.

Beamsville Pressed Brick Co.,

MANUFACTURERS OF

Fine Pressed, Plain, Ornamental, Rock face

BRICK

Farm Drain Tile, Roofing Tile, etc.

Red, Brown, Buff AND other shades.

Our goods cannot be excelled in quality. No lime or impurities as often found in clay.

Office and Works: BEAMSVILLE, ONT.

Telephone communication.

SALES AGENTS: ELLIOTT & McKENNY, 34 Yonge Street, - TORONTO. E. C. HOPKINS, 145 St. James St., MONTREAL.

Lamkin's Patent PIPE AND BOILER COVERING

SAVES 1000 POUNDS OF COAL EVERY TWENTY-FOUR HOURS.

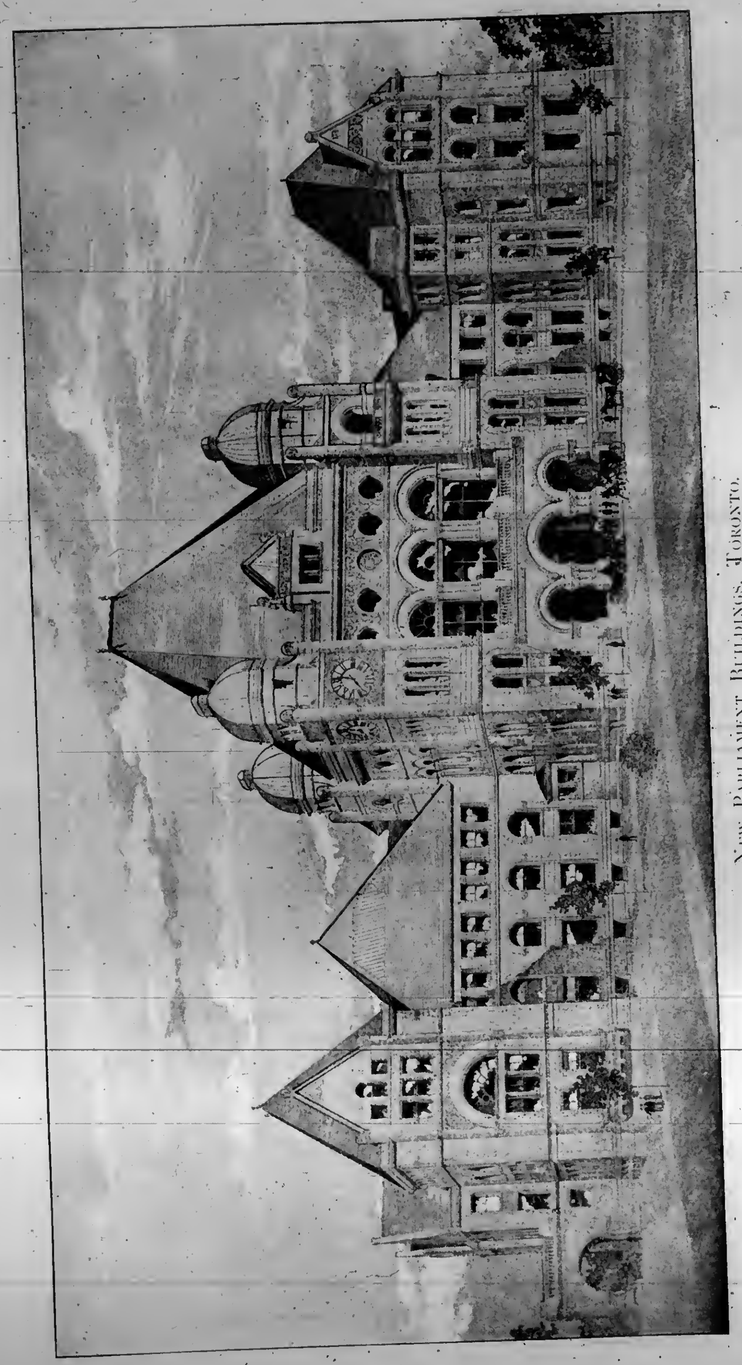
WHAT IT DOES FOR OTHERS IT WILL DO FOR YOU.

GAST & CO., Toronto, Ont. Windsor, Ont., Dec. 31st, 1889.

Gentlemen: In reply to your request for my opinion respecting Boiler Covering, I consider your covering good. You have done us a first-class job, and it saves us ten hundred pounds (1,000) of coal every twenty-four hours.

Windsor Water Works. Yours respectfully, JOSEPH HALL, Supt.

GAST & CO., Manufacturers, - 30 ADELAIDE ST. WEST, TORONTO, ONT.



WITH COMPLIMENTS OF

THE TORONTO RADIATOR MFG. CO.

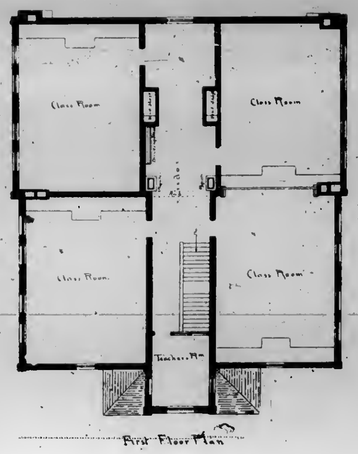
Toronto, Montreal, Quebec, Winnipeg, Victoria, Vancouver, B.C.

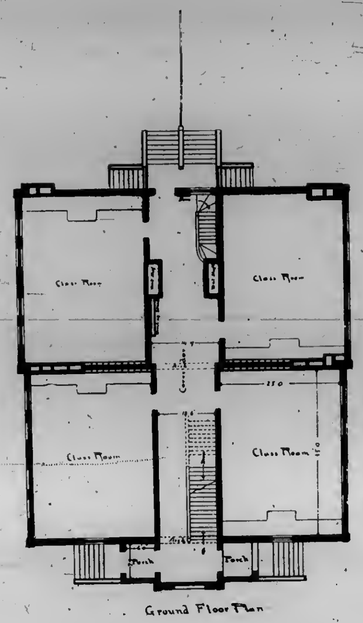
NEW PARLIAMENT BUILDINGS, TORONTO.

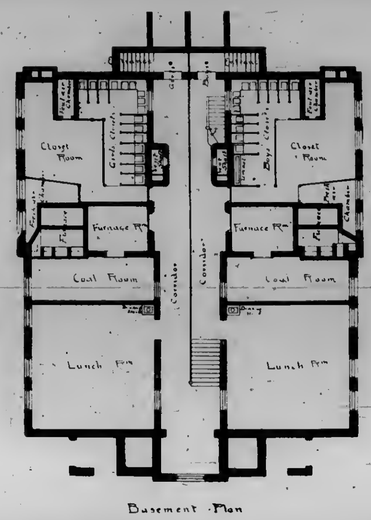
CANADIAN ARCHITECT AND BUILDER—VOL. V, NO. 2.

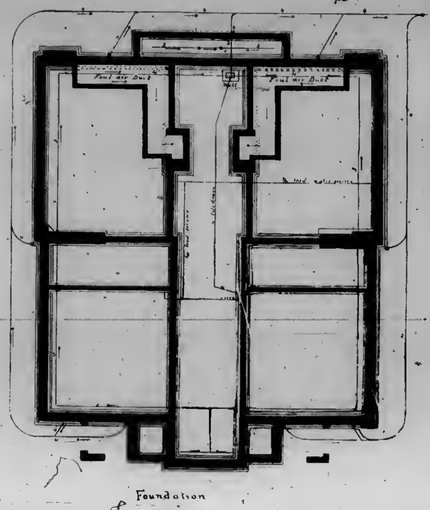
TRADE SUPPLEMENT.

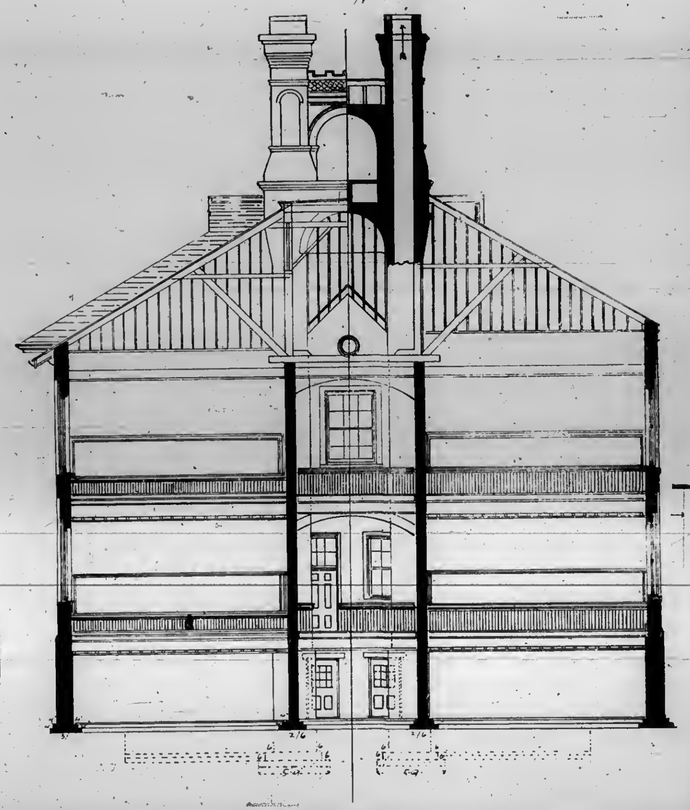
TO BE HEATED BY THE SAFFORD STEAM RADIATORS.





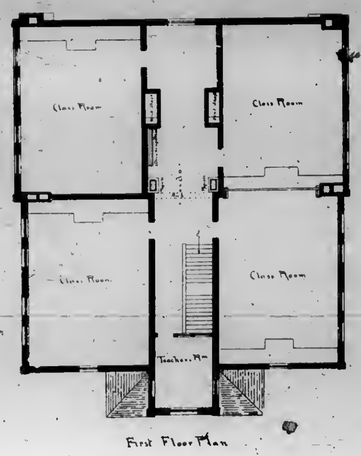




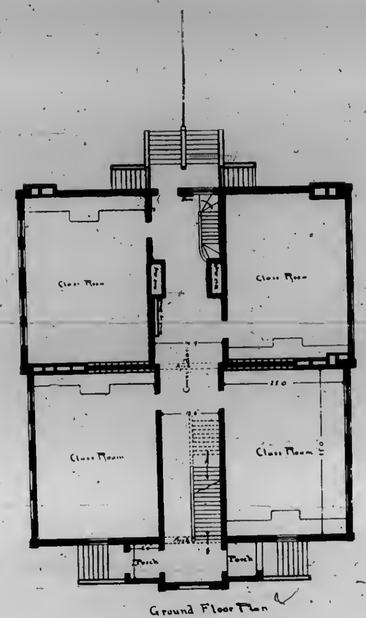


PUBLIC SCHOOL, GLADSTONE AVENUE, TORONTO.—STRICKLAND & SYMONS, ARCHITECTS.

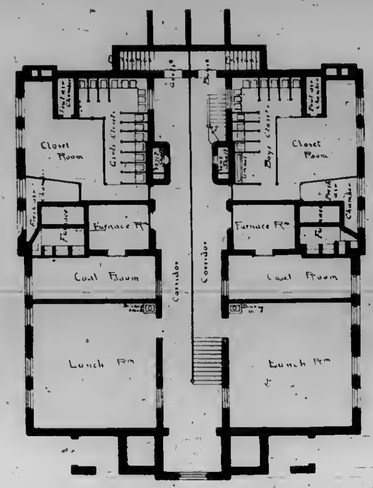
ILLUSTRATING ARTICLE IN THIS NUMBER, ON "HOW TO ESTIMATE," BY W. H. HODSON.



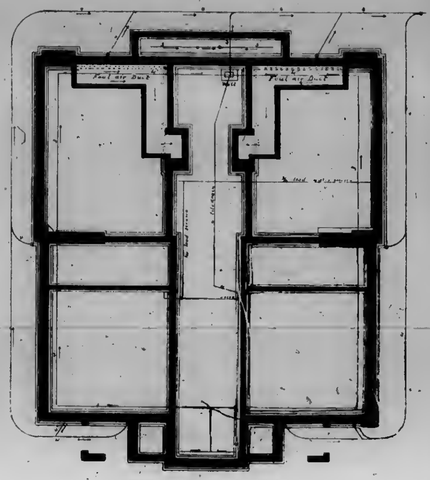
First Floor Plan



Ground Floor Plan

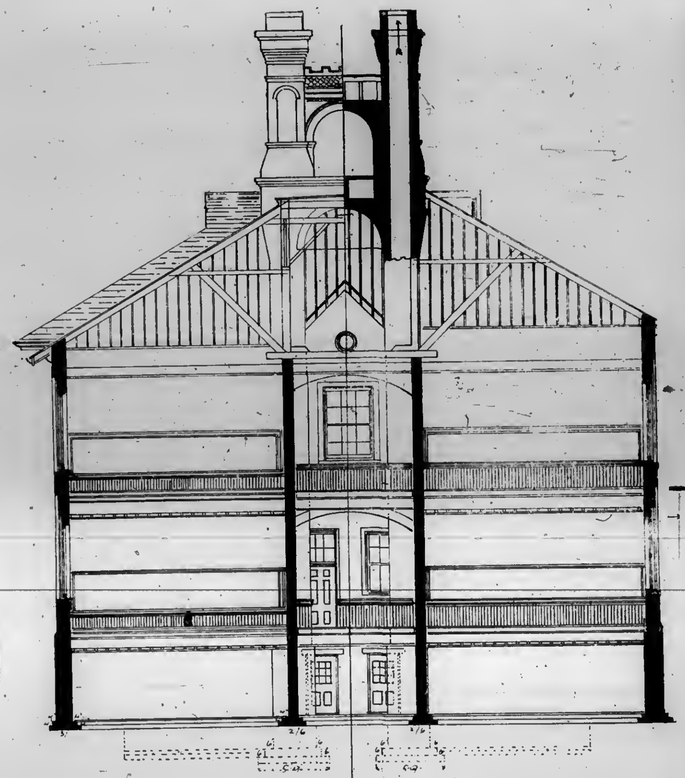


Basement Plan



Front Elevation.

Side Elevation.



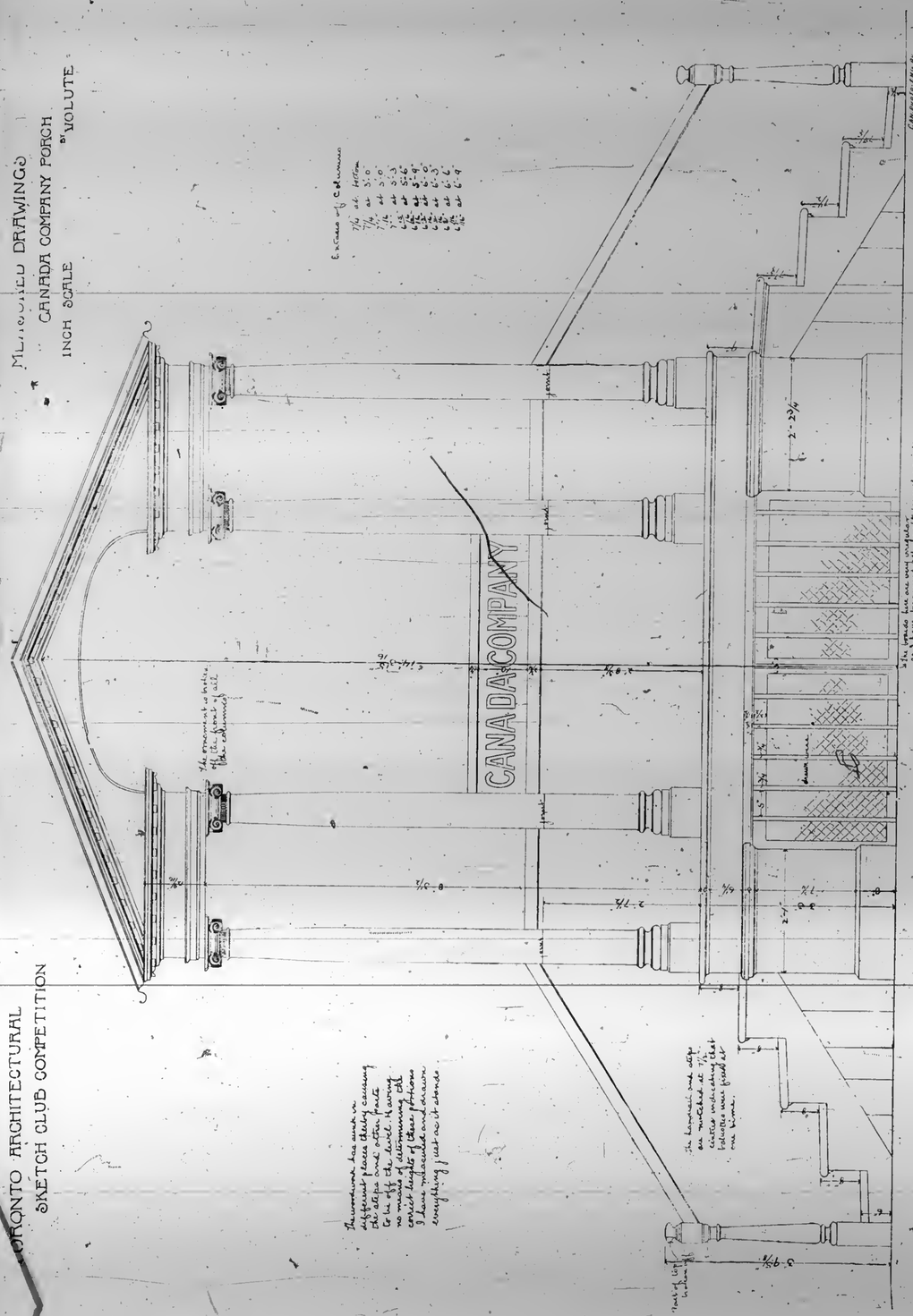
Sections

PUBLIC SCHOOL, GLADSTONE AVENUE, TORONTO.—STRICKLAND & SYMONS, ARCHITECTS.

ILLUSTRATING ARTICLE IN THIS NUMBER, ON "HOW TO ESTIMATE," BY W. H. HODSON.

TORONTO ARCHITECTURAL
SKETCH CLUB COMPETITION

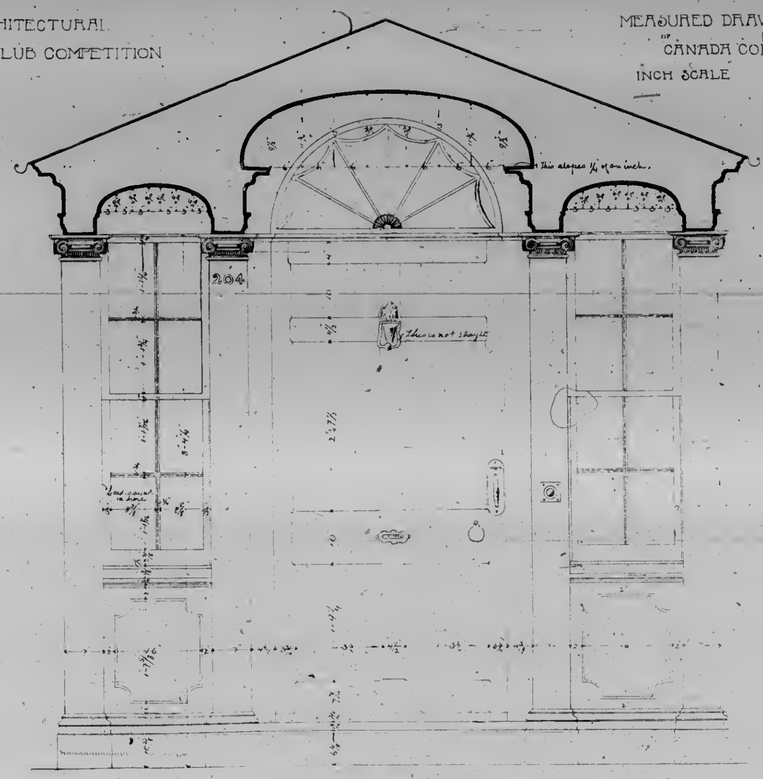
MEASURED DRAWINGS
OF
CANADA COMPANY PORCH
INCH SCALE "VOLUTE"



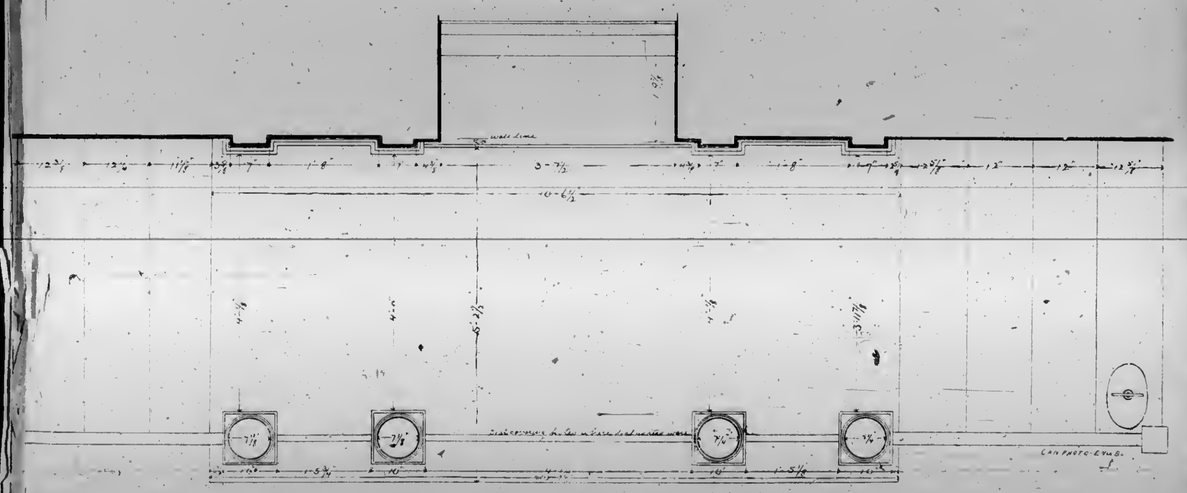
FRONT ELEVATION

Drawings by "Volute" (Mr. W. P. Over), Awarded First Position.

[Note.—To admit of publication, Drawings have been reduced in size one-half].



SECTION THRO PORCH



PLAN

Drawings by "Volute" (Mr. W. P. Over), Awarded First Position.

[Note.—To admit of publication, Drawings have been reduced in size one-half].

TORONTO ARCHITECTURAL SKETCH CLUB COMPETITION.

MEASURED DRAWINGS OF CANADA COMPANY PORCH.

FULL SIZE DETAILS.

BY VOLUTE.

PEDIMENT MOULDING.

ARCHITRAVE.

CAPITAL OF COLUMN.

BASE OF COLUMN.

DIAGONAL ELEVATIONS OF VOLUTE.

DIAGONAL

FRONT

PLAN LOOKING DOWN

PLAN LOOKING UP

MOULDING DRAWING.

NEWEL POST.

MOULDING BELOW FLOOR

FLOOR NOSING

MOULDING UNDER WINDOW

BASE OF PLASTER

MOULDING OVER DOOR

SECTION THRO STEP

TORONTO ARCHITECTURAL

DRAWINGS BY "VOLUTE" (MR. W. P. OVER). AWARDED FIRST POSITION.

[NOTE.—To admit of publication, Drawings have been reduced in size one-half].

MEASURED DRAWINGS

TORONTO ARCHITECTURAL

CANADIAN ARCHITECT AND BUILDER.

VOL. V.—No. III. TORONTO AND MONTREAL, CANADA, MARCH, 1892. { PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

14 King Street West, - TORONTO, CANADA.

64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	S. G. CURRY, Toronto.
1ST VICE-PRESIDENT	KING ARNOLD, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton.
TREASURER	D. B. DICK, Toronto.

COUNCIL:

WM. G. STORM	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
JOHN E. BELCHER	Peterborough.
EDMUND BURKE	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Merchants' Bank Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	F. X. BERLINQUET, Quebec.
1ST VICE-PRESIDENT	VICTOR ROY, Montreal.
2ND VICE-PRESIDENT	J. NELSON, A.R.C.A.
SECRETARY	C. CLIFT, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. C. HUTCHISON, R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
ALPH. RAZA	Montreal.
J. F. PEACHY	Quebec.

SEVERAL of the largest manufacturers of lime in Toronto, Milton and Guelph have consolidated their interests, and will hereafter be known as the Ontario Lime Association. Toronto will be the headquarters of the Association. An effort will no doubt be made to stiffen prices.

THE Association of Provincial Land Surveyors of Ontario are applying to the Legislature for incorporation. For some reason or other the Bill which has been introduced with this object has met with considerable opposition. The influence of this opposition seems likely to also stand in the way of the required amendments to the Ontario Architects' Act.

A CORRESPONDENT writes: "Allow me to congratulate you on the editorial article on cement testing in February issue of CANADIAN ARCHITECT AND BUILDER. I for one would be very glad to see your ideas regarding the establishing of a Government laboratory for testing cements carried out. Should occasion require it, you are at liberty to use my name as having been one of the sufferers. I can fully corroborate the statements contained in your article."

COL. Tracy, City Engineer of Vancouver, B. C., advises us that it is the purpose of the council of that city during the approaching summer to commence the use of bituminous rock pavement. This material, which will be imported from Southern California, is described as being a good deal like asphalt, with the exception of being elastic, giving a good foothold to horses. Our informant regards it as being almost an ideal pavement. The success of this material will be watched with interest by other cities.

A CORRESPONDENT writes from British Columbia concerning Christ Church Cathedral competition, Victoria, B.C., as follows: "All designs received at this end are being forwarded unopened to the Church House, Westminster, Eng., where those prepared by English architects will be received. They will then be examined by Canon Beaulands and Mr. B. Ferry, architect, and the ten most suitable designs will be submitted to Sir A. W. Blomfield, whose decision as to the merit and award of prizes will be accepted by the plans committee. Some local architects have competed, but we believe many others have held aloof, not altogether liking the conditions of competition."

BUILDING operations in Montreal promise to be somewhat extensive during the approaching summer. Strong efforts have been made for a year past by certain real estate speculators to boom suburban properties, and in spite of the experience of Toronto, the older and more conservative city has shown itself to be susceptible to the boomster's art. It is unlikely, however, that speculation in land or building will be carried to anything like the pitch attained in Toronto during the recent period of inflation. While anything bearing the least resemblance to wild-cat speculation ought to be severely discouraged, every possible encouragement should be afforded to legitimate building enterprises.

THE Ontario Association of Architects will hold the first examinations under the Act of Incorporation at the School of Practical Science, Toronto, on the 5th, 6th, 7th and 8th of next month. Three examinations will be held at the same time, the first and second intermediates and the final, and there are some sixty candidates coming forward to undergo the tests of their proficiency in the various stages. The Board of Examiners consists of seven members: Prof. Galbraith, chairman, and Messrs. C. H. C. Wright, E. Burke, R. W. Gambier-Bousfield, S. G. Curry, F. Darling and S. H. Townsend. This is the first of a long series of examinations, let us hope the result of which will be that the danger the public are now in, of falling into the hands of unskilled practitioners, will in time be done away with. Now a youth must perforce go through a regular course of training, passing examinations at certain stages to test his progress and show him in what particulars he is weak, until having passed the final examination, he may practise his profession with honor to himself and for the good of the public.

THE architectural students of Ontario are at present on the anxious seat in view of the approaching April examinations. Many architects now in practice regret that such examinations were not required of them during their studentship. Students of the present day should, therefore, appreciate the facilities which, under the Ontario Architects' Act, have been placed at their disposal for acquiring a proper knowledge of architecture. With the object of assisting students who shall present themselves as candidates for examination, we publish a paper on "Heating and Ventilation," by the President of the O.A.A., Mr. S. G. Curry, and also a paper on "Elements of Building Construction" and "Structural Iron Work," by Mr. E. Burke, recently read before the members of the Toronto Architectural Sketch Club. The authors have been appointed examiners in the subjects treated of in their respective papers.

IT is every day becoming more apparent that the activity which was expected to mark the coming season in Toronto in consequence of the changing of the street railway system and the construction of permanent pavements on the leading streets, will not be witnessed. The Council are in a fair way to spend the balance of the year in discussing the merits of the trolley versus the storage battery system of street car propulsion, notwithstanding that their experts reported in favor of the trolley, and in the face of the fact that the experimenting which has been done by American cities points to the trolley system as being at present the only one which can be depended on to do the work satisfactorily, especially where heavy grades and heavily laden cars are among the difficulties to be encountered. It is right enough that the Council should endeavor to make provision for the adoption of a system more perfect than the trolley, should such be made available before the period of the present company's franchise shall have expired, but they are not justified in throwing over the carrying out of this great improvement for another year when the evidence all tends to show that no corresponding advantage is likely to be gained. The outlook for the building trades is none too encouraging. There is consequently the greater reason why the City should endeavor to afford employment on as extended a scale as possible to artisans and laborers.

THIS is not the first time that we have taken occasion to speak of the Mechanics' Lien Law and its many disadvantages. The act remains in force, and as long as this is the case there will be heard from all sides complaints of its cumbersomeness, expense in procedure, and its incomprehensiveness. We have more than once heard it said by "persons in authority" when asked to explain some part of the Lien Law, "It's not surprising you don't understand it, for nobody ever did." This assertion is, of course, an exaggeration, but it has a great deal of truth in it. Surely then it is time to amend a law that has such obvious flaws in it. Many people, and among them lawyers of eminence, contend that it would be better to abolish it at once. The fact is, the system on which the law is based is wrong. It encourages fraud, as it attempts to legislate for credit, giving considerable opportunity for dishonesty. It fosters speculative building, and dishonest builders have not failed to take advantage of it, causing an amount of distress, annoyance and embarassment that it would fill volumes to dilate upon. Were there no Lien Law, there would not be much credit. But under the existing state of things the material man prefers to sell his goods on credit and run the chances of being able to protect himself by a lien, to not selling anything, the man who gives credit being the one who secures the orders. The material man can come down on the innocent owner, and so can the workman, and force him to pay again that which he has already paid the builder who has abscooded, for the percentage retained in making advances to the builder rarely are sufficient to cover the whole costs. The system of credit is bad, but this plan of safeguarding the man who gives credit in order to sell his material is worse.

MUCH has been heard of the danger attendaot upon the system of stringing electric wires overhead, and reiterated demands have been made that all wires be placed underground. It is questionable, however, whether the carrying out of this demand would not tend to enhance rather than diminish the danger. An example of the peril which is likely to attend the underground system occurred in Toronto a few days ago. Illuminating gas from the street mains found its way in sufficient quantity into one of the man-holes in the public streets through which passes a telephone cable, to require but the faintest induction spark from the covering of the cable, or a spark of atmospheric electricity to cause an explosion. The spark appears to have been forthcoming; for suddenly the heavy iron man-hole covering which had been firmly bolted down, was torn from its seat and carried into the air. A horse which was being driven past the spot at the moment fell into the man-hole, and before it could be extricated there occurred a second explosion, burning the animal severely. The driver of the horse and another person who happened to be near the man-hole when the explosion occurred escaped with slight injuries. It is a well-known fact that about 10 per cent. of the total supply of illuminating gas which goes into the street mains leaks out at the joints and saturates the earth. This gas must find its way into the man-holes, and when the right admixture of gas and air is reached, the material is ready for an explosion. There is always danger with underground wires that the inductive current set up in the lead covering of the cable may become sufficiently strong to generate a spark which would be the means of igniting the combustible materials. Had the explosion to which we have referred taken place in the man-hole at the intersection of King and Yonge streets, where the traffic is always great during business hours, there would in all probability have been many persons killed. The daily press which has so often held up to view the horrors of the overhead system, should now have something to say on the other side of the question.

A VERY singular case has been before the courts for some time, and it will be probably many months before we hear the end of it. As it contains points of considerable interest, we give the story as far as it has gone at present. Three prominent men of Waterford, Ontario, built a block of business premises on the main street of that town. The boundaries of the street had not been definitely decided, but when they were, it was found that the new block encroached some six feet upon the street. The owners of the building were proceeded against for allowing a nuisance and were fined. They appealed, but the result was an order to remove the "nuisance" within three months. This they failed to do, and the County judge allowed a writ of *de nocumento amovendo* to issue, which enjoined the sheriff to pull down the projecting part of the block at the owners' cost. The barrister in charge of the owners' interests held that the County judge had not the power to issue this curious writ, but that it was a matter for the High Court. He succeeded in obtaining a writ of *certiorari* during the recent term, so that proceedings were stayed on account of the irregularity, and will proceed during the ensuing term to apply for a rule *nisi* whereby the present proceedings will be quashed. The case gains interest from the fact that the writ of *de nocumento amovendo* is said to be the first that has been issued for a hundred years. The matter may still be brought before the High Court, and if so, the owners are liable to a fine of almost any amount, and repeated fines until the "nuisance" complained of is removed. There seems to be a difference as to the term which may be applied to an encroachment upon adjoining property, for there is a case recorded in which, by a mistake, a house was erected with one side wall, just its thickness, nine inches, on the adjoining lot. In this case the owner was proceeded against, not for a "nuisance," but simply for encroachment, and when the sheriff was ordered to tear down the wall he found he could not do so without injury to that part of the house touching the wall on the other side, and clearly within the lot of the house owner. He had no right to enter upon the lot or touch anything therein, and so far as we have been able to discover, the matter had to be left in this state.

OUR ILLUSTRATIONS.

HOUSE FOR A. R. REID, ESQ., MONTREAL.—ALEX. C. HUTCHISON, ARCHITECT.

This building was erected in Upper Drummond street some eighteen months ago. The fronts are of red Scotch and red New Brunswick sand stone. It is at present without the library shown on the plan, but it is proposed to make this addition during this year.

CHURCH OF THE MESSIAH, AVENUE ROAD, TORONTO.—GORDON & HELLIWELL, ARCHITECTS, TORONTO.

SKETCH OF SUMMER RESIDENCE ON TORONTO ISLAND.—LANGLEY & BURKE, ARCHITECTS, TORONTO.

INTERIOR OF HALL, F. D. MONK'S RESIDENCE, MONTREAL.—J. W. & E. C. HOPKINS, ARCHITECTS, MONTREAL.

OBITUARY.

It becomes our painful duty to chronicle the death of Mr. John Webb, one of the oldest, most prominent, and most highly esteemed contractors of the City of Hamilton. Death was the result of a severe attack of rheumatism, culminating in severe spasms of the heart after an illness of seven weeks. The subject of this notice was born near Hythe, in Kent County, England. He came to this country in 1871, and immediately entered into business in Hamilton as a contractor and builder. Among the buildings erected by him may be mentioned the *Times* building, Ryerson school, West Avenue school, Canada screw works, James McPherson & Co's building, the buildings occupied by Messrs. F. W. Fearman & Son, Thos. Lawry & Son, W. H. Gillard & Co., St. John's Church, the Tuckett tobacco factory, and others which were both a credit to him and to the city. He leaves a widow and nine children, four sons and five daughters. Deceased was a member of Doric Lodge, A. F. & A. M., and a charter member of Gore Lodge, A. O. U. W. For a number of years he was an active member of the Charitable Committee of St. George's Society. He was noted for his uprightness of character and kindliness of disposition.

PUBLICATIONS.

Messrs. H. R. Ives & Co., have issued an attractively printed little book, embellished with a number of humorous illustrations, calling attention to the advantages of their Buffalo hot water boiler, corrugated soil pipe, etc.

Elizabeth Bisland opens the March number of the *Cosmopolitan* with an article on the Cologne Cathedral, beautifully illustrated from photographs. M. H. de Young, Commissioner of the World Fair from California, has a most interesting article on expositions. The illustrations accompanying this article are from the pen of Harry Fenn and adequately display to the readers the architectural glories of the Fair buildings.

CANADIAN CITY ENGINEERS.

V.

HURD Peters, City Engineer of Saint John, New Brunswick, was born at Fredericton, N. B., being one of the younger sons of Hon. Charles Jeffrey Peters, Attorney-General of that Province.

After passing through the Collegiate school (silver medal) Mr. Peters took his degree of A.B. and A.M. at King's College, from the University of N.B. (gold medal). He also took his diploma at the special course in engineering at that time instituted under Mr. Cregan, C.E.

After having been employed on the European and North American R. R. between St. John and Vanceboro and on what is now the Intercolonial, between St. John and Moncton, as leveller, he spent some time working in the United States.

In 1854, in partnership with I. Edward Boyd, M.I.C.E., who recently died while in charge of the harbor works, Quebec, he opened an office under the title of Peters & Boyd for private practice in St. John. When Mr. Boyd subsequently took a position on the government railways, Mr. Peters continued in private practice until April, 1861, when he was appointed City Surveyor. Two years later, July, 1863, he was appointed City Engineer—that office being then for the first time established—and has so continued to the present time. He was one of the first Council of the Canadian Society of Civil Engineers, and his name appears in the Act of Incorporation.

The record of Mr. Peters' work is to be found in the present state of the city, for which he has been engineer for some 30 years.

Mr. Peters has also taken an active part in militia affairs, having retired with the rank of Lieut.-Col. 2nd Battalion St. John County Militia. He has likewise filled positions of trust in connection with the Episcopal Church.

Mr. Peters had his residence and office with all his plans and memoranda, destroyed in the conflagration which overtook St. John in 1877.

MR. HURD PETERS, CITY ENGINEER, ST. JOHN, N. B.

QUERIES AND ANSWERS.

"J. B. R." writes as follows from the Northwest Territory: "It was the intention of the company with which I am employed as superintendent of construction to build concrete, but for different reasons the company changed to frame and rough-cast. This left a large quantity of Selkirk lime on hand. Last fall I dug a large pit 14' x 12' x 2', and ran it full. After covering it with a good layer of sifted sand, I placed a rough floor over this, then another layer of sand and protected this again with manure. Will I meet with as good results when I require it as if I had left it to air slake? I was never placed in this position before, but was once told by a stone mason that the longer the lime lay in this state the better."

[ANS.—Storing lime in the manner mentioned by our correspondent is calculated to improve rather than to injure the quality. In England lime is frequently stored in cellars for the purpose of improving it. When thus treated it is called "putty lime," and is chiefly used for finishing. Unless the lime has suffered from the severe frosts, it will no doubt be found all right, and we would advise our correspondent if possible to keep it for finishing purposes. It will be found to be cool and will not crack.—ED. C. A. & B.]

PROVINCIAL LAND SURVEYORS.

THE seventh annual meeting of the Association of Provincial Land Surveyor of Ontario, was held in the Canadian Institute, Toronto, on Feb. 23rd, 24th and 25th. In addition to the transaction of much important business, papers were read as follows: "Cement and Cement Mortars," Mr. J. Butler, P.L.S., C.E., Napanee, Ont; "Does the Passing of an Act of Parliament Alway do Justice?" A. Niven, P.L.S., Haliburton; "Hints to a Surveyor About to Survey a Township for the Ontario Government," W. R. Burke, P.L.S., Ingersoll, Ont.; "Compass Lines," John McAree, D.T.S., Toronto; "The Value of Old Records in Relation to Municipal Surveys," Geo. B. Kirkpatrick, P.L.S., Crown Lands Dept., Toronto; "Sewerage for Towns and Villages," H. J. Bowman, P.L.S., C.E., Berlin, Ont.; "Georgetown Water Works," James Warren, P.L.S., C.E., Kincardine, Ont.; "Hamilton and Barton Incline Railway," J. W. Tyrrell, P.L.S., C.E., Hamilton, Ont.; "Storage of Water on the Trent System," R. B. Regers, P.L.S., C.E., Peterboro', Ont.; "Exploring for Nickel," C. E. Fitton, P.L.S., Orillia; "Railway Surveys," H. K. Wicksteed, P.L.S., C.E., Cobourg, Ont.; "Rock Blasting of Trenches for Water Works and Sewerage Purposes," A. L. McCulloch, P.L.S., C.E., Galt, Ont.

On the evening of the 24th inst., a pleasant time was spent by the members at the annual dinner of the Association, which took place at the Arlington.

AMATEUR DECORATING.

By W. H. ELLIOTT.

I NOTICED a paragraph a short time since in a daily newspaper in which the writer bewailed the slavery into which suffering humanity had fallen to the autocratic decorator. "People," said he, "no longer embody in their rooms their own taste, and are denied the opportunity for displaying to admiring friends their admirable traits of character; on the contrary, a woman of simple tastes is put into a georgeous boudoir of extreme French design and so on." The perpetual hunting for a grievance in writing on aesthetic matters is at times very wearisome, especially in view of the fact that in most cases the fault-finding with existing conditions is not borne out by actual experience. The cry for something different continually goes up, though Heaven only knows what different is wanted. If French ideas are introduced the good old English simplicity has gone for ever. If solid English design is used the aesthetic grumbler sighs for the lightness and greater artistic beauty of the French. And now we are told that the helpless public has fallen hopelessly into the hands of the professional decorator, and what an unfortunate thing it is that one cannot choose one's surroundings for one's self, as if we do not all know that for a decade past the decorating amateur has revelled in a reign of terra cotta and muddy green to his heart's content, producing the most thrilling effects for those who responsively thrill. And it is only that we have emerged at last from this period of indefiniteness and taken up something requiring knowledge, skill and caution in its handling—I say it is only for this reason that our aesthetic Israelites are lamenting their captivity and the end of their muddy period. Now it is not true that the decorator usually serves all people alike without regard to their characters, tastes and positions. In a great many cases he has a clearer idea of what will suit his client than the client can possibly have because of his inexperience and lack of knowledge of many possible variations in the treatment of his rooms. In how many cases does the ambitious householder see an effect in somebody else's house or at an hotel or in a pullman car which if not modified or tabooed entirely by the decorator, would be appropriated for the house and lay the householder open to the ridicule of every one of good taste. We feel a tender pity for the man who commits himself to the "every man his own architect" sort of influence, but the results consequent upon every man becoming his own decorator are quite as sorry and frequently more palpable because of the lack of examples to follow, such as every builder of houses has in the houses already built.

The refined and classical styles at present in vogue calling for decorative taste of the highest order, cannot be successfully played with by ambitious amateurs, and yet may be safely used in some one or other of their variations to suit almost anybody's taste and pocket book. What more can we ask than that, after providing a suitable background, he leave to our individual tastes the many little accessories, that more than the walls and ceiling may be made to exhibit an individuality and preference. Prettier rooms by far will be made for the next few years than have been made in the preceding ones, and the effect will rarely be marred for the lack of interference on the part of the amateur decorator.

Messrs. Evans, Coleman & Evans have been appointed agents at Vancouver for the British Columbia Terra Cotta Co., of Victoria, B. C. The company have produced some fine samples.

A patent Spanish tile made of copper and tin is being manufactured by Merchant & Co., of Philadelphia. Among the advantages claimed for them is that they are much lighter and more durable than tiles made from clay.

The Manitoba Stone and Asphalt Paving Co. have started business in Winnipeg. It is their intention to engage in the manufacture of tiles, to construct asphalt pavements, and act as agents for American manufacturers of pressed brick, over-mantels, etc.

"ELEMENTS OF BUILDING CONSTRUCTION—STRUCTURAL IRON WORK."

THE following lecture to first and second intermediate students on the "Elements of Building Construction," and to second intermediate students on "Structural Iron Work," was delivered at the Toronto Architectural Sketch Club by Mr. E. Burke, examiner in the above subjects:—

In presenting a paper on the elements of building construction before the first year students, the brief time at my disposal will permit of but a rapid and cursory presentation of the subject. In fact, the most of your work is so admirably covered in Mitchell's "Elements of Building Construction" that I will avoid a repetition of the points there covered, and endeavor to touch some not mentioned—especially where Canadian methods differ from those in vogue in England.

Prof. Aitchison in one of his recent lectures said: "Building consists in putting the materials we have at command in certain positions, and giving them certain forms. The size and shape of these forms depend on certain statical considerations. Arithmetic, mathematics and geometery can alone enable us to solve the necessary statical problems; so these elements must first be mastered to enable us to solve the statical problems that present themselves. Next comes the knowledge of the strengths and capabilities of the materials we have to use." Fortunately we now live in times when these strengths and capabilities are being determined with more accuracy than in the past, although we have to admit that most of our data is so indefinite that we are compelled when we build to employ what is called a "factor of safety," which in reality is a "factor of ignorance." For instance, a beam of a certain scantling is supposed to break under a strain of a certain number of pounds. As a matter of fact it may break at half that amount, as was demonstrated at the School of Science during our late convention. Hence it is usual in our constructions to allow from 5 to 10 times the supposed breaking strength of a material for a so called "factor of safety."

The first point in commencing a building is the question of the nature of the soil or bed upon which the walls are to rest. If this be of rock or of some compact dry substance which is comparatively unyielding, it is called a *natural* foundation and may be built upon directly. But if the ground is too soft to bear the weight of the structure required, it will need an artificial foundation. This may be obtained in a variety of ways: *First*, by planks in two or more thicknesses laid reversely and of sufficient breadth to sustain the weight above without undue settlement; *second*, by a bed of concrete of sufficient depth and width; *third*, by piles driven to a solid bottom, cut off evenly at tops to receive plank, concrete or stone footings; and *fourth*, by a gridiron of steel rails as developed by the necessities of Chicago building operations, where great spread is required in proportion to the height available for the footing courses. Where planks or piles are used, it is imperative that they be constantly submerged in water to prevent decay and the eventual collapse of the foundation of the structure. Footings should not project more than two-thirds of their thickness beyond the work above, and at least two-thirds of their width should be covered by the work above. Good rubble walling should be composed of stones thin in proportion to their length and breadth. The centre of gravity should be observed in placing the walls upon the footings and base of the building, allowance being also made for the weight of floors and partitions. In placing columns carrying weight it is of the utmost importance that they should be centrally placed. The non-observance of this rule was one of the causes of the accident to the Montreal Y.M.C.A.

The various bonds of brickwork used in England are clearly explained in "Mitchell." American bond, called "Stretching" or "Chimney Bond," is only recommended for ½ brick walls; while it makes a weak wall it certainly produces a much better appearance in a 9" wall than any other method of laying. A wall of this thickness having headers cannot be built smooth and even on both sides, as all bricks vary more or less in length. The diagonal bonders every 5th course give a wall built with this bond as much stiffness as is necessary for a wall of the limited height to which one this thickness should be carried. This bond also lends itself to the construction of hollow walls where one shell is but a half brick thick and can be bonded into the rest of the wall with hoop iron ties which should have a dip to prevent the water of condensation being carried to the inner thickness of the wall.

Mitchell speaks of built up wooden beams, that is, beams made up of several thicknesses of stuff, in connection with temporary structures chiefly, and that they are economical. In our practice this method of construction is considered superior to solid beams. Among others are the following reasons:—The material being of thin stuff, defects can be more readily detected and a superior quality secured. With several thicknesses the change or reversal of the grain thus obtained helps the stiffness of the construction, and by a system of splicing or breaking joint, no two joints coming opposite, long spans may be covered, such as the tie beams of roof principals. And lastly, the wood may be obtained better seasoned.

Much of the splicing, cogging, jointing and morticing dealt with in Mitchell is practically obsolete in this country, much better results being obtainable by the use of wro't iron bolts, straps and stirrups, the use of which avoids the inevitable weakening of parts which should be the strongest. The high rate of wages is also prohibitive, as the making of the joints illustrated would consume an immense amount of time, which in these days is, indeed, money. At the same time a great deal of the common class of work of to-day is to be deprecated,—there is too much tendency to "knock things together," superinduced by the craze for cheapness and inordinate haste, after the example set by our restless cousins to the South who use the almighty nail and trust it implicitly. With us deep joists are so readily obtainable that we do not need, as a rule, to resort to the English method of beams at comparatively short spacing and light joists with a counter ceiling to conceal the beams: a method wasteful as to height and creating in the large hollow spaces a very paradise for vermin. The practice of bevelling the ends of joists to prevent injury to the walls in case of fire is not mentioned, but is a very necessary precaution, perhaps more in regard to the prevention of loss of life and spread of fire than in the mere saving of the walls themselves. None of the methods of jointing flooring equal ours for adaptability, simplicity and ease of laying. Much of the ordinary work in England is without jointing, permitting dirt and moisture to drop to the ceiling or floor below.

In regard to roofs, the student must be warned against the examples in "Mitchell" where gutters are formed behind parapet walls. The only successful roof in our climate is that which permits the snow and ice to have free escape to the ground. To this end valleys should have ample space at the foot, enlarging as they approach the eaves, and gutters should invariably be set low enough to permit snow to slide off without obstruction. A bell-cast at the foot of the rafter will accomplish the same object. Facias should also project sufficiently to have a drip clear of the walls beneath.

Slates or tiles must, with us, be laid upon a solid substance. The English method of setting upon battens would permit our fine dry snow to blow in, and the extreme cold outside and the heat inside would cause condensation on the under-side resulting in wet ceilings. The roof principals illustrated, are entirely of the low pitch type, but a mastery of the principles of their construction will enable the student to soon grapple the points of other forms. The method of constructing principals with wooden king and queen posts is now practically obsolete. The great number of joints results in considerable shrinkage unless constantly tightened up, resulting in sagged roofs and strained walls. Roofs of composite construction are now in general use, where at least the king or queen bolt succeed the posts of the same name.

The practice of battening walls for the sake of warmth and dryness is not mentioned and does not seem to be usual in English practice. It seems strange that in such a humid climate some more successful method than that of the hollow wall has not been introduced. The hollow wall does not thoroughly meet the necessities of the case, inasmuch as a certain proportion of the wall, as at piers, openings, &c., must be solid. The hollow wall has the advantage of permitting a more solid job of plastering and should be used in work likely to meet rough usage, but it cannot compare in dryness and comfort with the battened wall. The disadvantages of the latter are, however: 1st, the danger of conveying fire through several stories; and 2nd, the opportunity for the free passage of vermin. Both these contingencies however can be avoided by proper breaks or stops at all floors and ceilings, either by sailing courses of brick, or by horizontal battens at the ceiling and floor line.

Mitchell's chapter on joinery conveys practically all the information necessary in the ordinary experience of an architect's office, and a careful perusal is recommended.

The following is an outline of the work with which the 1st and 2nd intermediate students should be familiar in connection with the coming examinations on "The Elements of Building Construction:"

The various bonds in brickwork in ordinary use, offsets in footings, ganged arches of various forms and inverted arches, trimmer arches for fire-places, corbelling.

Sketches of mason work showing uncoursed and coursed rubble; ashlar and the proper bonding of the same; window sills, stone heads, strings, copings and quoins; methods of connecting stone by cramps, dowels and joggles.

Show how to scarf, mortice, tenon and build up timbers as applied to plates, roof timbers, beams and partitions.

Draw simple roof truss, king or queen post or rods, with details of framing and iron work.

Draw floor beams, joists, trimmers and coverings, or floors single and double: a framed partition with a door opening in it.

Draw a section of door and window frames, the latter boxed, casement or lead glazed; section and elevation of plain, panelled, moulded, raised panel and bolection moulded doors.

Show how to flash on a felt and gravel roof, and also the flashings of a sloping roof at parapet walls; also construction of gutters suitable for this climate.

In the Second Intermediate the student should also be able to draw sections of various forms of cast and wro't iron columns, the latter built with Z bars or angle iron; section of head and foot of superimposed columns showing method of connecting.

Explain the various strains to which iron is subjected in buildings.

Show section of wro't iron girders and connections of cross beams; proper method of anchoring beams to walls.

Show simple composite andiron ro of and other trusses, with details of connections.

"STRUCTURAL IRON WORK."

A Flitch girder is composed of two or more sticks of timber with a wro't iron plate inserted between the wood and bolted.

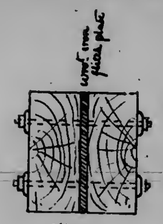


Fig 1

This form is now practically obsolete as the rolled iron or steel beams cost little if any more. Cast iron girders are also practically obsolete, being limited to very short spans in the form of lintels over door or window openings, and are unreliable owing to the possibility of hidden defects in castings, resulting in collapse in case of a sudden shock, or in case of fire, when they will crack on the first application of a stream of water. They should never therefore be trusted without a relieving arch above.

Fig 2

The sectional form of a cast iron girder should be different from that of one of rolled iron. The lower or tensional flange should be 4 to 6 times the area of the upper or compressional, as cast iron crushes with an average weight of 45 tons per square inch, and fails in tension with a pull of from 7 to 8 tons per square inch. Mitchell gives the depth of from 1-10th to 1-15th of the length, and the compressional flange 1-30th to 1-40th of the length. Wro't iron girders are much more reliable than cast, although they will yield by bending under a high temperature, such as is reached in a burning building. The difference in strength between compression and tension in wro't iron is so small that little or no attention need be paid as to the comparative dimensions of the upper and lower flanges, except in very heavy work. Wro't iron crushes with an average weight of 17 tons per square inch, and fails under a tension of 22 tons.

Fig 3

When one girder is not sufficient to carry the weight required, two of the required stiffness are placed side by side, and their relative positions retained by separators, which may be of cast iron with holes for the bolts to pass through, or they may be of short pieces of wro't iron pipe cut to the required length through which the bolts are passed. When girders over 12" to 15" deep are necessary, they are usually built up with rolled iron plates with angle iron connections or stiffeners. In the construction of columns, cast iron is the most largely used material, although rolled iron is being used more freely, especially in the construction of tall structures requiring the largest proportion of strength in comparison with space occupied. In these structures it is absolutely necessary that the material should be flawless and capable of resisting torsion and other strains which would snap cast iron and bring the structure to the ground. Columns of wro't iron will not resist heat as long as cast iron and consequently must be protected from the effects of fire when they have to carry important weights. The forms of wro't columns are numerous, the Z bar being the basis of those most used. Cast iron is so subject to flaws, often times hidden, that a large excess of material has to be provided in order to guard against failure.

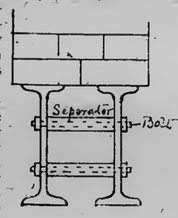


Fig 4

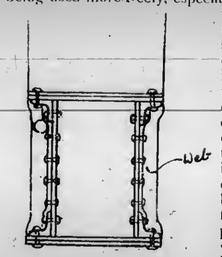


Fig 5

Fig 6

Fig 7

Fig 8

A column which may appear perfect on the surface may be little stronger than cardboard. One side may be 1½" thick and the other only ¼th, or what may appear to be only a slight ridge or depression may be a serious defect, called "cold shot" leaving the column practically open on one side.

No column may be pronounced safe unless it is drilled in several places in order to test the evenness of the thickness of the metal. Cast iron columns are of various forms, circular, however, being the strongest in proportion to the weight of metal used. Whenever possible, the webs or flanges should be reinforced with brackets or stiffeners at frequent intervals, and there should be no abrupt internal angles or transition in form. Castings should also vary in thickness very gradually. Cast iron should not bear upon cast iron when carrying any important weight without the bearings being turned or faced in order to remove any lumps or inequalities from their surface to give them an even bearing. Plates or caps should have a raised rim so that when the bearing is turned, the unfaced surfaces will still be removed from contact. Iron roof trusses are now composed entirely of wro't iron, except the foot, which is usually of cast iron. The following forms are outlines of typical trusses.

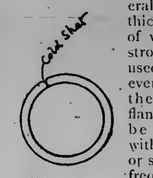


Fig 9

Fig 10

Fig 11

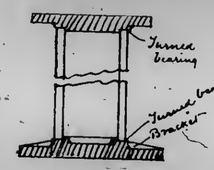


Fig 12

The joints are made with flat plates rivetted to the webs of members in compression and drilled for pins receiving ends of tension rods.

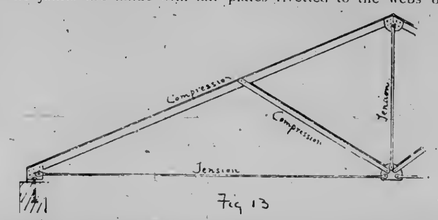


Fig 13

Trussed beams in ordinary practice are generally composite

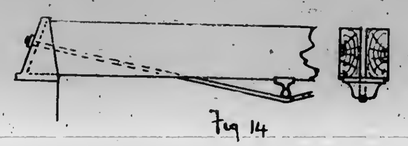


Fig 14

in structure, the ironwork being confined to cast iron shoes and wro't iron tension rods and the necessary bolts.

PERSONAL.

Messrs. Tripp & Wills, architects, have opened an office at New Westminster, B. C.

Mr. O. A. Graydon, city engineer of London, Ont., has been elected a member of the Canadian Society of Civil Engineers.

Messrs. R. C. J. Dunn and J. C. T. McKean, architects, St. John, N.B., have recently formed a partnership under the name of Dunn & McKean.

Mr. Joseph Hobson, chief engineer of the southern division of the G.T.R., has been appointed a member of the council of the Canadian Society of Civil Engineers.

Mr. John Miller, of the Pease Furnace Company, Toronto, formerly of London, has accepted a position with a large furnace firm in Chicago, and leaves for that city shortly.

The name of Mr. Geo. Gouinlock, of Toronto, was inadvertently omitted from the list published in our last issue of architects present at the annual convention of the O. A. A.

Mr. M. B. Aylesworth, Architect, Toronto, has just returned from a four months tour in Great Britain, the continent and the United States. He describes his trip as a most enjoyable one.

Mr. Geo. Theodore Bertheron, the oldest portrait painter in Canada, died in Toronto recently. He was born in Vienna, in 1806. He was the oldest member of the Ontario Society of Artists and was also an associate of the Royal Canadian Academy. He painted the portraits of many eminent Canadian jurists and parliamentarians.

The Standard Drain Pipe Co., of St. John, Que., are adding to their plant a 125 h. p. engine.

MR. JOHN KENNEDY, M. I. C. E., M. C. S. C. E.

JOHN KENNEDY, Chief Engineer of the Harbour Commissioners of Montreal, elected in January last as President of the Canadian Society of Civil Engineers, is a native Canadian, having been born at Spencerville, Ontario. He has for many years been a member of the Institution of Civil Engineers, England, and also of the American Society of Civil Engineers, as well as a charter member of the Canadian society.

Mr. Kennedy, in his long and active career in engineering, has had a variety and compass of experience that fall to the lot of but few in the profession—in fact, that can fall to the lot of those only who are gifted with rare powers.

A very brief and imperfect summary of the steps by which he has risen from a pupil in the office of Mr. Thos. C. Keefer, Past President of the Can. Soc. C. E., at the age of 15, to a foremost place in the highest rank of the profession, may be mentioned. His experience in municipal engineering was gained in the city of Montreal, where at an early age he was deputy city surveyor; in mining engineering, as manager of the Hull Iron Works; in railway engineering, when in four years he rose from being division engineer on the Wellington, Grey and Bruce Railway, to be chief engineer of the Great Western Railway, when at the summit of its activity and expansion; in the specialty of water works, in which he has been more or less intimately connected with nearly all the larger water works in the Dominion; in consultation or designing outright, as in the case of the pumping machinery of the Ottawa water works which, as an example of design would alone establish a reputation; in mechanical engineering in general, in which he is a recognized authority, having been widely consulted in various kinds of mill machinery, and in dredging machinery, his designs being found on the Pacific and the Atlantic, on the waters of Oregon, Charleston, New York and the St. Lawrence. In general hydraulic engineering he is also an authority, his advice having been sought by the Dominion and Provincial Governments and a wide range of municipal corporations and private companies. He has managed the deepening of the St. Lawrence ship channel, and still conducts the Montreal harbour works with marked ability. On arbitrations and commissions his experience and counsel are constantly in demand, as on the Trent Valley Canal Commission, the Lachine Canal Commission, the Commission on remeasurement of construction work on the Canadian Pacific Railway, the Montreal Flood Commission, and many others, and as an expert he has been frequently called before the committees of the Privy Council.

Mr. Kennedy's assistance has ever been freely and fully given to any professional brethren who have asked his advice. His ability as an engineer, his integrity as a man, and the extent of his reputation at home and abroad, give the assurance that in electing him President of their Society, the civil engineers of Canada not only honour themselves and him, but advance as well their own interests and standing as a professional body.

JOHN KENNEDY, ESQ., C. E., MONTREAL.

ORNAMENT IN ARCHITECTURE.

ORNAMENT is extremely useful in conferring on buildings a degree of elegance and richness which, without it, would be difficult to obtain; and it also may be made to convey an impression of wealth and magnificence which, in its absence, could only be attained by increased dimensions or massiveness, which would be as expensive and, in some instances, at least, less effective. Ornament is also extremely useful in altering the apparent proportion of buildings. Thus, by the employment of strongly marked horizontal lines, a building which is too tall may be reduced to proportion; one that is too low made to look nearly as high again by employing only vertical features. Buildings that from the inherent necessities of their construction look weak may be made to appear of any desired degree of strength, and sparkling gayety of effect be given to those that otherwise would be too massive and heavy. Internally the architect very often cannot control the dimensions of his apartments, but by a judicious application of ornament he may always make low rooms look higher, narrow rooms broader, and reduce long rooms to a better proportion. More than even this, ornament enables an architect to give to every part of his design exactly that degree of prominence and dignity, and that class of expression, which suits its position or purposes. These are all legitimate uses for the employment of ornament, and when used for these purposes it is never offensive. It always becomes so when it is employed to conceal either use or construction, or to make a building try and look like what it is not or cannot be.—*Scientific American.*

HEATING AND VENTILATION.

Mr. S. G. Curry, who has been appointed examiner in the above subjects in connection with the O. A. A examinations, recently addressed the members of the Toronto Architectural Sketch Club substantially as follows:

I propose to treat my subject in a very general way and not to go into detail to any extent; my object is to discuss heating, but as ventilation is largely bound up with heating it is impossible to treat of the one without the other.

The ordinary fire-place was the first method of heating adopted in our houses, and while it might not have been the most satisfactory method of warming a room, it answered most satisfactorily the purposes of ventilation. A fire-place warms a room by radiation, the heat rays passing through the air and warming the walls, floors, ceilings and any other articles which may be in the room and within range of the fire.

The next method was that of stoves, which warmed the rooms to a slight extent by radiation, but principally by convection or the heating of the air by passing over the heated surface of the stove.

Stoves gave place to furnaces placed in the basement, which heated large quantities of air to a high temperature, the air thus heated being conducted by means of pipes to the different rooms to be warmed.

The ordinary hot air furnace has developed, until we have different forms of hot air, steam and hot water combination furnaces, the object of the combination furnaces being to heat the central portion of the house near the furnace with hot air and the more distant parts with steam or hot water radiation.

Hot water heating is a favorite method. In this system water is heated in a boiler, placed in the basement and conveyed by means of pipes to radiators placed in the rooms to be heated. The heat which has been absorbed by the water is given off through the radiators placed in the rooms. Indirect heating by hot water is used to some extent: the air being brought in from the outside, warmed by passing through a heater placed in the basement and conveyed through the pipes to the rooms above.

Steam heating in its general principle is very similar to the hot water method, there being a boiler in the basement with radiators placed in the rooms to be heated, the steam being conducted from the boiler to the radiators and the water resulting from condensation being returned to the boiler through pipes. With steam, indirect heating can be used most satisfactorily.

It may be well to consider the advantages and disadvantages of the various means of heating our buildings. The fire-place is only of service in small rooms, and in this climate is altogether inadequate except in mild weather. The fire-place has these advantages: It heats entirely by radiation, and consequently does not raise the temperature of the room above a reasonable and healthful degree; it is also an effective means of ventilation, as all air required for the combustion of the fuel is withdrawn from the room, thus causing an inflow of fresh, pure air. Its principal disadvantage is, that owing to the fact that the fire-place warms a room by radiation a person sitting near the fire may have the portion of the body exposed to the fire extremely warm, while the rest of the body is proportionately cold. This effect is caused by the heat's rays striking the portion of the body exposed to the fire, while at the same time the temperature of the air in the room may be very low owing to the walls being cold. The air in the room can only be warmed by coming in contact with the surfaces of walls and furniture which have become warm through being within range of the fire and thus receiving heat by convection.

Some manufacturers and dealers have been selling low down grates, claiming that they warm a room better than a grate set high up. Such is a mistake, because when the fire is set low down near the floor, the heat rays cannot strike the floor except at an angle so obtuse that the floor derives very little heat from the fire. A high fire will throw the heat rays at a less obtuse angle, and will consequently warm the floor better. The heat rays from a low fire will pass over the floor in almost parallel lines. In countries where the fire-place has been depended upon for heat, many very ingenious grates have been invented with the object of warming the air in the rooms by passing it around the fire and discharging it back into the room, or for taking fresh air from the outside of the house and discharging it into the room after passing it around the back of the fire-place. Grates of this description have not come into use in this climate as they would not be able to warm the rooms properly, and consequently some other means of heating must be adopted which is generally sufficient without the assistance of the fire-place. We thus lose the benefits of the ventilation which always results from the use of a fire-place, even though it has no special arrangements for supplying fresh, warm air.

Very little can be said in favour of the method of heating by stoves, except that it is capable of economically heating rooms to a very high temperature. A stove heats a room slightly by radiation, but principally by convection, as already stated. The walls and floors remain comparatively cold as they receive no radiated heat, and the contact of the warm air does not warm them in any degree equal to that radiated from a fire. The reverse is the case—the walls through being colder chill the air of the room. There is a slight amount of ventilation caused by the withdrawal of the necessary amount of air to support combustion in the stove. Fresh air, as in the case of a fire-place, comes in through cracks and crevices in the windows, doors, etc. A great number of arrangements have been made whereby ventilation may be secured with the use of stoves. The stove pipe has been placed within a second pipe so that the heat from it would induce an outward current between the two pipes, thus ventilating the room. Casings have been constructed around stoves, so that the air to be warmed was made to pass up between the stove and the lining. This was first done with the object of drawing the cold air from the floor and warming it. After a time the casing was carried down to the floor with a number of holes near the base, through which the cold air might be drawn, and at the same time a pipe was put in which connected with the outside air. The fresh cold air entered through this pipe, and was discharged under or at one side of the stove in such manner that it was warmed between the stove and the casing. With slides covering the openings into the room at the bottom of casing and with the dampers in the pipe supplying fresh air, it was possible to regulate the temperature of the room to a nicety, for if the room got too warm, by closing the slides at the bottom of casing and opening the damper in the fresh air pipe the temperature could be lowered very rapidly, or if the room got too cold, by closing the dampers and opening the slides the temperature could be raised very quickly. Many modifications of the above arrangements were brought into use, and in the majority of cases were found to be satisfactory. Having adopted the casing around a stove, placed in the room to be warmed, it was but a short step to place a stove with this casing in the space adjoining the room to be warmed or below it. Thus by degrees the hot air furnace became a reality. An ordinary stove with casing was placed in the basement, and, as it was found to be satisfactory for the heating of one room, it gradually came into use for the purpose of heating a number of rooms. As a result, the small stove gave place to a larger one and the large stove to the furnace, which is really nothing more than a stove specially designed for the work which it has to do.

The principal benefits to be derived from the use of a hot air furnace are the doing away with a number of fires placed in stoves for one large fire, with a consequent reduction in attendance, and the bringing of fresh air into the house, which provision is always made in the erection of a furnace. If the furnace is of ample size and the fresh air opening left open, a house warmed by the means of a hot air furnace will be reasonably well ventilated. The air in a house heated by a hot air furnace may be very impure, not because the house is so heated, but because the apparatus is improperly managed or is defective. If the occupant objects to burning the necessary fuel, closes the fresh air inlets and draws the furnace supply of air from the house, he cannot expect very pure air. He is simply making his heating system correspond to a stove in his room without a supply of fresh air. The air of the house is carried through the furnace over and over again. When it becomes cold it drops to the floor and from the floor is carried through the furnace, where it is warmed and again discharged to the different rooms to be warmed.

The principal point to be observed in setting up a hot air furnace in a house is to put in a furnace of large size—the larger the better. A large furnace will be more economical than a small one; even an excessively large furnace will not burn any more fuel than a small one. If a small furnace is put in it will be possible to keep the house warm in mild weather by ordinary fires, but in cold weather the furnace will have to be driven beyond its capacity. This driving of the furnace means that it becomes over-heated and possibly red hot, and the air passing over it is heated to a temperature far too high. If air is heated much beyond 140° F., it is positively not in a proper condition for breathing. All its vitality has been abstracted, and it is so dry as to absorb moisture from any and every substance in the house, thus causing the woodwork to shrink to an extent which one would not think possible, besides abstracting moisture from the occupants of the house to their serious injury.

Having arranged to put in a large furnace, in what portion of the house should it be placed to give the greatest satisfaction? In this climate where the prevailing winds are from the north-west, the furnace should be placed towards that side of the house. If it is not so placed it will be found very difficult to get any warm air into the rooms which lie north-west of the furnace, the warm air going almost entirely to the rooms on the opposite side. The furnace should not be placed too far from the centre of the rooms to be warmed, as it is possible to go to the opposite extreme and find that the rooms to the south-west of the furnace cannot be heated, because the air has to be carried through too great a length of horizontal pipe. At times we have very cold east winds, which makes it difficult to warm rooms with an easterly exposure, and if the furnace is placed too far from these rooms it will be impossible to heat them under such conditions. A hot air furnace requires for its satisfactory working that there should be some means of withdrawing air from the house. In the ordinary house a very large amount of air escapes by means of cracks and crevices around windows and doors, about the base boards, and also to some extent through the walls. The best way to arrange for the discharge of impure air is by the means of a fire-place, which will withdraw the cold air from the floor, which is the proper point at which ventilation should be sought in a furnace heated house. Those fire-places which have flues in inside walls will nearly always be found to be withdrawing air from the room in which they are placed. A fire-place with a flue in the outside wall cannot be depended upon to withdraw air except a fire is burning therein. For a compactly built house of ordinary size, a hot air furnace is a very satisfactory means of warming, provided it is of ample size and there is a proper number of fire-places in the house. Of course it is to be understood that the furnace, hot air pipes, ducts, etc., have been put in by a man who thoroughly understands hot air heating.

The hot air furnace has been modified to some extent by the addition of hot water or steam heating in combination. This was first brought about by hot air furnaces being placed in houses having rooms so situated that it was impossible to heat them from the furnace. It occurred to some one that if a coil of pipe were placed within the fire pot of the furnace and connected to several radiators placed in those rooms which could not be heated by hot air, the difficulty would be solved. This arrangement was adopted in its crude form, but was not considered satisfactory by those who understood its drawbacks. The principal and most serious objection was that two openings had to be cut in the furnace which could not be closed tightly and which consequently allowed the gases of combustion to escape from the fire pot into the space surrounding the furnace and from that space into the house. It was also necessary to put on considerable amount of radiating surface, for if such was not done and the furnace was fired hard, trouble was almost sure to arise through the over-heating of the water in the coil and pipes. The idea was taken up, but instead of having a hot air furnace with combination hot water heating, a hot air and steam combination furnace resulted. This furnace was made of wrought iron with a steam generating chamber at the top of furnace. The air was warmed in the usual way by being passed over the outside surfaces of the furnace, and the steam was generated in the chamber above the furnace by passing the hot gases through vertical tubes as in a vertical steam boiler before allowing them to escape into the main flue. The central rooms were heated by hot air, and the rooms at a distance on the exposed sides of the house by radiators, which were supplied with steam from the chamber at the top of the furnace. This style of furnace is very satisfactory, provided it is properly put in and too much work is not expected of it. Lately a hot air and hot water combination boiler has been invented. It is really a hot water boiler, as it does nearly all the heating by means of hot water, the warm air being auxiliary to the hot water. The fresh air is made to pass around and over the boiler and is then allowed to escape into those portions of the house which are deemed to require plenty of fresh air. This form of boiler is not able to heat more air than is absolutely necessary to keep a house supplied with sufficient fresh air to maintain a reasonably healthy condition.

The next method of heating with which we will deal, is that of hot water as it has been practised for several years past. The boiler is placed in the basement, and flow and return pipes are run to radiators placed in the different rooms to be heated. The pressure on the system is that due to the head of water given by the height at which the expansion tank may be placed. The pressure at the tank, of course, will be that of the atmosphere. The pressure at the boiler may be 15 or 20 lbs., or even higher, in the case of a very high building. With this system it is practically impossible to get the water at any time much above 212 degrees, for if it should be heated higher than that it will change into steam at the expansion tank and blow off to the atmosphere, having its place taken by fresh cold water which will lower the atmosphere of that in the boiler and pipes very quickly. Some years ago nearly every radiator had its independent supply and return mains, or at the most there were not more than two or three radiators fed from the same main, and they were invariably placed at the same level, so that they would feed equally well. Of late years the tendency has been to place more radiators on

the same feed pipe and use great care in seeing that the connections were so made that each radiator would get an ample supply of heat. At the present time the tendency is to run mains for hot water heating very much on the same principle as steam mains are run. This method has been found satisfactory if the hot water engineer is thoroughly acquainted with his work and understands the principles governing hot water regulation. In the hands of an ignorant mechanic the results would be most disastrous. In very good and elaborate work the mains are valved so that it is possible to cut the heat off in any portion of the building without the least interference with the working of the balance. With hot water heating a steady uniform temperature can be maintained at all times with very little trouble. There is very little improvement in hot water heating over that derived from stoves, except that due to the fact that the air in the house is heated on a very large surface at lower temperature. It is the same air which is warmed over and over again, except whatever may come in through cracks and crevices owing to the difference in pressure between the cold outside air and the warm air in the house. As a rule nearly all the hot water heating has been done without any attempt at introducing fresh air.

Indirect hot water heating has been tried in this climate but with little success. The risk from frost is very great, and if the heater should become frozen the damage done is by no means light. It is possible during the day to have the benefit of indirect warming, when the fire can be kept burning brightly and there is some one to watch the heaters, dampers and fresh air supply, but to allow indirect heating to be continued during the night is exceedingly dangerous, because the outside temperature may drop very low and the fire under the boiler may become burnt out, in which case the heaters would freeze very quickly and cause a large amount of damage. I am aware that indirect hot water heating has been tried, and that according to the statement of those who have put it in, it has been found satisfactory. A careful examination of every so-called indirect hot water system will show that in nearly every case the air is supplied to the heater from the basement, and not from the outside, as soon as the weather becomes at all cold. In fact there are indirect hot water systems where the air is never taken from outside the house, but is brought from the basement at all times. It is possible by a very carefully arranged system with a very large boiler surface and great care on the part of the attendant, to pass a plentiful supply of fresh air over hot water pipes in the ordinary way, but the safest, most economical and satisfactory method is to build a brick enclosed space of such size as may be necessary, similar to that surrounding a hot air furnace. By placing a large quantity of pipe in deep coils, cold air may be warmed with a reasonable degree of safety. Fresh air should be brought in at the bottom of the space, with the opening so arranged that the incoming air cannot blow on to the hot water coils. Tin pipes are then taken from the sides of the enclosed space to the different rooms to be warmed. By arranging several of these warming chambers, according to the size of the house, a house may be fairly well warmed by the indirect system without much danger of damage from frost. There will have to be less or more direct heating surface in every room to be used in cold weather, as it will be found impossible to keep a house warm by the indirect hot air plan, as it is impossible to pass a large volume of very cold air through the heating coils. Hot water heating in an ordinary sized building will be found very satisfactory, but when the building is very large, steam heating will give better satisfaction.

The steam heating system is very similar to the hot water system in general outline. There is the boiler in the basement with supply and return mains to radiators placed where heat is required. A steam boiler may be of any size from a small portable one to a very large boiler similar to those used for generating steam for power purposes. In steam heating on the gravity principle there is but one large supply main and corresponding return back to the boiler. The steam is taken to the different radiators by means of branches from the main supply, and the water of condensation returned in like manner to the main return.

With a steam plant it is possible to have a first-class indirect heating job. The indirect heaters are generally placed in the the basement below the rooms which are to be warmed with a hot air flue running up to the rooms to be warmed. The fresh air may be supplied to the different indirect heaters by means of one or more common fresh air ducts, or an independent supply may be brought to each heater. The latter method, if it is possible, is the better to adopt, as each heater having its own supply will always have the necessary quantity of fresh air. With one common duct, if the system is not very carefully arranged, the heaters which supply air to the rooms on the upper floors will draw such large quantities of air as to practically rob the heaters to the ground floor. In bringing fresh air into the heaters it is necessary to arrange checks in such a way that cold currents of air can not be driven upon the radiators. The fresh air should rise slowly to the bottom of the heaters through an ample opening. Where the air is brought from the outside separately to each heater, it will be well to take it low down towards the floor and then allow it to ascend to the heating chamber. The supply and return pipe to radiator should be so run that they will be outside of the heating chamber and cold air supply. If the return main is dropped down within the cold air supply or near it, there is a possibility of it freezing. There is little to fear from frost with the indirect steam radiators placed in the manner described above, even though the cold air opening should be fully open and the steam in the boiler run down, as there is nothing to freeze beyond a small amount of vapor. It is seldom satisfactory to attempt to heat two rooms from one radiator. It is always better to have the radiator proportioned to the size of the room to be warmed and take from it one hot air pipe. The action is then positive, there being no possibility of one pipe drawing all the air and leaving the other pipe inactive, or with a possible down current in it to the radiator.

Steam heating is generally done on the gravity system where the plant is put in for heating purposes only. Where there is a boiler used for power purposes, steam may be taken from it and reduced down so that it can be used with perfect safety and with good results in the ordinary gravity system of piping by returning the condensed water to the boiler by means of a pump. In such cases it is usual to make arrangements to use the exhaust steam from the cylinder of the engine with the back pressure valve set so as to keep a small pressure in the steam mains.

In large buildings where it is possible to have the steam plant thoroughly designed and with a surplus boiler power, very satisfactory heating may be had with steam, but where the boiler is not of large size and has a small amount of heating surface, it is very difficult to maintain the heat at anything like an average temperature.

HOW TO ESTIMATE.*

By W. H. Hodson.

FOLLOWING is the remaining portion of the specification and bills of quantities accompanying the drawings of Public School on Gladstone Avenue, Toronto, published in the CANADIAN ARCHITECT AND BUILDER for February:

BLACKBOARDS.

Provide and fix ground work of blackboard on sliding door composed of six sheets of ¼ thick teather board 30 in. x 36 in. jointed and glued on to large door panel 36 in. x 15 ft. long, and left in readiness to receive composition paste to be put on by the School Board. (This leather board can be procured from the establishment of P. Jacobi, 5 Wellington St. east, city, at 15 cents per pound.) At the platform end of seven class rooms there will be slate blackboards 4 ft. high and 16 ft. long, composed of four slates ½ of an inch thick, jointed and packed and fitted to an even and true surface, and to be of Rockland slate of best quality, and to be approved by the architect and the inspector of city Public schools. These slates to be secured in position by wooden stop screws or with round head screws. Provide and fix moulded casing around all blackboards, both slate and plaster composition, in all class rooms, also ⅞ x 3 in. ground at back of slate board. The casing around blackboard to be 4 x 1¾ in., and to cope into side of architrave and to be moulded in same manner. For amount of composition blackboards see plasterer's specifications. The blackboards will extend along both sides and ends of each class room. The carpenter's tenders are to state the deduction of the slate if not required.

BRICKWORK.

All brick used in the works are to be of the best quality of Carlton brick, and (except otherwise specified) to be of a deep red color and to be hard and well burnt and free from lime and other defects. All outer walls and chimney stacks are to be faced up with "picked" hard and deep red colored "face brick." No soft brick will be allowed in the work, and are not to be brought upon the ground, but if any should be brought there, they are to be immediately removed. The mortar is to be composed of the best quality of coarse, clean sharp grit sand, and fresh burnt lime, in the proportion of 2½ of sand to one of lime, mixed with a proper quantity of clean water and thoroughly incorporated and tempered together. Build all brick walls as shown upon drawings and in accordance with the dimensions figured on plans and sections. The brickwork is to be laid up so as to gauge four courses to every 11½ in. in height, and to be carried up uniformly throughout the building. Every course of brick is to be laid in a full bed of mortar, and to be thoroughly flushed in with mortar at all cross and other joints. The walls are to be built in English bond for all partition walls, and for the inner portion of all external walls, but the outer face of all external walls is to be built "American" or "Stretcher" bond, the face brick being clipped to receive diagonal binders continuously on every 5th course. The walls and chimney stacks are to be carred up plumb, square and true, built to a line on both sides, particularly the face of all outer walls which are to be built fair and true, with each and every course laid with close and level joints. The inner face of outer walls are to be finished for plastering on; also both faces of all inner or partition walls in same manner. All the outer or foundation walls of basement are to be lined up with brickwork one-half brick or 4½ in. in thickness, tied into the stone work with a double heading course at the floor line, midway up, and at ceiling line of basement, and midway between these double heading courses to have a single heading course, making three double and two single heading courses for the whole height of basement storey. This brick lining will be composed of the best quality of picked hard grey brick, laid with level and fair close joints well bedded in mortar and the joints neatly struck with the trowel. The partition walls in basement, also the chimney breasts, are to be faced up "grey" brick, as above described, and pointed in the same manner, as there will be no plastering on basement walls. The bricklayer will provide for and execute all brickwork in connection with the Smead-Dowd heating and ventilating apparatus as indicated by the drawings and in accordance with the plans and specifications of such heating and ventilating apparatus hereto appended. The bricks used in connection with the above mentioned heating and ventilating apparatus are to be of the very best quality of picked hard and well shaped, red and grey brick in such proportion as may be required, to be built in a shapely and workmanlike manner, with close joints, neatly struck with the trowel. The walls for the air chambers and furnaces will be from 9 in. to 13½ in. in thickness, and extending from floor to ceiling, and all built square, true and plumb. Build the large ventilating and smoke stacks as shown per plans, elevation and sections, and in accordance with the dimensions figured on same. These stacks are to be built with picked hard brick, and the inside of same carefully and thoroughly parged with mortar, and so as to render the same even and smooth inside.

*This series of articles commenced in November, 1891.

The upper portion of these stacks is to be parged with Portland cement, say the upper 6 ft. of same, and all the sailing and hose courses, capping and belfry archway, &c., all to be laid in Portland cement, and all the joints and weatherings made and pointed in the most careful and thorough manner. Provide and build in sheet iron smoke pipe collars, four of them (14 in.) diameter in smoke flues in basement, wire rimmed on the outside and 9 in. deep and rim round same with ½ brick arch. Provide and build in a cast iron plate division between the smoke and ventilating flues in each stack as shown per drawings, extending from the basement floor level to top of stack above roof. These plates will be ⅜ in. to ¾ in. thick, 2 ft. 6 in. wide, and from 2 ft. to 2½ ft. in height, each made with a groove along the upper edge of each plate. Provide and build in cast iron soot doors and frames to same in bottom of each smoke flue, 14 in. square or larger, and provide and build manhole doorway in bottom of each ventilating flue, say 2 ft. 6 in. x 4 ft., arched over and provided with a fine tooled or rubbed stone head, 6 in. x 14 in. x 3 ft. 6 in. long. Provide and build an air duct under the basement floor in each closet room (two of them), having an area of 12 ft. each inside, and the length required as indicated on drawings. These ducts will be about 3 ft. in depth by 4 in. wide, built with picked hard brick and laid in Portland cement mortar; to have 9 in. wall at one side (the walls of building forming the other side) and to have a brick bottom laid on the flat and grouted with cement. Connect these ducts with the ventilating flue at the bottom of same with an opening 3 ft. x 4 ft., capped over with a tooled stone cap 12 in. x 14 in. x 5 ft. 6 in. in length. The foundation of the walls of building forming one side of these air ducts, and through which the same has to pass to reach the bottom of ventilating stack, are to have the extra depth required for that purpose, viz., 3 ft. Build all hot air flues leading from the basement up to the ground and first floors as indicated by the drawings; to be built in the most careful manner and thoroughly and smoothly parged inside with mortar. Build in all register frames and collars, &c., furnished by the contractors for heating apparatus and as indicated by the plans of heating. Provide and build in ½ in. round by 8 in. long, climbing irons in the brickwork of ventilating flues, every 6th course in height, alternately on each side of flue and placed about 9 in. from one end of same. Also provide and build manhole opening into each ventilating flue immediately above the attic joists, say 2 ft. 3 in. x 4 ft. high, with two rimmed arches over same on 2 x ½ x 4 ft. iron bar, and set frames to same pointed by carpenter. The rear basement wall will on any future extension of the building become an inside partition wall, and will therefore be built entirely of *brick* instead of stone, and will be of picked hard burnt brick carefully selected and the face bricks laid in Portland cement. This wall will be 18 in. in thickness, as figured on drawings. Build area walls of picked hard brick to rear entrance and rear basement entrance steps, as shown per drawings; also brick parapet walls at side of steps, and provide and build in ½ in. x 18 in. iron anchor bolts (27 of them) with ½ x 4 in. cross piece at bottom to secure coping to above walls. Provide and build parapet walls of brick to side of front entrance steps, as shown per drawings, and provide and build in ½ in. bolts (12 in number), 6 to each set of steps to anchor down the coping to same and as described for coping to rear steps. Build all belt, string and sailing courses, pilasters, &c., to outer walls, as shown per elevations; also all aprons to underside of window sills, the latter cut and rubbed to shape indicated and as per details to be furnished as required. Build water table plinth to base of brickwork, as shown per elevations, with the top course of moulded splayed brick with the top bed of same laid in Portland cement. Arches to window and door openings, also relieving arches in rear wall of building, to be 13½ in. and 9 in. in height respectively, as indicated by drawing; to be cut and guaged and with soffits rubbed and finished in best manner. Turn relieving arches two ½ brick rims in height to inside of all window and door openings to have a camber of not less than 6 in., formed on brick cores on top of straight lintels. Turn brick arches across the corridors on both stories as indicated by dotted lines on drawings, segmental in form and 13½ in. in height. The inside of front porches are to be faced up with picked, clean and even colored white brick laid stretcher bond in putty joints and lead jointed, and the inside arches showing in same porches to be finished in same manner; also that portion of outer main wall showing on the inside of porches. The outer face of all external walls (except the face of rear wall) will be dry tuck pointed in the very best manner, the joints being raked out full ½ in. deep as the work progresses, and when ready for the pointing to be stopped in with putty mortar specially prepared and colored a dark Indian red or other color to be selected and approved by the architect. The stopping for tuck pointing is to be colored with best "Venetian" red, and a sample piece of the work is to be done and approved by the architects before the regular work is begun. It is to be distinctly understood that a first class job in every respect is required, and that none other will be accepted by the architects. The face of rear wall is to be laid up with even colored brick with close and true joints and struck with the trowel in a neat and workmanlike manner. Beam filling is to be carried to top of joists and to roof boarding in all cases, and as to latter to be pointed with mortar so as to render the same air tight. Carefully and thoroughly flush into all window and door frames as the brickwork progresses, and carefully preserve the staying of all frames. Build in all bond strips, joists, plates, lintels, wood blocks, &c., required by carpenter, and build chases for water and waste pipes required by plumber. Provide and lay the basement floors throughout with concrete and Portland cement, and as follows, viz.: First clean off the earth floors removing all wood cuttings and other rubbish, and carefully level the ground, grading the same towards the weeping drains; then provide and lay over the whole surface of floors a bed of fine broken brick and coarse gravel well mixed together, to a depth of at least four inches, all well rammed down; then over this lay a bed of fine gravel (screened) one inch in thickness mixed with Portland cement in the proportion of one of cement to three of gravel, and over this float on a coat of Portland cement one inch in thickness mixed with clean sharp sand, in the proportion of one to two. The top coat of cement is to be floated to sand and trowelled down to a smooth and level surface throughout, and to be protected until thoroughly set. The cement floor in each room is to be graded to the centre and provided with a 6 in. cast iron grating connected with the drains underneath to carry off water when the floors are washed. All the above concrete and cement floors are to be executed with the very best of Portland cement and other materials, and in the most workmanlike and thorough manner. The contractor or contractors are to provide good and sufficient scaffolding, to be approved by the architects, and be left up for the other trades. He or they will conform to the requirements and provisions of the building by-laws of the city. The chimney stacks are to be tuck pointed as described for walls, in the most careful manner, and the stone base and cap set and pointed in Portland cement. As soon as the tuck pointing is done, or sooner if required by the architect, the contractor will remove all bricklayers' surplus materials, and all rubbish and plant from the premises, and will clean up the lot and such portions of the street fronts used by him, and will also clean out the basement and other flats of the building, removing from same all bricklayers' rubbish, surplus materials and plant, &c. The whole of the bricklayers' work is to be executed in the most thorough and workmanlike manner and complete in every respect, the contractor furnishing all necessary and proper materials, scaffolding, tools and labour, and executing all the works called for by the plans and specifications, comprehending what might reasonably be implied though not particularly mentioned in the specifications or shown on the drawings.

CUT STONEWORK.

Provide and set all cut stonework required throughout the building complete in all respects, and as follows, viz.: All window sills to be of Credit Valley brown stone, 6 in. x 10 in., fine tooled and weathered on top and throated under, but to be rock face on the face and to project 2 in. from face of brickwork. All windows above the basement and all entrance doors to have 6 in. x 12 in. stone heads of Credit Valley brown stone, fine tooled on the soffit or under side, and to be back checked and picked to a face on the back side to fit to frames and lintels, but to be left rock faced on the front. The two basement rear entrance doors to have 12 in. x 6 in. tooled or rubbed Berea heads. The chimney and ventilating stacks will have 6 in. thick base and cap stone, as shown per elevations and sections; to be fine tooled and weathered on the top side and throated under. Cut left rock face on the edges. These cap and bases will be formed in the number of stones each as shown per details, to be cramped and leaded together and the joints set and pointed with Portland cement. The base stone will form the floor of belfry between the two vent stacks, and will have a 2 to 3 in. hole drilled through same and a piece of 2 in., 8 lb. lead pipe inserted in same and neatly dressed down and flanged to the stonework, and to pass down about three or four feet below for bell rope to pass through. Provide and set two Berea stone corbels 14 in. x 24 in. x 12 in. to carry the point of main rafters at side of ventilating stacks; to be tooled work. Provide and set fine tooled Berea stone sills to basement entrance doors, 6 in. x 4 ft. 6 in. x 18 in. The sills to rear windows are to be of fine tooled Berea, weathered and throated. Provide and fix inscription stone to front of building 21 in. x 6 in. and 14 ft. 9 in. in length, with the inscription "City Public School" cut in same in letters 9 in. high, inch wide and ½ in. deep, and capitals 14 in. high, 1¼ in. wide and inch deep. This stone will be of Credit Valley brown stone, rock faced on the margin and fine tooled in the centre to receive the lettering. Provide and fix cap stones of rubbed Berea stone 3 in. thick, to cover the top of hot air flue projections on the two rear corners of building. There will be four of these stones, two of them 14 in. x 36 in. and two of them 14 in. x 48 in., to be weathered on top.

GALVANIZED IRONWORK.

Provide best quality of "Iron" brand or Gospel Oak No. 26 B.W.G. galvanized iron, and form and execute and complete in the most substantial and workmanlike manner all the galvanized ironwork hereinafter described. The deck roof to be covered with galvanized iron formed in long sheets with joints made on 2 in. rolls with caps to same nailed and soldered, and with false or expansion rolls between same. Cross joints to be lock jointed and soldered in best manner. Turn the iron down 4 in. over slate and form moulding at junction of deck and slate roof as per marginal section, all well stayed, nailed and soldered, and with spring or wind seam along the slate apron. Line all vallies with galvanized iron, 20 in. in width, and under same lay one ply of tarred felt 30 in. wide properly nailed down. Lay apron of galvanized iron to all eaves 10 in. wide, turned up under slating and nailed to roof boarding and dressed down into eave troughs. Eave troughs throughout to be oval and fillet shaped, with back to same 4 in. above level of trough, all well secured to facia of cornice with long spikes through galvanized iron trales. Eave troughs to be well soldered at all cross joints. Down pipes to be Douglas Bros. patent octagon shaped, secured with patent hold fast spikes to brick walls, and to be carried down 2 ft. below grade of ground and hanged and cemented into drain pipes. There will be six stacks of 5 in. octagon down pipes as above described, and two small stacks of same from the front porch roof; also four stacks of 4 in. round down pipe from play-shed roofs, the latter to have shoes to same to waste onto the planking. The main roof gutters to be 6 in. moulded, the porch 5 in. do. and the sheds 5 in., all complete. Provide and fix 10 in. wide cloak flashings to all roofs abutting against brickwork; also continual aprons where required around the base of the ventilating stacks and belfry, the iron to be tucked one inch into joints of brickwork and wedged with iron wedges, and cemented with Portland cement, and dressed down and fitted neat and close to brickwork, and where practicable to be stepped with the brick courses. Provide and fix galvanized iron cresting (moulded) to belfry ridge in accordance with details, and flash same to brickwork also moulded eave moulding to same as per drawings. All the galvanized ironwork is to be executed as expeditiously as the progress of the building will admit of, and in the most substantial and workmanlike manner, complete in all respects. Provide and cover the man-hole opening in deck roof both sides and top; sides 12 in. high and top about 3 ft. square with galvanized iron, all fitted and finished in best manner.

SLATING.

Provide and slate the roof (excepting those of the play sheds) with the best description of Canadian slate from the Melbourne Quarries. Slates to be 10 in. x 20 in., laid on single ply of tarred felt with double lap leaving 10 in. to the weather. Each slate to be nailed with two galvanized iron nails, and to be laid with double row at eaves. Trim the slate to a line on both sides of all vallies, and cut and lay all hips with cut close chamfer and point same with slate colored plastic cement. Provide and lay 10 in. wide step flashings of galvanized iron to all slating abutting against brickwork, and in most careful manner. Carefully lay and close nail the tarred felting so as to cover the roof boarding at all points, and lay double straddle thickness of felting over all hips, vallies and ridges. Execute all other work necessary to render the slating complete in every respect. Examine the slating on the completion of the work of all other trades, and make good any broken or displaced slate, and clean out and remove all broken slate and cuttings of same from eave troughs and down pipes and vallies. Remove all surplus slate and cuttings, &c., from the premises on completion of the slating. The belfry roof is to be laid with round tailed red tiles laid in cement and all well cemented at joints and against brickwork.

PLUMBING WORK.

Provide and lay in from street main, clear of frost and with stop and waste cock boxed in and packed, &c., ¾ in. 6-lb. lead water service to basement of building, with *separate* ⅝ in. 10 lb. branch service from same to the drinking stands in basement, lunch rooms and to ground and first floor corridors, and in all cases to be carried on neat dressed and moulded boards fastened to wall and ceilings, and where required to be cased in the woodwork provided by carpenter. The service pipes must be arranged so that the same can be emptied with proper stop and waste cocks. Provide and fix in each lunch room or basement one of Mott's patterns of cast iron enamelled drinking stands, No. 93 pattern, page 42 of Mott's catalogue, 1881 edition. Also provide and fit up in the recess next to ventilating stacks on ground and first floor corridors, Mott's pattern of cast iron sectional urinals (8 ft. long each) to be used as drinking stands, to be supported on proper dressed boards secured to wainscoting; see Mott's catalogue No. 257-8 pattern, page 127, edition of 1881; these drinking stands to have ⅝ best pattern self-acting spring cocks, nickel plated, two to each stand in basement and six to each stand on ground and first floors, (16 in all). Each stand to have 1½ in. 6 lb. lead waste and trap and screw

to same complete, and connected to drain under basement floor. The above described plumbing work to be of the most substantial character and finished in best manner, and to include sixteen heavy metal drinking cups with strong chain attachments to the drinking stands complete.

PLASTERING WORK.

Provide and render the inside of all outer walls before the same are lathed (basement walls excepted) with one good heavy coat of brown hair mortar. Provide and lay in "pugging" between ground floor and first floor joists for *deafening*, to be composed of coarse mortar and spread in with a mould and so as to be two inches thick in the centre and three inches at the sides, as shown per marginal section. Provide and lath all outer walls (basement walls excepted) and all ceilings and soffits of stairs with best quality of sawn pine lath 1 in. wide for ceilings and 1½ wide for walls, to be laid on with at least 5-16 of an inch keep joint and breaking joints every sixth lath; lath to be well seasoned and free from sap and other defects. Render, float and set, in best "*three coat*" work, *all* walls and ceilings and soffit of stairs throughout the building (basement excepted), and finish the same in best "hard white finish," all thoroughly trowelled. The basement ceiling throughout is to be plastered in two good coats of plaster, floated and set in hard sand finish, all well trowelled. The mortar for plastering is to be composed of the best quality of lime and clean sharp sand, mixed with an ample quantity of long animal hair, all thoroughly incorporated together. The hard white finish or putty coat is to consist of best plaster of Paris, with a sufficient quantity of *washed white* sand mixed with same. The lathing on outer walls will not be carried below the top of wainscotting, but the plasterer will float on a second coat of brown mortar over the face of the first rough coat, and will carefully point and flush in around frame and all points where necessary. All the foregoing described plastering is to be of the very best and most substantial description and quality, and complete in every respect. The plasterer will provide for and remove all plaster droppings and other plasterers' rubbish and thoroughly clean out the building on completion of the plastering work, doing each room and corridor as the same are completed.

COMPOSITION BLACKBOARDS.

All the class rooms, eight of them, will have the best description and quality of composition blackboards, made under the directions and supervision of the Inspector of Public Schools of the city of Toronto. These composition blackboards will extend around the four walls of each class room, excepting 15 ft. in length of the platform end of each class room, which will be composed of slate. The width or height of the composition blackboards will be 3 ft. 6 in., excepting the 10 ft. in length at the platform end of each class room, which will be 4 ft. in height. The slate blackboards will be provided and set up by the carpenter, but the plasterer will float the walls at back of same and will finish the composition boards up to and fair and true with the face of the slate. The sum of $150 of the contract amount for plastering will be retained by the School Board until the composition blackboards have been properly tested and approved by the Inspector of Public Schools of the city of Toronto, upon whose certificate of the efficiency of the blackboards the above mentioned sum of $150 will be paid to the contractor.

PAINTING AND GLAZING.

All dressed woodwork is to be well primed, stopped with oil putty and knotted with best spirit knotting preparatory to the regular painting. For particulars of woodwork examine the drawings and read carpenter and joiners specification. All frames and other finished woodwork is to be primed as soon as prepared by the carpenter. All sash are to be primed and glazed as soon as fitted by the carpenter, and carefully stored away until ready for hanging. All dressed woodwork inside and outside of building, including all the woodwork of stairs and entrance steps, also all the woodwork of the privy closets and conveniences in basement, is to be painted in the very best manner and style with the best brand of white lead and linseed oil paint colored to choice tints, to be approved by the architects, and as follows, viz.: The woodwork both inside and outside of building (excepting the inside of the basement) is to have (3) three good coats of paint in addition to the priming coat. The woodwork in basement will be painted (2) two good coats of paint in addition to the priming. All galvanized ironwork, including all gutters, down pipes, hips and vallies, and the deck of roof, is to be painted three good coats of paint, including the *priming* coat, which is to be of red lead. The woodwork of play sheds, viz., the cornice posts and braces to same, also the siding and batten to same, is to be painted two good coats of paint in addition to the priming coat, which is to be the same as described for the school building. The fence along the street frontage of school lot, 200 ft. in length and 4 ft. in height, will consist of open picket fence with gates to same and large corner posts, all dressed stuff. This fence will be primed and painted in (3) three good coats of paint, counting the priming as one coat, and as described for the building. The division fence dividing the play yards will be of dressed stuff, close board, 7 ft. high. This fence will be primed and painted same as described for the picket fence. The two front entrance doors to have four coats of paint and well rubbed down with pumice stone, and finished smooth and clean. Paint the mouldings around the blackboards extending along both sides and two ends of each class room same as described for other woodwork. The entrance door sills, and the treads of entrance steps and of stairs will be of oak, and the floors to ground and first floor stories will be of hardwood. These door sills, treads of steps and stairs, and the hardwood floors to the eight class rooms, and the two main corridors and entrance porches, will be twice coated with linseed oil laid on hot, say at a temperature of at least 130 degrees Fahrenheit, and thoroughly well rubbed in with woolen cloths until the same is hard and dry. The stair rails will be well rubbed down and coated with oil as above described, but with three coats of oil. Paint all exposed plumbing pipes and ironwork. Paint the brickwork at back of two false windows two good coats of paint as shall be directed. Provide for and give the walls of basement throughout, including the brickwork of the heating and ventilating apparatus, but excepting the inside of two coat rooms, two good heavy coats of fresh white lime whitewash. The painter will clean off all glass and woodwork, &c., which may have become spotted or stained, &c., during the operation of painting or white-washing.

GLASS AND GLAZING.

The glass used throughout the building is to be of the very best description and quality of *selected* 16 oz. Diamond Star brand of glass, all well cut in, puttied and back puttied, and finished in very best manner complete. The transom lights over all class room doors, and the glass to glass partitions across the upper corridor, also glass in basement entrance doors and to basement borrowed lights, will be glazed as above described. The sash are to be glazed as soon as hitted, and left to harden until ready for hanging. The whole of the painting and glazing is to be executed with the very best of materials and in the most thorough and workmanlike manner, and to the entire satisfaction of the architects in charge of the works. The tenders for painting and glazing of the school building, sheds and fencing are to provide for and include all the painting and glazing as specified, allowing for the work already executed, providing, however, for making good any defects in same so that the whole work shall be a good and workmanlike job and complete in all respects.

BILL OF QUANTITIES.

CARPENTER AND JOINER WORK.

	$	c.
39857 ft. of pine timber (board measure) in joists, rafters, plates, lintels, etc., and labor in same, as specified		
91 squares (100 ft.) of ⅞ in. G & T flooring, 3 in. wide, of white maple, complete		
4¼ squares of ⅞ in. G & T flooring, of maple, 6 in. x 2 in. beams (these beams are laid on cement floor) to privy closets, complete		
67½ squares of 1⅛ in. G & T roof boarding, 6 in. wide to main belfry, front and rear porches, etc., complete		
91 squares of ⅞ in. rough flooring, 10 in. wide		
7 squares of ⅞ in. maple raised teacher's platform, on 6 in. x 2 in. bearers, complete		
91 squares of 2 in. x 3 in. and 2 in. x 2 in. strapping, basement and ground ceilings, complete		
76¼ squares of 2 in. x 2½ in. strapping, ground and first floor walls, complete		
4 squares of sheeding at basement entrance and upper steps, roof complete		
275 running ft. of cornice to main roof, complete		
58 running ft. of moulding to gablets of main roof, complete		
308 running ft. of chained joists, 14 in. x 2 in., 1½ in. packing pieces spiked together, and 1 in. iron straining rod, 6 in. x 8 in. x ½ in. end plates, nuts and washers, ¾ in. iron bolts, 72 in number, complete		
1300 running ft. of ⅞ in. G & T narrow wainscotting mould cap and plinth, 3 ft. 6 in. in height, complete		
424 running ft. of ridge rolls and tilting pieces to valleys and eaves, complete		
70 running ft. of 1¼ in. iron gas piping, for hand-rail to main stairs, includes bracket and socket flanges to newel, complete		
20 running ft. of pine linth, 14 in. x 10 in., dressed, trussed on top and with inch iron rods, nuts, washers, etc., complete		
27 1⅜ in. stair steps, oak tread and 1 rest landing, strings, balustrading, V jointed wainscotting, capping, oak hand-rail, includes the balustrating of well, etc., chamfered posts 6 in. x 6 in., spandrail, 8 in. x 8 in. turned oak newel, etc., complete		
15 basement stair steps, oak tread, strings, balustrading, V jointed wainscotting, capping, hand-rail, includes the balustrading of well, etc., chamfered posts, 6 in. x 6 in., spandrail, 8 in. x 8 in. turned oak newels, etc., complete		
17 rear basement steps, 2 x 2 oak plank platform and supports, top, uprights, and diagonal rails, ¾ in. bolts to coping, strings, etc., complete as above		
18 rear entrance steps descending to basement, narrower, 14 in. x 3 in. pine chamfered coping bolted to wall and round oak roll planted on top, complete		
18 front porch entrance steps, 2 in. x 2 in. slatted treads, 1½ in. oak risers, strings, 2 platforms, oak parapets, and moulded coping, etc., complete		
2 2⅜ in. front entrance doors, 12 in. x 3 in. frames, lock and other hardware, etc., complete		
2 2¼ inside porch doors, frames, locks and other hardware, etc., complete		
1 2⅜ in. rear entrance door, frame, lock and other hardware, etc., complete		
2 2½ in. basement entrance sash doors, frames, locks and other hardware, etc., complete		
8 1¾ in. class room doors, frames and fanlight, steel spring latches and other hardware, etc., complete		
1 2⅜ in. sliding door, jambs, boxing, hardwood stop, ¾ in. half round sliding rail, wheels, etc., complete		
6 1¼ in. basement doors, frames, locks and other hardware, etc., complete		
4 1⅛ in. foul air chamber and vent shaft doors, frames, hinges and bolts, etc., complete		
17 1¼ in. basement windows, frames, hinges, pulleys, cords, plumb bob balance, bolts, etc., complete		
4 borrowed lights, frames, and with vertical iron bars to corridors in basement, etc., complete		
1 1¼ in. large half circle window, frame, mullion bars, etc., complete		
3 small circular sashes to porch and rear gable, etc., complete		
42 1¼ in. English sashes, ground and first floor, boxed frames, double hung, sash lines, weights, lifts, sash fasteners, etc., complete		
8 brass pull down hooks and poles, etc., complete		
2 rear porches to basement entrance steps, includes 6 x 6 in. dressed and chamfered posts, plates, and cross bearers, double sheeting, dressed rafters, facia and crown moulding, etc., complete		
48 wrought iron anchors, 36 in. x 2 in. x ½ in., one end turned up 6 in., two ⅞ in. bolts other end, etc., complete		
50 ¾ in. iron bolts, nuts, etc., to bent plates, etc., complete		
48 ventilating openings in base of wainscotting, wood frames and wire cloth screens complete		
29 privy closets—fit up with risers, seats, hinged covers, 1¼ G & T divisions and screens 36 ft. long, 6 ft. 6 in. high capped 3 in. x 3 in. chamfered posts from floor to ceiling, etc., complete		
42 small cupboards in class rooms, flock panel doors in two boxes, locks, fasteners, etc., shelving, mould cornice, etc., complete		
500 clothes hooks, and screws, etc, complete		
1 back board, dressed, to urinal, 6 ft. 3 ins. x 15 in. x 1¼ in., etc., complete		
Trimmings to stairs, ventilating stacks, fines, etc., double tusk frames, joists spiked together, 2 in. x ½ in. stirrup pins to stair well, etc., complete		
Trimming for man-hole, framed door, hinged on top, fasteners and hooks, includes step ladder to same, etc., complete		
Bracketting for galvanized iron cornice at belfry, etc., complete		
Provide and set all centres for brickbayers, stay frames, ease cut stone work as directed, etc., complete		
Carpenter to box in plumber's piping, do all cutting, etc., as required, and attend on other trades, etc., complete		
Temporary doors and fasteners and general care of building night and Sundays		
Dressing basement window lintels 2 faces and basement door 3 faces, complete		
Dressing wall face of bond timbers in basement		
1 blackboard on sliding door panel, 6 sheets of 1/4th in. thick leather 30 in. x 16 in., jointed and glued ready to receive composition		
7 blackboards of slate, 16 ft. x 4 ft., jointed, packed and fit to even surface, including mould casing, stops, round headed screws, separate price if used		
Mould casing to 560 ft. of composition blackboard		
State deduction for slate if not required in blackboards		

NOTE.—Beginning with bearing timbers, (undressed) the measure thus: joist 30 ft. x 10 in. x 3 = equal to 6 ft. 3 in. cube—to bring into board measure; multiply by 12 (for a 1 foot square) gives the board measure 75 feet. Flooring, roof boarding, studding, furring, etc., measured length and breadth, thus: 25 ft. x 16 ft. gives = 400 ft. equal to 4 squares of 10 ft. x 10 ft. Lineal measure or running feet applies to cornices and dressed work generally, the sizes stated either in quantities or specification. Items in numbers, such as doors, windows, &c., as above.

BRICKWORK.

	$	c.
43,000 hard Carlton face brick, picked, for 3 faces, pointed, red putty mortar, including chimney stacks		
326,500 red and grey hard brick, picked, wall lining, etc., etc., trowel pointed, etc.		
2,900 clean, even colored white brick, to front porches, lead jointed		
2,200 hard brick to foul air duct, in cement		
30 supl. yds. of brick on flat, grouted in cement		
483 supl. yds. of 4 in. concrete and 1 in. Portland cement floor		
223 running ft. of water table, top course mould brick in cement		
4 14 in. x 9 in. smoke pipe collars of sheet iron to flues, with wire rims, etc.		
2 cast iron plate divisions to smoke and ventilating flues, ⅜ in. to ¼ in. x 2 ft. 6 in. x 2 ft. to 2 ft. 6 in., upper edge grooved, total height 80 ft. 9 in.		
2 cast iron soot doors and frames, 14 in. square		
2 man-hole doorways, stone head 3 ft. 6 in. x 14 in. x 6 in.		
1 tooled cap stone, 5 ft. 6 in. x 14 in. x 12 in., at flue connections		
2 4 ft. x 2 in. x ½ in. iron bars to arches at man-hole openings		
27 ¼ in. x 18 in. iron anchor bolts, with ½ in. x 4 in. cross pieces		
12 ¾ in. iron bolts to anchor down coping of rear steps		
63 arches to window and door openings		
2 large arches across corridors		
61 relieving arches to window and door openings		
2 large relieving arches in rear wall		
1 6 in. cast iron grating to drain		
Building in registers, frames, collars, etc., furnished by the contractor for heating		
Provide and build in 8 in. x ¾ in. climbing irons, about 60 in number, to stack		
Bedding to window and door frames throughout, bond strips, plates, lintels, wood, bricks, etc., etc.		
Provide and construct scaffolding as required and to be left up for other trades		
Setting (only) stone bases and caps to chimney stack in Portland cement		
Removal surplus materials, rubbish plant, etc., clean out basement, etc., etc.		
1 semi-circular double arch to upper front window		
2 smaller circular arches to porch		
2 semi-circular arches at belfry		
8 small circular, to stacks		

NOTE.—Brickwork is measured cube and in Montreal the number of bricks given in estimating, is 20 bricks to the cube foot, and is ascertained thus:

6 bricks long say 4' 0"
9 " high " 2' 0"

54
3 brick thick

8' 0" as divisor.

$$8\left[\frac{162}{16}\right]$$ to the foot.

The openings are measured and deducted from the solid work. Concrete when not deep is measured by the superficial yard, thus, 3 ft. by 3 ft. gives one yard. Concrete in heavy work is measured cube, 3 ft. x 3 ft. x 3 ft., or 27 feet to the cubic yard. Arches, etc., are given in numbers and other items noted as above.

CUT STONEWORK.

	$	c.
37 Credit Valley brown cut stone sills, 5 ft. 3 in. x 10 in. x 6 in., weathered and throated, rock faced		
4 Credit Valley brown cut stone sills, 7 ft. x 10 in. x 6 in., weathered, throated and rock face		
16 Credit Valley brown cut stone sills, 4 ft. 6 in. x 10 in. x 6 in., weathered, throated and rock face, to basement		
37 Credit Valley brown cut stone heads, 5 ft. 6 in. x 12 in. x 6 in., soffit tooled		
4 Credit Valley brown cut stone heads, 7 ft. 3 in. x 12 in. x 6 in., soffit tooled		
2 Credit Valley brown cut stone sills, 4 ft. 9 in. x 10 in. x 6 in., weathered and throated, rock faced		
2 Credit Valley brown cut stone heads, 4 ft. 9 in. x 12 in. x 6 in., soffit tooled		
2 Berea stone door heads, 5 ft. 0 in. x 16 in. x 12 in., to basement		
2 Berea stone corbels, 24 in. x 14 in. x 12 in., to rafters		
2 cap stones to air-flues, 3 ft. x 1 ft. 2 in. x 3 in., weathered		
2 cap stones to air flues, 4 ft. x 1 ft. 2 in. x 3 in., weathered		
2 tooled Berea stone door sills, 4 ft. 6 in. x 18 in. x 6 in.		
1 Credit Valley brown inscription stone (City Public School), 14 ft. 9 in. x 21 in. x 6 in., fine tooled for lettering, rock face, margin, lettering, etc., complete		
19 running ft. of sill and belt course to front window		
1 base stone at belfry floor (17 ft. x 11 ft.) in different size stones, tooled, weathered and throated, including 1-3 in. bulk and 5 ft. of 8 lbs. lead pipe inserted, dressed down to stone		
2 cap stones to stacks (10 ft. 3 in. x 4 ft. 6 in.) in different size stones, weathered and throated, crumped, leaded and pointed in Portland cement		

NOTE.—Cut stone is measured superficial, that is, square, thus: 20 ft. x 20 ft. gives 400 superficial feet. Sills, heads, steps, etc., are counted and the number given according to sizes and quality of work, as shown in above items of quantities.

SLATING AND GALVANIZED IRONWORK.

	$	c.
65½ squares of Melbourne slating on 1 ply tarred felt		
5 squares of 26 oz. galvanized iron, deck roof includes 2 in. rolls, solder, etc.		
1 square of red tiling (belfry roof) in cement		
78 lineal ft. of galvanized iron mould nosing, seamed and soldered		
132 lineal ft. of galvanized iron valley lining, 20 in. on tarred felt 30 in. wide		
275 lineal ft. of galvanized iron eaves, apron 10 in. dressed down		
292 lineal ft. of galvanized iron 6 in. mould gutter, soldered and spiked		
37 lineal ft. of galvanized iron 5 in. mould gutter to porch		
280 lineal ft. of galvanized iron 5 in. Douglas down pipes (octagon) cemented to drain		
133 lineal ft. of galvanized iron cloak flashings and aprons, cemented and dressed down		
36 lineal ft. of cresting and eave mould (belfry ridge), galvanized iron		
1 man-hole lift, 3 ft. x 3 ft., covered with galvanized iron top and sides		

NOTE.—Measured, and contents given in squares, before mentioned, lineal measure, also, and the sizes as above.

PLUMBING.

	$	c.
200 lineal ft. ⅝ in. lead service pipe, 6 lbs. to the yard		
90 lineal ft. 1⅓ in. lead waste pipe, 6 lbs. to the yard		
2 Motts enamelled drinking stands, No. 93, basement, complete		
2 Motts urinals (used as drinking stands), No. 257-8 ground and first storey		
2 stop and waste cocks to pipes, etc., complete		
1 urinal in basement, complete		
16 ⅝ nickle self-acting cocks, complete		
6 traps and screws to waste pipes, complete		
1 stop and waste cock to main, boxed in, complete		
16 heavy metal drinking cups and chains, complete		
¾ in. lead main pipe, 6 lbs. to the yard, at per lineal foot, complete		

NOTE.—In these works there are many and various items, as will be noted in the above, comprising lineal measure and numbers.

PLASTERING.

	$	c.
740 supl. yds. of 1 coat (heavy) on walls, flush into frames, etc., before lathing		
900 supl. yds. of pugging, 2 to 3 in.		
2970 supl. yds. of 3 coat work, (white finish)		
480 supl. yds. of 2 coat work, basement ceilings		
560 lineal ft. of composition blackboard, 3 ft. x 6 in. high		
112 lineal ft. of composition blackboard, 4 ft. high, separate price in lieu of slate		
Removing and cleaning throughout at finish of plaster work, complete		

NOTE.—Superficial measure is given, that is, the walls and ceilings are measured through, openings are measured and deducted from same, showing the net number of superficial yards done. Cornices and other moulds in plaster are lineal measure, the girths of same added for mitreing internal and external angles. Centres are numbered, giving diameters.

PAINTING AND GLAZING.

	$	c.
1300 supl. yds. of priming and 3 coats painting		
265 supl. yds. of priming and 2 coats painting		
236 supl. yds. of priming and 3 coats painting, on galvanized iron work		
20 supl. yds. of priming and 4 coats, rubbed down with pumice stone.		
718 supl. yds. of 2 coats oiling, floors, steps, sills, etc.		
32 " of 3 " stair rails		
906 " of 2 coats lime washing, basement walls		
Cleaning off generally glass and woodwork, etc., at completion of work		
1356 supl. ft. of 16 oz. Diamond Star brand glass		

NOTE.—Painting measured and given, superficial yards in quantities as shown. Glazing, measure superficial feet, and in plate glass at per pane, with size stated.

CONCRETE BUILDING.

THE members of the Technical Society of the Pacific Coast lately went to Palo Alto on the invitation of E. L. Ransome, who has nearly completed two large concrete buildings for the Leland Sanford, Jr., University. One of these is the girls' dormority. The larger one is the museum building, and is the finest piece of building concrete work yet done in this vicinity. The structure is absolutely fireproof, and intended also to be earthquake-proof. It is built on the system patented by Mr. Ransome, so as to be a homogeneous structure as to walls and partitions, there being no joints. Twisted iron rods are used for additional strength where necessary. The cement is mixed in the Ransome patent mixer and elevated to points where used. A large force of men has been at work on this building for sometime and it is now almost complete. Even the interior arches and ceilings are of concrete. The stairways are made of concrete, and these will be covered with marble steps. The hallways will be finished in marble over the concrete. There is no wood anywhere in the building, the window frames, etc., being of metal. The exterior is furnished with a smooth coat of cement to resemble brownstone. The heavy columns of the entrances are, like the main structure, of concrete, and the statuary to surmount the building is moulded of the same material.

There are two concrete buildings now and others are to follow. They were built by contract by Messrs. Ransome & Cushing in an exceedingly short space of time. Stone buildings of equal dimensions would have taken three or four times longer to construct.—*Scientific American.*

To make a red wash for brick on a cheap job, says V.B.G. in *Exchange:* Take 4 ozs. of brown glue (none but the best should be used), melt in the usual way and dilute with water to 4 gals. While the glue water is hot dissolve it in 1 lb. of alum. Then stir in the Venetian red, yellow ochre or Spanish brown in proportions to get the color you desire, and the proper consistency to spread well. This wash should go on in thin coats. I have known instances where this wash seemed to wear like paint. I prefer a mixture of Venetian and ochre for colors.

The Toronto Art Students' League has elected the following officers for the ensuing year, R. H. Holmes, president; Mr. W. D. Blatchley, vice-president; C. W. Jeffries, treasurer; W. W. Alexander, corresponding secretary; D. F. Thomson, recording secretary. We are pleased to hear that the Society is making satisfactory progress.

Kiln-baked bricks occur in the ruins of ancient Babylon, and were pressed out of a wooden mould. Some have been found bearing the name and title of Nebuchadnezzar. In the ruins of Babylon it is claimed that original Chaldaic accounts of the genesis and of the deluge have been discovered stamped in cuneiform characters on clay tablets.

CORRUGATED IRON

ILLUSTRATED CATALOGUE FREE
METALLIC ROOFING Co
MANUFACTURERS TORONTO

IMPORTATION ORDERS SOLICITED FOR
CONTRACTORS' PLANT and MACHINERY, FIRE CLAY SANITARY WARE.
Copland & Company, - 152 St. James Street, MONTREAL.
Agents Loudon & Co. and Fire Brick Association.

EXCELSIOR PAVEMENT CO.

Sidewalks, Carriage Drives, Corridors, Landings, Steps,

MALT, CELLAR & STABLE FLOORS, VASES.

Estimates given promptly on application.

Office, 271 College Street, - TORONTO.
TELEPHONE 1199.
T. J. WHITTARD, Superintendent. J. WATSON, Manager.

HOT AIR FURNACES

Coal or Wood; Cast Iron or Steel Domes.

56 VARIETIES.

Quick, Powerful and Economical; Full guarantee of Construction, Detail and Operation.

IT WILL PAY to get our Catalogue and Prices before closing contracts.

McCLARY MFG. CO.
London, Toronto, Montreal, Winnipeg

STUART'S PATENT GRANOLITHIC

FOR SIDEWALKS, FLOORS, STEPS, LANDINGS, CORRIDORS, AREAS AND STABLES.

No building perfect without Granolithic Footpaths. It has stood the test of years and climates.

IMPERIAL STONEWARE LAUNDRY TUBS
Are without parallel. The finest and most complete Tubs in the Market. Guaranteed perfect.
Building Granite, Granite Paving Blocks, Polished Granite of every kind, Monumental Work. Marble for Interiors, Plumbers, Furniture, Cemetery, or any purpose, and of all kinds of Marble in the market.
SEND FOR ESTIMATES.

ROBERT FORSYTH,

MONTREAL: 130 Bleury Street.

TORONTO: 14 Toronto Arcade.

MILTON PRESSED BRICK

THE MILTON PRESSED BRICK AND SEWER PIPE CO., Ltd., have one of the best equipped plants in the country, and turn out a brick unequalled anywhere in color and finish. Contracts have already been secured for the season of 1892 of over four million pressed brick.

PLAIN AND ORNAMENTAL BRICK, TERRA COTTA, ETC., ALWAYS IN STOCK.

WORKS AND OFFICE: MILTON, ONT.

TORONTO OFFICES:
4 ADELAIDE ST. EAST AND 1172 YONGE STREET.
DR. ROBERTSON, PRESIDENT. J. S. McCANNELL, MANAGING DIRECTOR.

MONTREAL AGENT
W. E. GOWER, M.C.S., C.E.,
Mechanics' Institute Building, St. James Street.

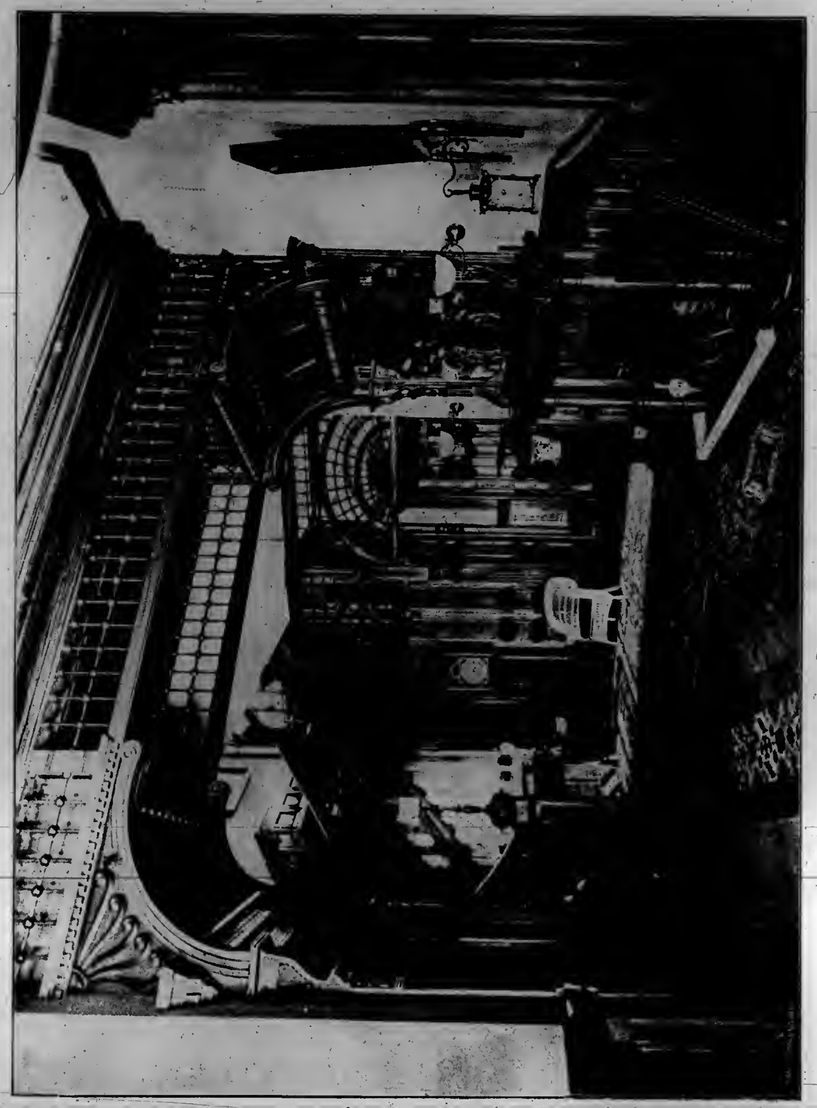
Don Valley Pressed Brick Works

TAYLOR BROTHERS,
TORONTO.

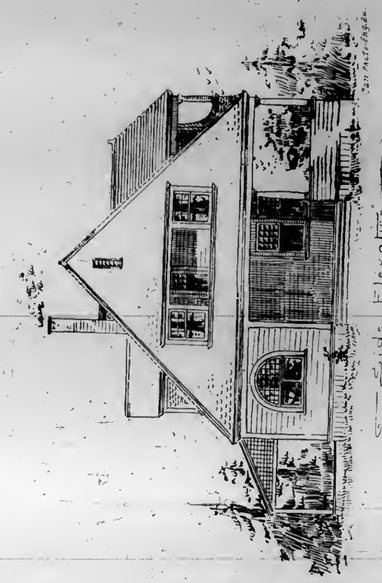
SPECIALTIES FOR 1892:
RED, TROJAN, CARTHAGINIAN, ROMAN, POMPEIIAN, OBSIDIAN, AND FANCY COLORS,

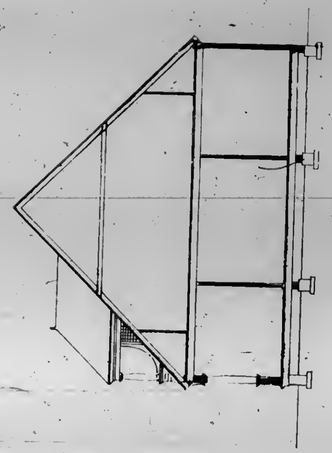
Our goods are now acknowledged by the leading Canadian and United States Architects to be the highest grade manufactured in America to-day.

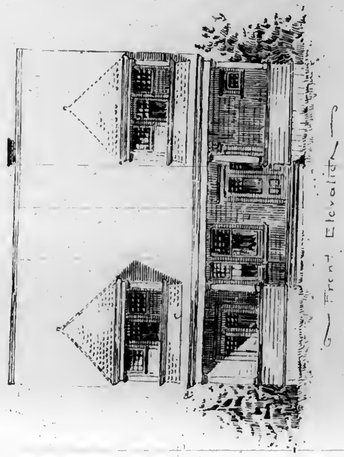
OFFICE AND SHOWROOMS:
60 Adelaide Street East, **TORONTO.**

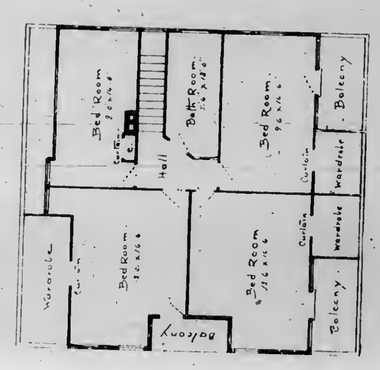


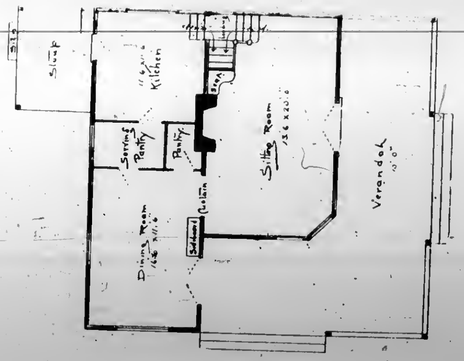
INTERIOR OF HALL, F. D. MONK'S RESIDENCE, MONTREAL.
J. W. & E. C. HOPKINS, ARCHITECTS, MONTREAL.







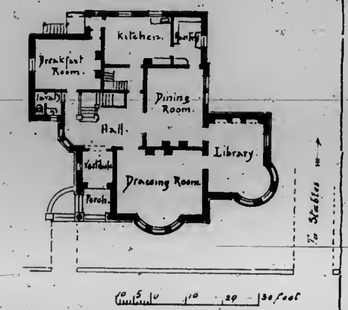




Sketch of
Summer Cottage on Toronto Island
for Elias E Good Esq.
Scale — ¼ Inch to Foot
Longley & Burke. Archts.

— R. G. Reid, Esqre —
— Residence, Drummond St. —
— Montreal: —

— Cl. C. Hutchisson. Archt. —



CHURCH OF THE MESSIAH, AVENUE ROAD, TORONTO.

Gordon & Helliwell, Architects, Toronto.

CANADIAN ARCHITECT AND BUILDER.

VOL. V.—No. IV. TORONTO AND MONTREAL, CANADA, APRIL, 1892. PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher.

14 King Street West, - TORONTO, CANADA.

64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	S. G. CURRY, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton.
TREASURER	D. B. DICK, Toronto.

COUNCIL:

WM. G. STORM	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
JOHN E. BELCHER	Peterborough.
EDMUND BURKE	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Merchants' Bank Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	F. X. BERLINQUET, Quebec.
1ST VICE-PRESIDENT	VICTOR ROY, Montreal.
2ND VICE-PRESIDENT	J. NELSON, A.R.C.A.
SECRETARY	C. CLIFT, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. C. HUTCHISON, R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
ALPH. RAZA	Montreal.
J. F. PEACHY	Quebec.

THE journeymen painters and decorators of Winnipeg are at present on strike owing to the refusal of the employers to grant an increase of wages amounting to 2½ cents per hour all round. The scale heretofore in force has been 22½, 25, 27½ and 30 cents per hour.

THE *Australasian Builder* suggests that New South Wales copy the example of British Columbia by sending to the World's Fair specimens of its native timbers. Our Pacific province will build a structure which will contain all the varieties of native woods. It will be built in sections of contrasting woods, neatly mortised together; the roof will consist of native slate and a variety of cedar shingles. The building will be shipped to Chicago in sections, and will be put together on the fair grounds.

ADDITIONAL interest would be given to the annual meetings of the O. A. A. if to the usual exhibition of drawings there was added an exhibit of building materials and appliances. We understand that an upper flat in the School of Science might be utilized for this purpose. Such an exhibit would be especially interesting to members of the Association practising in the towns and smaller cities of the Province, who are without the opportunities open to architects in large cities of becoming familiar with the latest improvements in materials. An exhibit of this character might assist in bringing to the annual meetings a larger number of the members resident outside of Toronto. There is little reason to doubt that manufacturers and dealers would be pleased to exhibit if the necessary accommodation for the purpose was provided.

IT was announced early this month by Sir John Thomson that the Dominion Government intends to erect a statue to Sir John Macdonald on Parliament Square, Ottawa, and the announcement was received by all members of the House with great satisfaction. What the intention of the Government may be as to the employment of an artist for this work we have not heard; the money has yet to be voted for the purpose, and until that is done no decision will be made. It is, however, earnestly to be hoped that the best talent in the Dominion may be secured for the work—and that there is talent capable of executing the work to be found within our boundries there can be no reason to doubt. No one but a Canadian should have the commission for such a thoroughly national monument, and every facility should be given to Canadian artists to enable them by competition or otherwise to show that they possess the necessary talent.

THE appointment of Prof. Saunders as Canadian Commissioner to the Columbian Exposition or "World's Fair" will be a satisfaction to every one interested. Prof. Saunders has had great experience in these matters, having acted as our Commissioner in nearly all the exhibitions Canada has taken part in, and we feel sure that so far as the Commissioner is concerned, the exhibition of Canadian products and manufactures will be a success. As to exactly what the arrangements are for our exhibits, we have not yet been able to find out; very little seems to have been done as yet. The Montreal Board of Trade are taking the matter up on behalf of or in the interests of the city, and it is to be hoped that other cities will now begin to interest themselves in the matter. All loyal Canadians should do their best to make this exhibition a success, sinking petty jealousies with regard to our neighbor and remembering only the great interests of Canada.

SOME extracts from an address on "Native versus Natural Cements," are printed in this issue. The statements and deductions contained therein must prove of interest to many of our readers. Our attention has lately been called to the results of tests of Canadian cements and artificial cements under the direction of the Dominion Government engineers. These tests show that the native cement rapidly improves in quality with age. For example, while in a seven days test the tensile strength of native cement is shown to have been less than one-third that of English artificial cement, at the end of twelve months the strength of the two cements was about equal, showing that age improves to a wonderful degree the quality of the native article, which also has the advantage in point of cheapness. We would be pleased to know how far Canadian engineers and architects have gone in the direction of proving for themselves the merits of the two varieties.

THE opinion seems to be very general that work in the building trade will be quiet this year. "Things are awfully quiet" we hear remarked half a dozen times every day, with reference to all lines of business. The record of building permits taken out at the City Hall is very incomprehensible. It is stated that permits have been taken out for so many thousand dollars worth of work making a considerable increase over the amount shown by the permits issued for the same period last year. But where is the work? As it is well known there is a great deal of irregularity in the matter of taking out permits. Many people do not take any out at all until the building has been completed, and then again, many works for which permits are granted are not carried out, so that as an opportunity of comparison, the permit book is not of much value. There are several large buildings drawing near completion, but we hear of few if any as likely to be begun this year. However the season is young as yet, and we hope matters may improve as it gets older.

IN view of the penalties to which they were liable to become subject under the Employers' Liability Act, the master builders of Melbourne, Australia, arrived at an understanding with their workmen by which an insurance of £50 against accident of whatever kind was to be carried by each workman. Towards the cost of this insurance both employer and employee were asked to contribute, the latter in the proportion of sixpence per week. This arrangement, while seemingly advantageous to both parties, did not long satisfy the workmen, who began to grumble about the weekly payment of sixpence. The employers opened negotiations with the insurance company for the cancellation of the policies. Despite the willingness they thus manifested to terminate the arrangement as soon as possible, the stone masons went out on strike because it was not ended immediately. Exhibitions of unreasonableness have not been wanting on the part of employees in the building trades, but this certainly deserves to be classed as a conspicuous example. It would be safe to assume that many of those who begrudged to pay sixpence a week to secure compensation in case of accident, would freely spend twice or thrice that amount at the saloonist's or tobacconist's counter.

THE organization of the Toronto Builders' Exchange on the lines of the Exchanges affiliated with the National Association of Builders of the United States, seems likely to mark a new and better era in the history of building in that city. For years there existed the Federated Association of Builders, but having been unsuitably planned, it accomplished but little in the direction of uniting and advancing the interests of the various trades. In the new organization the weak points in the old have been carefully avoided. The officers are known to be energetic and deeply enthusiastic in the success of the undertaking. A large membership has already been secured. Under these circumstances the success of the movement seems to be assured. Some of the objects of the Exchange as well as some of the benefits which it is in a position to confer upon its members are touched upon in an article which we print elsewhere in this paper. It has clearly defined purposes, and will no doubt succeed in placing on a more satisfactory footing the interests of its members. Already we learn that communications have been received from Ottawa and other cities desirous of establishing similar Exchanges. It is to be hoped that the movement will extend until every city of importance in the Dominion has its Exchange. When that stage shall have been reached, the next step should be the organization of a National Association representing the various Exchanges and the building interests of the whole country.

THE attention of the Government has been called to the fact that the contractor for the new Toronto drill hall is having the cut stone work done in the Province of Quebec, thus depriving local workmen of the employment to which they deem themselves to be entitled. It does appear to us, as we have before stated, that the city of Toronto having provided the Government with a free site for the building, might reasonably expect that employment would be given to local workmen who must bear their share of the taxes imposed by the purchase of the land. At the same time the city and the Government both having failed to make this a condition either of the agreement between the city and the Government or the Government and the contractor, it is too much to expect that anything can now be done to remedy the matter. The contractor in making up his tender had in view the employment of Quebec labor, as a result of which it is claimed he will effect a saving of about $40,000. Having obtained the contract without restrictions, his right to carry it out by whatever means will yield him the greatest amount of profit, cannot be fairly called in question. Whatever fault may be found belongs to the City Council which neglected in the negotiations with the Government, to protect the interests of the local workmen.

SINCE our last issue the examinations of the candidates for admission as members of the Ontario Association of Architects, have taken place, but they were billed too late in the month for us to obtain any report as to results that we could use in this issue; we hope to be able to give full particulars next month. In the meantime we may say that by permission of the Minister of Education, the Hon. G. W. Ross, and Professor Galbraith, (who is also Chairman of the Board of Examiners), the examinations were held in the examination hall at the School of Practical Science, where in profound peace and quiet thirty-five candidates spent three hours twice a day for four days working at the papers set. The Moderators were members of the Board of Examiners, and two or three were present at each examination to order the routine and supervise. The Board of Examiners consists of Professor Galbraith, Chairman; Mr. Wright, Lecturer in Architecture of the school, and the following architects: Messrs. Burke, Gambier-Bousfield, Curry, (President of the O. A. A.), Darling and Townsend. We understand that the results will be made known as soon as possible, but it must necessarily take some time for the Board as a whole to consider the reports of each of its members and finally to decide who have passed and who have not. The candidates at these examinations, whether successful or not, will carry away with them a lesson that will serve them all their lives, so that none need think he has wasted four good days. An examination in any subject is an excellent education; it has often the effect of an "eye opener," and there are but few upon whom such a tonic does not work beneficially.

NO arrangement has yet been arrived at concerning the method to be used for propelling the electric cars of the Toronto street railway. The question is between the "trolley" system and the "storage" system; the one has about as many supporters as the other, and therefore it is difficult to come to a decision. As a matter of fact the "storage" system is in its infancy only, and, though in a few years time it may be developed with practical utility, yet at present its adoption would only be a most costly experiment and probably fraught with a good deal of danger. The "trolley" system has been tried and found practically useful in many places, and, though by no means a perfect arrangement, is undoubtedly the best, if indeed it is not the only one possible under the circumstances for introduction to Toronto. A contemporary speaks of it as "the most uncivilized convenience known to our times," and certainly it is not a desirable system were there any better to choose from, but is at present "Hobson's choice." In the meantime, while this matter remains unsettled, the streets remain in the worst possible condition. New permanent roadways have been promised for the last three or four years, yet it looks as if it will be another season before we shall see any improvement. The change of system for the street cars, from horses to electricity means an entire change of the roadbeds over which the lines are to run. Not only have our aldermen not decided about the paving, but it is by no means certain which streets the cars will run along. It is proposed to make a single line running west on one street, and a return single line running east on an adjacent parallel street wherever such an arrangement can be carried out. When these points will be settled nobody can possibly tell. At the present rate of progress it may possibly be a couple of years or more.

OUR ILLUSTRATIONS.

PHOTOGRAVURE PLATE—RESIDENCE OF MR. W. H. A. MASSEY, JARVIS STREET, TORONTO—WM. YOUNG, ARCHITECT, NEW YORK.

RESIDENCE OF MR. HECTOR MCKENZIE, MONTREAL.—J. W. & E. C. HOPKINS, ARCHITECTS, MONTREAL.

The stone is imported freestone of a most pleasing color from the "Mowat Quarries," Scotland, supplied through Thos. Samuel & Sons, Canadian agents, Montreal and Toronto.

PRESBYTERIAN SUNDAY SCHOOL BUILDING, HAMILTON, ONT.—JAS. BALFOUR, ARCHITECT, HAMILTON.

HOSPITAL FOR SICK CHILDREN, TORONTO—DARLING & CURRY, ARCHITECTS, TORONTO.

ONTARIO SOCIETY OF ARTISTS.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—The next annual exhibition of this society will be opened on May the 23rd next, in their Art Gallery, 175 King street W., Toronto. Pictures, perspectives, drawings etc., must be delivered unpacked at gallery not later than May 17th. The title of pictures, with name and address of architect to be on the back of each frame. All work must be sent at owner's risk, but an insurance during exhibition will be effected by the society. It is proposed to issue an illustrated catalogue, and to make it a success, it is necessary to have each architect represented. The size of sketches should 2⅞" x 4" or 4" x 6⅝", executed on lithographic transfer paper, grained, smooth or stippled, drawn in tuche or crayon. If unable to work in these mediums, photos to sizes may be substituted (accompanied with $2.50 to the Committee) and they will be drawn for the exhibitor by competent artists. Sketches, photos, drawings and communications should be sent to J. A. Radford, Adelaide street E., Toronto, not later than April 24th. Entry forms to be had of the Registrar of the Ontario Association of Architects, W. A. Langton, Merchant's Bank building, Toronto, and from Mr. Clift, Secretary of the Province of Quebec Association of Architects, St. James street, Montreal.

J. A. RADFORD, }
CARL AHRENS, } Catalogue Committee.

GRANITE ARCHITECTURE.

It may be useful to note that in modern granite architecture, as in the true granite style of the ancient Egyptians, simplicity in design should be a *sine qua non*. Such a treatment gives the most pleasing effect, says the *New York Manufacturer and Builder*, and is in perfect accordance with the hard nature of the material. Any attempt at elaboration is altogether out of place. Over-wrought granite is always painful to the sensitive eye, influenced, no doubt, by the remembrance of the vast amount of labor involved in the work. Over-polishing, too, has a peculiarly harsh and repulsive appearance, especially in the Aberdeen variety. A better and more pleasing effect may be obtained by employing a breadth of unpolished surface to heighten the value of the highly polished portions.

The House Committee on Public Buildings and Grounds at Washington, D. C., devoted four hours on the 10th ult., to hearing a committee of the American Institute of Architects upon House Bill 261, which is intended to change the practice of the Government in connection with the design and supervision of public buildings by turning the same over to the best architects of the country selected for each building with special references to its peculiar conditions and needs. It was asserted that by this means the standard of design and construction of Government buildings can be greatly improved. The Committee of Architects and the House Committee seemed to agree upon all essential points.

"ONLY THE HARDWARE."

It is always instructive to examine completed works of magnitude critically, and not only to admire but also to discover whether they might have been improved, as well as to profit by the experience thus gained for future work.

Such criticism is instructive for all branches of work, and in none is it more so than in the many new buildings which are constantly being erected in our great cities.

Among these is a new and beautiful hotel building worthy of highest admiration and praise for the effective manner in which the architect has designed the structure, and also included in one consistent whole the interior decoration. The various rooms are beautifully and brilliantly finished and the Renaissance school, after which the building is designed, lends itself admirably to the application of the most elaborate and effective ornamentation. In some portions the work merges into the latter developments of the Renaissance, and Rococco decoration and the work of the First Empire is freely used.

It is unfortunate, however, that in the midst of such effective work one item should have been so neglected as to mar the completeness of the work, and by its unsuitability cause a feeling of regret when it meets the eye. The hardware, which might have given such valuable aid in the completion of the scheme of decoration, appears to have no connection with the rest of the work, and it almost seems to have been chosen without regard to any of surroundings. Although used in connection with such elaborate work, and that, too, of a period in which the most beautiful designs in metal were made, we notice only plain bronze hardware, of the barest brand colonial outlines, conspicuous only by its incongruous appearance in the midst of so much that is brilliant and consistent.

One of the most beautiful portions of the building is the main reception room, which is in the Empire style, and the detail of which has been considered with extreme care, even to the extent of the small pieces of ornament applied to the doors, while below on the same door, where so much care has been expended in carrying out the details of the style, the unfortunate hardware to which reference has been made is shown in all its ugliness, particularly as it is of plain polished bronze, while the color of the woodwork is of a cream, which is so frequently used in this style of decoration.

It is the old story: "Only the hardware," and so not worthy of notice or care by the architect or decorator, and not until the work is done and it is too late to be considered does the magnitude of the error become apparent. The time is rapidly approaching, however, when the sadly neglected item is to be wholly redeemed from its present indefinable position, and by its growing importance demand the recognition which has so long been withheld.—*Trefoil.*

The following officers have been elected by the National Art Association for 1892 and 1893: Patron His Excellency, Lord Stanley; Honorary Patron, the Marquis of Lansdowne; President, O. B. Jacobi, Toronto; Vice-President, A. C. Hutchison, Montreal; Secretary-Treasurer, James Smith; Council, S. W. Watts, Ottawa; Forshaw, Ray, Kingston; A. F. Dunlop, Montreal; A. D. Taylor, Montreal; Hamilton McCarthy, Toronto; Thos. Fuller, Ottawa; Homes Watson, Doon; Mr. Matthews, Toronto; J. C. Hopkins, Montreal; Henry Labgley, Toronto; W. Brymner, Montreal, and Jos. Connolly, Toronto.

PERSONAL.

Mr. Fred. W. Farncomb has been admitted to partnership in the firm of Jones & McBride, architects, London, Ont.

We are pleased to learn that the Hon. C. F. Fraser, Minister of Public Works for Ontario, has been much improved in health by a sojourn of five months in Colorado. He is just returned home.

Mr. Murray A. White, Secretary of the Toronto Architectural Sketch Club, has removed to Chicago, having we are pleased to learn secured a position with a leading architectural firm of that city.

The firm of Daoust and Gendron, architects, Montreal, has been dissolved by mutual consent. Each member has opened an office in the city, and will continue to practice his profession on his own account.

PUBLICATIONS.

We are under obligation to the Secretary of the National Association of Builders of the United States, for a copy of the official report of the Sixth Annual Convention held at Cleveland in January last; also for a separately bound copy of the President's address.

SANITATION AND HEATING

SANITARY PLUMBING.*

By Cesare L. Marani, Grad. S. P. S.

Before we consider its proper construction and the disposition of its waste, permit me to say that the subject of "House Plumbing" has grown enormously within the last few years, and that now it holds a place of no small importance in the planning of buildings. For this reason it is impossible for me to do otherwise than to touch on such points as I consider of greater importance, and which, I fear, are often overlooked by the owner and architect.

Now that an increased desire for thorough sanitation is being manifested by the better classes, the sanitary engineer is often called upon, if not actually to take charge of the plumbing work, at least to plan and advise in the interests of health and economy.

At present this work is largely controlled by the architect and plumber combined, who seem more eager to attain to better results, and much more

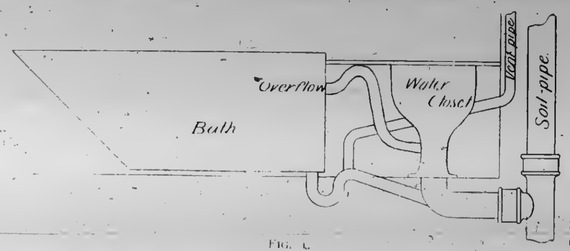


Fig. 1.

competent to do so, than they were formerly. Still it cannot be denied that the average architect possesses little or no scientific knowledge whatever on this important subject, thus clearly demonstrating a fact, that he and the rest of his profession attach too little importance to their responsibilities in connection with the plumbing of buildings, and therefore do not seem to experience for this that feeling of personal accountability so essential to success, which they do for other and less important sections of their work.

It is hardly necessary to explain that in these, and the remarks I am about to make, I refer not to the average members of "associations of architects," such as we now have in the Provinces of Ontario and Quebec, nor to the Boston Architectural Club, and other Societies in the States; but to the *average*, when we include all who may be said to be practising as architects, whether considered qualified to so by these architectural bodies or not, and therefore, in this way considering the *actual* centre of gravity that affects the general public.

Col. George E. Waring, writing on this subject for the information of architects, as well as others, goes on to say: "I have never applied a water test, under pressure, to work that has been done in a fine house under control of an architect, with any other result, so far as his frame of mind was concerned, than to annoy him by the demonstration of leaks and defects

"What seems still more remarkable, when I have sometimes thought that I had an architect really converted, when he acknowledged the work to be simple, elegant, safe, cheap, and in every way satisfactory, was that the conversion never lasted. I never found that the example had the slightest influence on him afterwards."

Sometimes we meet with owners, who, while they show all eagerness to consider from a standpoint of comfort, any proposed piece of plumbing work in connection with their house, nevertheless seem afraid to look on the sanitary aspect of the thing, lest the necessity of adopting certain changes or precautionary measures, might rise perforce before them, like the unwelcome ghost of Banquo. In the first place, any additional expense thus entailed, proving little or no obstacle; while in the second, the smallest outlay for the protection of health, would be regarded as a *dead loss*, and objected to in every possible way.

That an architect should ever pander to the wishes of such people, who may be said to be pursuing an ostrich-like policy, is indeed to be regretted.

Sometimes an owner imagines that his rights as Despot in his own castle are being encroached upon. It is then the duty of the architect to point out the wisdom of providing for the preservation of health and happiness, not only of himself, but also of others, since we are creatures very much dependent on our neighbors for our sanitary condition.

I knew an architect once who tried to exonerate himself from all responsibility in connection with a certain piece of "plumbing work," by saying that he had persuaded the owner to employ the best *practical plumbers* in town to do the said work, and that therefore there could be nothing wrong with it.

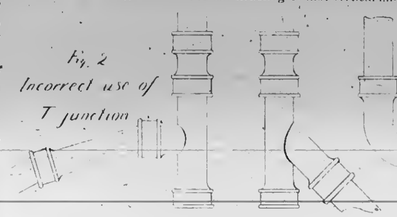
Obviously the above reasoning was rather sophistical. Who constitute the "best practical plumbers" in a community? Are they men of science as well as clever mechanics? Are they fully entitled, by a sound experience and careful study of their trade, to the full import of such an appellation? I fear not, and certainly much less to that signification which a too confiding public is ever sure to place on such titles. It is a fallacy to imagine that the knowledge of how to handle, cut, and connect pipes, wipe joints, and charge well, of necessity makes a man master of the plumber's trade. And yet I know, from experience, that in the great majority of cases, this is regarded as the criterion. It might seem that the impression prevails among a large class of pipe fitters and mechanics, that the possession of a certain number of working tools, together with the *valuable* assistance of a couple of incompetent "shop-boys," a large shingle suspended over the sidewalk, more pronounced in its economy for truth than expense, a few cast iron connections displayed just outside the shop, and lots of gas brackets and other brass fixtures inside, constitutes a man at once a "practical plumber." There are a great many good workmen who are by no means good plumbers, and still a great number of good plumbers who are by no means "Practical Plumbers and Sanitary Engineers," as they often style themselves.

It therefore falls back on the architect to provide the soul, yes, the ethereal spirit of theoretical knowledge, and furthermore, to see the same properly and practically incorporated in the work of the plumber. That a man can pursue the plumbing trade without having first thoroughly mastered it in all its details, I consider as the great present evil. Hundreds of dollars have been spent, to my knowledge, in rectifying blunders made by such workmen, of whom it might be said, and this justly, that they had come by their trade dishonestly, because by too short a route. They of course little cared what might befall to their work, much less to the health and happiness of others, so long as they might pocket their gains and remain in blissful oblivion as to their moral responsibilities. As an illustration, of what I should term downright practical ignorance, I might give a case that occurred in the town of Brockville, Ont., a few years ago.

One of the so-called "master plumbers," who, previous to his settlement in the town, had worked at his trade for nearly fifteen years in the city of Montreal, and who was therefore looked upon by the simple public as a most desirable man to employ, actually presented a piece of "plumbing work" to be passed and approved of by the Inspector, where a two inch lead pipe, two feet four inches in length, had been bent and used under the closet seat, so as to act as a vent pipe to the closet trap, and at the same time as an overflow, waste for the bath tub (see fig. 1). The workmanship, however, was simply perfect.

Not very long ago a case came under my notice in this city, where a long vertical line of soil pipes had choked and blocked up completely. It was thought at first that the servants must have thrown bones and rags, etc., down the closets, but further examination showed that there was nothing in the pipes, save the legitimate house wastes and closet paper.

The plumbers, in erecting the said line of pipes, had used too little gasket in some of the joints, and none at all in others. The consequence was, that the lead intended for the joints had spurted inside, and in some cases forming regular groups of fingers across the pipes, thus obstructing the passage of paper, etc. The only way this could be rectified was by the tearing down and re-constructing of that vertical line of soil pipes.



On investigation, it was found that the plumber, who was responsible for this, had had no intention of scamping his work. He had made some extraordinary experiments (by himself), which had convinced him against using a gasket where he could possibly help it. He had come to the conclusion that though a gasket was of great assistance in preventing any loss of lead while pouring a joint, yet from a sanitary standpoint it was objectionable as absorbing and retaining filthy liquids. In the interests of his employers therefore, he had decided to use gasketing only where it was impossible to do without it, and the good faith of the man was manifested in that he had not charged for gasketing, nor for the amount of extra lead he must have lost in trying to fill the joints. It is needless to explain further.

To my mind the house is the unit of sanitary administration. In fact, the whole sewerage system beyond, with its many intricacies and problems, both mechanical and financial, never would have developed, nor even have sprung into existence, but for the dwelling.

We may look upon man's modern habitation, therefore, as the principal source from whence all sewerage estimates. To secure perfect safety to the inmates, while removing at the same time the daily household wastes beyond the outer walls, is then our first consideration. Except where houses are

* Lecture delivered before the Engineering Society of the School of Practical Science, Toronto.

isolated, or strung out in small colonies along concession roads, or again clustered into hamlets and villages, what is known as the water carriage system is by far the most efficacious for the removal of the daily semi-liquid and liquid wastes of the dwelling. By wastes, I mean human excreta, chamber slops, water used for baths, water in which dishes, pots, vegetables, clothes, etc., have been washed, and in fact any water that has been put to a thousand and one of its other uses in a house. We might consider the following as our "plumbing" axioms, and the system with its fixtures, traps, ventilation, and waste pipes, etc., that will conform in the highest degree to them, must perforce be accepted as the best. It is then evident:

Firstly.—That the waste matters generated in the house should be removed at once.

Secondly.—That so far as it lies in our power, the waste pipe system should be freed from any tendency to retain decomposing matter giving off gaseous products known to be detrimental to health, or these very gases when generated elsewhere.

Thirdly.—That every part of the plumbing should be visible where possible, and conveniently situated as against repairs or accidents.

Fourthly.—That all parts should be of sound materials free from flaws, blemishes, or other defects, and of the kind of material best suited for their special purposes.

Fifthly.—That the whole system should be put tightly together, in the best approved manner, and possessing uniformity in strength and durability.

Sixthly.—That the whole system should be as simple as possible, consistent with convenience, efficiency, and security.

Seventhly.—That the appliances used should be economical, reliable, and adding materially to the comforts of the inmates of the building.

That the waste matters generated in the house be removed at once, can be attained by having as direct and short a line of waste and soil pipes as possible. Every necessary bend in a line of pipes being made by a regular curve, and never abruptly. Wherever the waste and soil pipes run otherwise than vertically, ample grades should be provided. The smoothness and evenness of the interior of the pipes, along with their size, and also the manner in which they are connected and branched together, having a marked effect on the velocity of discharge.

The use of an inverted T or Y junction for the purpose of effecting a connection between a vertical and horizontal line of pipes, should never be tolerated. The reasons are obvious (see figs. 2, 3). I have actually come across several cases of this unscientific mode of construction.

As there seems to exist, even among writers on sanitation, an uncertainty as to the exact meaning of the terms *house drain*, *soil pipes*, *waste pipes*, etc., it might not be out of place for us to decide upon their proper application before proceeding further. Let a house be given us, and a hundred feet away the street sewer. (See fig. 4).

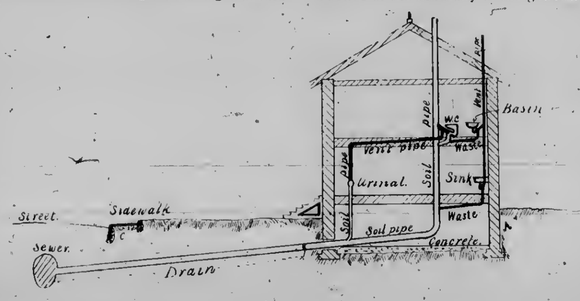


Fig. 4.

Then the system of pipes commencing at the street sewer, running up to the walls of the house, passing through them, and then branching out throughout the building, may be divided into two parts. First, that part outside the street sewer and the outer walls; and secondly, that part inside the dwelling. The first is known as the *house drain*, or *drain*, and conveys to the said street sewer all liquids and semi-liquid wastes, and further, all roof and cellar water that may be trapped into it.

The second part, inside the dwelling, is again sub-divided into *soil pipes*, *waste pipes*, and *vent pipes*.

Soil pipes, or soil pipes, are those pipes which carry away human excreta, principally from water-closets, and form the main trunks of the plumbing system of buildings. As such, therefore, they almost invariably receive in addition, the wastes from baths, basins, sinks, tubs, etc., that are conveyed to them by the waste pipes of the system.

Laterals to the main trunks, receiving liquid excreta from hoppers and urinals, are called soil pipes only in a secondary sense, while vent pipes form that part of the system which does not convey waste waters or sewerage of any kind, but is intended to afford free ventilation to the different parts, and to the syphoning of traps. Such portion of the soil pipe as may be found above the highest fixtures, however, and there for no other purpose than that of ventilation, curiously enough retains the name of soil pipe, and does not come under the classification of vent pipes.

We therefore have waste pipes in connection with all fixtures, save those into which human excreta may be emptied. These waste pipes may either enter the house drain independently, or join the soil pipe and discharge their liquid wastes into it.

Soil pipes again may convey excreta alone, or all the wastes of the house to the drain beyond the walls, while at the same time acting as the main ventilating shafts of the system, since their upper ends are always left open and carried well above the roof.

Lastly, the house drain, or simply drain, conveys to the sewer all liquid and semi-liquid wastes placed beyond the walls of the building by the soil and waste pipes.

It must be understood that we have simply considered these terms as applied to house plumbing, and house drains, and not as in the subject of land drainage, nor as in certain of the distinctions used in what is known as the "Separate System of Sewerage."

(To be Continued.)

HOW TO SELECT A SITE FOR A COUNTRY HOUSE.

There are no definite rules, of course, that will always apply to the selection of a site for the house. Usually it should not be placed exactly in the middle of a place, or close to the front, and it should associate itself in some way with some considerable plantation of trees that may already exist.

I am speaking of considerations that must be met in a systematic way, and more or less in accordance with the best practice of the art of landscape gardening. But avoid being too conventionally artistic. Use common sense, and first of all make your grounds comfortable and convenient; then do what you can for the æsthetic. The latter may, in your opinion, be of the most importance, but the former, be sure, will, sooner or later, revenge itself upon you for any undue neglect.

I am speaking now of all country places, meaning thereby a lot that may be only 25 feet by 100 feet, or may be five or six acres. In any case you are devising a picture when you undertake to lay out your grounds, even in the most simple fashion; and any arrangement that will develop and present with the best effect the most artistically valuable features, should be invariably chosen, though at first it may seem odd, and not in accordance with your conventional ideas of landscape gardening art. Any evident attempt at mere oddity is, of course, bad, and destructive of the harmony of the general arrangement; but there may be an unusualness of treatment that *seems* odd, though in reality effective and harmonious, simply because it is conventional.

Against one thing let me warn the reader, and that is the indiscriminate use of formal foliage or flower-beds on most lawns. They are apt to lend a garish and vulgar air to the place. Close to the house you may sometimes use one or two of these beds, but their bright red and yellow colors should be set a little on one side and not allowed to glare at one too much. I respect the universal delight in rich color, but all formal patches of color should be used carefully and in proper relations to the whole picture.—Samuel Parsons, Jr., Supt. of Parks, New York, in March *Scribner*.

POINTS ABOUT ADVERTISING.

John Wanamaker, who can claim to speak from experience says: "I never in my life used such a thing as a poster or dodger, or handbill. My plan for fifteen years has been to buy so much space in the newspaper and fill it up with what I wanted. I would not give an advertisement in a newspaper of 500 circulation for 5,000 dodgers or posters. If I wanted to sell cheap jewelry or run a gambling scheme I might use posters, but I would not insult a decent reading public with handbills. The class of people who read such things are poor material to look to for support in mercantile affairs. I deal directly with the publisher. I say to him 'How long will you let me run a column of matter through your paper for $100 or $500?' as the case may be. I let him do the figuring, and if I think he is not trying to take more than his share I give him the copy. I lay aside the profits on a particular line of goods for advertising purposes. The first year I laid aside $3,000; last year I laid aside and spent $40,000. I have done better this year and shall increase that sum as the profits warrant it. I owe my success to the newspapers."

Mr. King Arnoldi, of Ottawa, recently secured judgment against the School Board of Vankleek Hill, Ont., for the amount of his fees for preparing plans for the new school at that place.

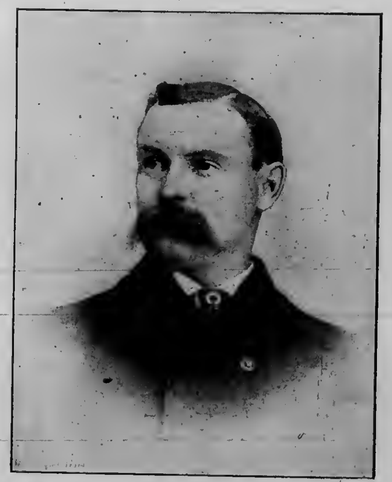
TORONTO BUILDERS' EXCHANGE.

We have much pleasure in presenting to readers of the Canadian Architect and Builder the portrait of Mr. Wm. J. Hill, the President of the newly organized Builders' Exchange of Toronto, accompanied by a few particulars concerning the organization. The other officers are: Geo. Moir, 1st Vice-President; Geo. Oakley, 2nd Vice-President; David Williams, Treasurer; John Aldridge, Benjamin Brick, William Park, James Crang, M. Murphy, J. L. Nichols, Directors.

The Exchange owes its existence to the fact that the Federated Association of Builders and Contractors, which it supersedes, was not fulfilling the objects it was designed to serve, and certain members determined no longer to be satisfied with its inefficiency, but to establish a new organization founded on the lines of the Builders' Exchanges represented by the National Association of Builders of the United States, whose operation has proved to be most beneficial and satisfactory. The formation of the old Association was such that it was almost impossible to secure concerted action on any question. It was composed of an equal number of delegates from the different trades, and was designed to be maintained by the imposition of a capitation tax. Being thus made up of a number of independent bodies, there was the tendency to narrowness and sectionalism when occasion called for broad and liberal measures. The organization was necessarily unwieldly and lacked cohesiveness.

In 1891 some energetic members of the Master Masons' Section, as has been stated, tired of the organization and withdrew from it, with the object of instituting something better. A sufficient list of signatures was easily obtained to enable application to be made for a charter, which was granted, the provisional Board of Directors consisting of Messrs. G. Wright, M. Murphy, J. Crang, J. Aldridge, W. Williams, B. Brick and J. Nichols.

A code of by-laws was drawn up, and a book of certificates of membership printed, and although scarcely two months have elapsed since its formation, we are informed that fully 80 per cent. of the builders and contractors of the city have become connected with the organization, which may be regarded as a sufficient justification of the wisdom of the promoters of the undertaking.



Mr. W. J. Hill, President Toronto Builders' Exchange.

The membership is divided into two classes, designated as "corporate" and "non-corporate" members. The former includes all persons actively engaged as building contractors, and the latter, manufacturers and dealers in building materials. "Non-corporate" members enjoy all the privileges of the Exchange, except that of voting. The fees are the same for both classes, viz., $10 per year, and in the case of new members, an additional entrance fee of $10.

Applications for membership should be made to the Secretary. The name of every applicant is posted for one week on the walls of the Exchange, at the end of which time if no objection is made the application is dealt with by the Board of Directors. The control of the Exchange is vested in a Board of Directors, who must hold corporate certificates. The Exchange has power to form sections to represent the various branches of the building trades and promote their special interests.

Arrangements are being made with dealers for a trade discount to be given to members who may pay their accounts before the 10th of each month. These discounts will be more than sufficient to cover the cost of membership. By this means also an effort is to be made to discourage the credit system which has to so large an extent demoralized the building business.

Any disputes which may arise between members of the Exchange will be adjusted by means of arbitration. Under the by-laws no member is allowed to bring suit in the courts against another with whom he may have a difference, until every means of settling the difficulty by means of arbitration has been exhausted. Instead of appointing an arbitration committee, the whole Exchange has been constituted a committee of arbitration, so that members desiring the services of arbitrators are at liberty to select from the entire membership persons in whose judgment they may have the most confidence. In this direction the Exchange is likely to be the means of saving its members a large amount of money which would otherwise be spent in litigation. An instance comes to mind of a dispute of a somewhat trifling nature between a contractor and sub-contractor, the settlement of which by the courts cost the litigants seven hundred dollars. Such cases are not unusual, yet it would no doubt be found possible under the method adopted by the Exchange to bring about a settlement of the greater part of them at a trifling cost. Members desirous of having their claims arbitrated upon will be required to make a deposit sufficient to cover the cost. In this connection it may be mentioned that as members of an incorporated body, members of the Exchange who may in future be called upon to give expert evidence as witnesses in building cases, will be entitled to receive $5 per day for their services, instead of as heretofore, getting $1.00 per day as though their testimony was of no greater value than that of the laborer who might be asked to substantiate the simplest fact.

The Exchange has appointed a Legislation Committee to provide for the improvement of the form of contract, and laws affecting the building trade; a Committee to provide for improved arrangements between the contractor and the architect with regard to the method of issuing certificates, etc., and a Labor Committee to secure better arrangements as to wages and other matters affecting the relationship of employers and employees.

The new Exchange has started out honorably by paying off all moral and legal liabilities of the old Association. It starts out without any entanglements or old agreements, and will refrain from making any agreements until certain objectionable conditions which at present prevail shall have been remedied.

In concluding this reference to the new Exchange, which seems designed to have a most successful career, we reprint from a copy which has come into our hands the "Stipulations of the Toronto General Builders' Society," bearing date February, 1867, together with the names of the members representing the various trades, many of whom still occupy positions of prominence and public esteem:

1. Detail drawings to be furnished by the architect at the time of tendering.

2. Contractors to attend at the required time, and be present at the opening of tenders.

3. The lowest tender to be accepted, and if not accepted or work not proceeded with, such tenderer to be remunerated at the rate of one-half per cent. on new work, or one per cent. on alterations and repairs, for time, trouble and expense in preparing such tenders.

4. Work not mentioned in the specifications, or shewn on the drawings at the time of tendering, to be paid for as extra work.

5. The owner of the property to execute the contract in duplicate, and sign plans and specifications, at the same time as the contractor, and one duplicate original, so executed, to be delivered to contractor.

6. The contractor to be paid as the work progresses, at the rate of eighty-five per cent. on work done and materials furnished including extra work.

7. The contractor to have a lien on the building or other erection for unpaid contract money, and the right, if so disposed, to withhold possession until the contract money, or such portion thereof as he may be entitled to at the time of the completion of the work, be paid.

8. The work, as it progresses, to be kept insured in some responible insurance office, in the name either of the owner or contractor, and such insurance to be for the joint benefit of both in the proportions in which they are respectively interested; and the premium, if paid by the contractor, to be added by him to the amount of his contract.

9. In the event of a dispute or disputes between the owner or architect, and contractor, the contractor to be allowed to appoint an arbitrator, who, with the architect, shall decide the matter in dispute; and in the event of their failing to do so, they shall appoint a third arbitrator, and the decision of the three, or majority of them, shall be final.

10. All alterations or additions to contract to be only proceeded with on the written order of architect or proprietor.

The undersigned agree with each other, well and truly to observe the stipulations annexed, in all respects according to their true intent and meaning, and not in any manner to act contrary thereto, or accept any contract in violation of the same, or at variance therewith:

Masons and Bricklayers—Scott & Stolley, Ramsay & Farquhar, Edward Synge, Thomas Snarr, Joseph Gearing, Edward Galley, Robert Carrol Jr., W. J. Hughes, W. H. Booth, William Ireson, May & Gibbins, John W. Bowden, John Platt,

Stone Cutters—Scott & Stolley, Ramsay Farquhar, Edward Synge.

Carpenters and Joiners—William Burke, Jacob P. Wagner, Withrow & Hillock, Robbins & Worth, James McBean, William Moulds, John Shanklin, William Latch, John Wilson, J. W. Phillips, John Plenderleith, Robert Kennedy, Ford & Forbes, Fowler & Coleman, William Briggs, William Horton, Mark Hall, John Oliver, Peter A. Scott, James Farley, George Emery, John Greenlees.

Painters and Glaziers—G. Pearcy & Son, Dill & Milligan, William Stanley, George Booth, Andrew Widdowson, James Thomson, William Fry, Robert Bell, William Elliott, Joseph McCausland, John Bilton, John Kidd, W. D. Rogers

Plumbers, &c.—John Ritchie, Cummings & Wells.

Plasterers—Joseph Gibson, Thomas Jennings, Joseph Gearing, Thomas Snarr.

OBITUARY.

With sincere regret we have this month to record the decease of a very worthy gentleman who for the past 17 years has been a well known figure in the city of Montreal. Mr. J. C. Radford for all this period was Health Officer in that city, and probably no civic official was better known among architects and builders. He was universally respected and his remains were followed to the grave by the City Council, the Board of Health and many with whom in life, in the excerise of his functions he had continually to do. He was a Trustee of the First Baptist Church and the President of the Temperance Society.

MONTREAL

(Correspondence of the Canadian Architect and Builder.)

I regret to have to state that Mr. P. W. St. George, City Surveyor, has been confined to his residence for some weeks by a severe illness. Happily however, he is now on the road to convalescence, and on the advice of his physician will spend a short time in the South. It is hoped that he will shortly return home fully restored to health.

Mr. McConnell, Superintendent of the City Water Works Department, has resigned his position owing to inability to work harmoniously with the water committee. Mr. McConnell was a valuable official, and his retirement is therefore to be regretted.

Plans have been prepared and submitted to the President of the Grand Trunk Railway Company, for the extension of Victoria Bridge, with the object of providing a grand promenade for vehicle and pedestrian traffic across the river.

An old and highly esteemed civic employé has passed away in the person of the late Mr. Glackmeyer, City Clerk. For nearly a half century the deceased gentleman satisfactorily served the city, and his removal is the subject of the deepest regret to past and present members of the Council as well as a wide circle of acquaintances among all classes of the community.

Following is a list of the members of the Province of Quebec Association of Architects registered up to the close of 1891:

C. T. Ballard, J. H. Bowe, L. J. Browne, R. P. Barnes, Chs. Chausse, Chris. Clift, Theo. Daoust, W. E. Doran, J. E. Doré, A. F. Dunlop, A. Dubreuil, John Esinhart, Robert Findlay, A. Flockton, A. G. Fowler, J. R. Gardner, L. Z. Gauthier, A. Gendron, Jos. Haynes, W. H. Hodson, E. C. Hopkins, J. W. Hopkins, A. C. Hutchison, A. H. Lapierre, G. De G. Languedoc, S. Lesage, A. Levreque, O. Mailloux, E. Mann, E. Maxwell, L. R. Montbriant, James Nelson, H. C. Nelson, Jos. Perrault, H. M. Perrault, M. Perrault, A. Préfontaine, A. Raza, J. B. Resther, J. Z. Resther, J. D. Rhind, Victor Roy, J. Simard, James Smith, C. St. Jean, A. T. Taylor, W. T. Thomas, Jos. Veene, A. Vincent, W. McLea Walbank, Geo. W. Wood, James Wright, W. S. Wright, Montreal.

Chs. Baillairgé, F. X. Berlinquet, J. B. Bertrand, J. George Bussières, Chs. Bernier, D. Ouellett, L. C. Ernest Pagé, J. F. Peachy, Thos. Raymond, Harry Staveley, G. E. Tanguay, Alfred Vallée, Quebec.

A. Boileau, St. Genevieve (Jac.-Car.)

A. H. Larochelle, Lévis, P. Q.

E. M. Talbot, St. Roch, Que.

The Art Association's spring exhibition of paintings will open next week. The following list of prizes will be offered for competition at the exhibition:—For the best figure painting, in oil $200; second best $100; for the best sea or landscape $200; second best $100; for the best portrait $100; for the best painting of still life $100; for the best painting by an artist under thirty years of age, not a Royal Canadian academician or associate $100; second best $50. In addition to these a special prize of $200 will be awarded to the picture obtaining the greatest number of votes from visitors attending the exhibition, each ticket of admission carrying one vote. This competition is open to all pictures of Canadian artists without distinction, and can be won by the recipient of any other prize. It is hoped by this means to encourage a more thorough study and criticism of the pictures exhibited as well as to find out the direction of popular taste in art. It is in contemplation to make extensive additions to the Association building at a cost of about $35,000, by means of which the picture gallery will be doubled in size, and class rooms, studio and reading rooms provided. The work will be commenced on the 1st of May.

FROST: ITS EFFECTS ON BUILDING.

Out-of-door building operations have been much interfered with by the recent frosts. In many new houses which are being erected by the speculative builder the mortar-joints and pointing have become loose or disintegrated or entirely fallen out through the moisture in the materials. The unfortunate buyer who is persuaded to invest in house property may find a heavy outlay required in making good the brickwork, in repointing, in restoring stonework that has fractured and become loose by the wedge-like action of expansion incident to frost. We cannot understand any builder, except under pecuniary obligations, proceeding with brickwork during a severe frost. He generally takes not the slightest precaution to cover the walls with weather-boards or straw or to use quick-setting mortar made of unslacked lime, a practice which prevails at Christiania, and is said to be successful. This indifference aggravates the offence. Even in Christiania, where building in frosty weather has received particular attention, it is considered that bricklayers' work does not answer in more than 14 to 9½ below freezing point. The bricks too, lie exposed to all weathers on building estates; there is no attempt made to protect them from the rain or frost; the consequence is, they are used filled with moisture or congealed water. So with blocks of stone; we have seen them sawn and left exposed to the rain or snow, and immediately afterwards cut up and built up on the brickwork. No one looks after these irregularities, and they go on unchecked until the results are shown in rotten brickwork and stone that flies all to pieces.

In glazing roofs, the same indifference to weather is met with. As glass expands and contracts by heat and cold, the putty joints give way and crack. It is very seldom that we find ordinary care shown as in leaving room in the rebates for expansion and contraction of large sheets of glass, or, better still, to fixing the glass in grooves, especially for shop-front windows. Many systems of patent glazing, such as that of Helliwell, by affording protection to the joints by lead caps, and allowing grooves underneath for condensed moisture, prevent the mischief. The effects of severe frost tell more seriously on the work of the plumber. Not only do the pipes give way by the expansion of the water in them, but the lead flats and gutters contract to such an extent as to cause them to split or tear in the weak parts, or at their connections with the flashings. Yet it is extraordinary that the same unscientific method of laying and fixing should prevail, and that architects still permit these modes of execution to be carried out, or lead to be used unable to bear the strain put upon it. When we can insist on a certain thickness of lead for flats and gutters, and specify certain methods of laying to allow for contraction, when we can incase our water pipes and cover them in non-conducting substances, and provide taps for emptying them during a severe frost, when we can fix our pipes without holding them tight at the joints, there ought to be no possible excuse for allowing them to become exposed to the destructive agencies of frost and heat. The public hailed the advent of the "registered" plumber to do much to prevent these shortcomings, to instruct in scientific plumbing, and to create an improved system of sanitation; but all will be of no purpose unless the appreciative British employer puts within his reach the means for securing the benefits of technical skill, which he can only to do by putting his hand in his pocket and paying honestly those who can best do the work.

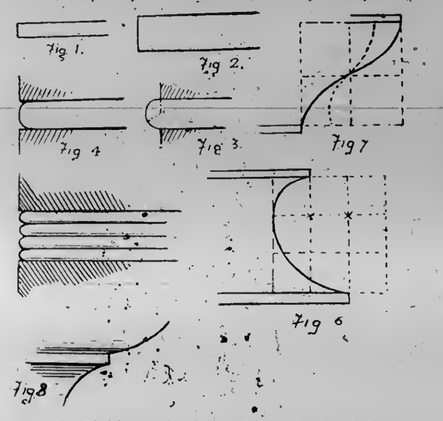
TORONTO ARCHITECTURAL SKETCH CLUB.

The members of the above Club will hold their second annual dinner at Webb's restaurant next Tuesday evening, the 19th inst. The occasion will afford an opportunity for recuperation to those who have been expending so much energy on the recent O. A. A. examinations.

DECORATION AND FURNITURE

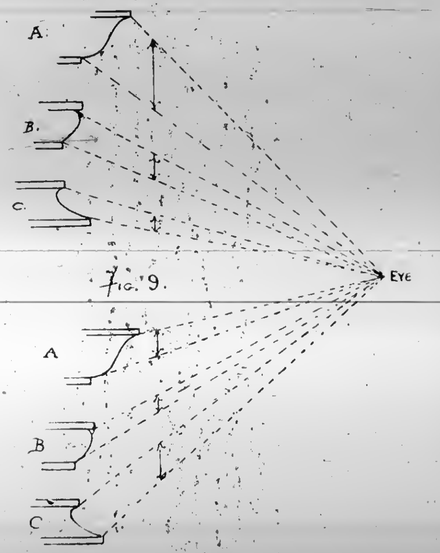
THE ARRANGEMENT OF MOULDINGS.

IN this article we purpose to show how mouldings should be arranged, according to the place and position they are to occupy. It is evident what an important part mouldings play by the fact of being employed in such different substances. They are used in woodwork, pottery, and stonework, also in jewellery, and are



perhaps the chief feature in picture frames, besides being represented in the flat by means of painted lines in such cases as the partitions on vases, painted panels on flat surfaces, etc., ; and wherever a space requires a border, it is often supplied by lines of different thicknesses and depths of space between them.

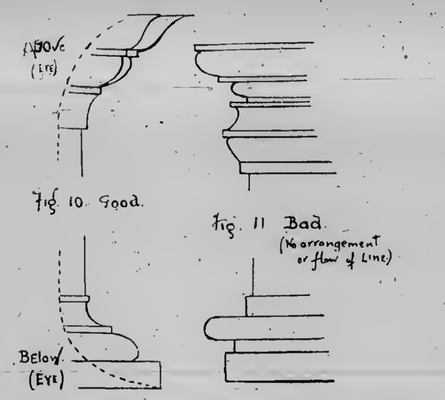
Let us look at a few positions that mouldings occupy in connection with the different substances in which they are employed. Mouldings are prominent in their use to woodwork with



regard to panelling, and are applied to emphasize the shape of the panels on which they are used. Whenever any size of somewhat large dimensions is required to be decorated and the space is too large to decorate directly it is usual to panel it up into good proportions by means of mouldings. Again, in buildings they break the monotony by being introduced at the various stages or stories. For inside decoration also, mouldings are used for the cornice, and at the bottom of the dado; in fact, almost everything we look at has mouldings. Cupboards, table legs, and window frames, although we may not have noticed them particularly, are all, more or less, composed of mouldings. If these objects had been plain, we should very soon have noticed the deficiency - hence the value of mouldings.

Figs. 1 to 8 show the various kinds and proportions of the mouldings which we are going to consider. The designing and arranging of all of them are based on these, and it would be as well to remember that each of these belong to one of the following four classes: flat, convex, concave, or compound. A *flat* moulding is one which neither projects nor recedes. A *convex* may be any shape (*i.e.*, degree of curvature), if it projects only. A *concave* moulding is one that recedes, no matter at what angle, whilst a *compound* moulding is the combination of a convex and a concave. It is the combination of these different kinds that we are now going to consider, as well as how they should be arranged.

The several names and positions of these are as follows: Fig. 1 is called a fillet; it is the smallest moulding, but perhaps the most important one, as it is used to connect one moulding with another. The Tenia (Fig. 2.) is really a large fillet, and forms the Abacus



in the Doric Order. The Astragal, shown in Fig. 3, is a convex moulding; its projection is half a circle. Fig. 4 is called a bead moulding, and is like Fig. 3 without the projection, whilst a number of bead mouldings placed together is called a reeding, as shown in Fig. 5.

The Scotia is a very fine example of a concave moulding; it recedes two-thirds its own height, and the method for obtaining it is shown in Fig. 6 by the dotted lines and xx, which mark the centres of the quarter circles. A compound moulding is the combination of a concave and convex (Fig. 7). It is often divided by a fillet (Fig. 8), which emphasizes the curve and makes effective lights and shadows. It is the difference of projection in these mouldings that makes it necessary to consider whether they should be placed above or below the eye. Fig 6, for example, shows repetitions of the same mouldings, but by comparing *a* above with *a* below, it will be seen that the top *a* makes a capital crowning piece in this position.

Flow of line is the chief consideration in arranging the different kinds of mouldings together, and Fig. 10 shows a much better arrangement than Fig. 11. The reason for this is on account of this flow of line shown by the dotted line, which only in the one case has been regarded.—"H. R. C." in *Furniture and Decoration.*

WINDOW GLASS IN ARCHITECTURE.

THE papers on "Painted Glass" which were read at the Institute two or three weeks ago would have been more in place, perhaps, at the Architectural Association. Good enough as far as they went, they did not go far enough to be of much service to practising architects. They told them what they knew already, and little besides. And this was not because the authors had little to tell—undoubtedly they could, under more favorable conditions, have said a great deal which would have been extremely valuable. But it so happened that most, if not all, of them selected subjects which might well have occupied a whole

evening, or several evenings; and yet were limited, in the length of their papers, to something which could be read in less than half an hour. The result was that, for the most part, they were occupied with the elementary facts of the matter. They skimmed over too large a surface, and had not time to go down to the treasures below.

Yet the treatment of painted glass, which was practically confined on this occasion to that of figure subjects, is only a small part of the question. It may be the highest part, but it is also, for most architects, the exceptional part. Every building, from the cheapest to the costliest, contains window glazing; and to many people it is constantly in view through a great part of the day. How to improve "domestic" glass is, therefore, for most of us a more intimate and pressing question than how to deal with the "storied windows, richly dight," of churches and monumental structures. We have outlived the time when a gigantic sheet of "British plate" satisfied the highest ambition of the British householder. We are in a period which is trying, like the olden ones, to apply art to common things. But though common things in brickwork and woodwork and metalwork are getting their share of attention, common things in glazing seem to be rather neglected. It is rare to find anything of this sort with a trace of art about it between elaborate stained glass and plain 21oz. sheet.

Then, again, the essential things which pertain to glass—which distinguish good glass from bad—are largely things relating to color and quality; to color and texture, if one may use the latter word for want of a better. Now, these are precisely the things which words cannot describe, and which diagrams cannot display. To make it clear which glass is excellent and which is execrable, the only way is to show the glass itself, and to show it by daylight. The difficulty is, that this can seldom be done at an evening lecture. Specimens can be handed round, but their real tints and tones when sunlight passes through them can hardly even be guessed at. And a passing glance at such specimens is not enough. They need to be stored where an architect can return and study them at leisure. They should, in short, form part of a permanent and easily accessible collection. It need be little more than a collection of samples. It is not figures of saints and angels that are wanted. It is a lot of pieces of glass of all kinds and colors, old and new. The old pieces should be marked with their date, or approximate date, and place of origin; and the new pieces with their makers' names. They would have to be fixed in leads, perhaps, for security; but there must be no labels requesting visitors "not to touch." The object is to afford facilities for getting to know them thoroughly, both by sight and feeling.

With such a museum of samples as this—a museum which, even if it occupied only one small and well lighted room, would be infinitely better than nothing, every architect would have it in his power to ascertain what glazing materials were actually available, and would be able to design his work accordingly. Of course, the scheme is not ambitious enough to attract the support of the nation or of the public. We are not likely to see it carried out at South Kensington, where the examples of old glass which exist are very inconveniently placed for study. But it would be well worth the while of any first-rate firm, concerned in the manufacture, to put together such a collection, and to throw it open to architects. It would bring more business than an illustrated catalogue, and at a fraction of the cost.—*Building News.*

We are glad to note that the day has come when the architect is beginning to appreciate the fact that the advertisers who place their business in the architectural journals are not alone advertising their goods, but making it possible for the architectural profession and building trades to be represented by the highest class and most expensive journals of the country. A few mornings since we were in the office of a prominent architect who upon opening his mail immediately consigned all the circulars, etc., to the waste basket, saying in explanation of his action that he paid about two hundred dollars a year for architectural periodicals and from these he expected to keep fully informed on all matters of interest in his business. Continuing he said: "I have little use for the firm that will seek to bore us with tons of this sort of advertising matter, and cannot see how they can expect a busy architect to wade through such a mass of stuff when he can by reference to his papers gain the desired information." As the busy architect is the only one who has use for any amount of building materials there can be no advantage in going to the great expense of reaching the man who has no better employment than the reading of circulars.—*Northwestern Architect.*

MANUFACTURES AND MATERIALS

HYDRAULIC CEMENTS—NATURAL AND ARTIFICIAL.*

THERE are two classes of hydraulic cements with which we are all familiar, the artificial, or so-called Portland, and that produced from natural cement rock. All hydraulic cements, whether artificial or natural, are produced by a mixture of clay and carbonate of lime, or lime and magnesia.

In the manufacture of Portland cement in England, the clay is mostly selected from the river beds and the carbonate of lime from the chalk deposits which form a large portion of England's surface, and is a nearly pure carbonate of lime. Limestone is used wherever the chalk is unobtainable in some parts of England and Germany, and elsewhere, and is finely pulverized preparatory to its mixture with clay. These two ingredients are usually mixed together in a pug mill, with a free use of water. Sometimes, however, they are ground together in a comparatively dry state.

The material as it enters the kiln, whether it be an artificial mixture or a natural cement stone, is a mechanical combination of two chemical compounds, *i. e.*, silicate of alumina and carbonate of lime. The preliminary operation in calcination is the expulsion of moisture, which is soon followed by the carbonic acid contained in the carbonate of lime. The Portland cement manufacturer has it in his power to control the proportions of the materials he uses, and renders it possible for him to make his product uniform. Careful attention to proportions and mixing, and care in the matter of calcination, will produce a cement that seemingly leaves little to be desired. But so long as these details are entrusted to the hands of ordinary laborers—and there seems to be no other way—so long as the natural cements sustain their present reputations, and through their very cheapness keeping down the price of Portland, none but the cheapest class of labor can be employed in the manufacture of artificial cements, and no matter how vigilant the superintendent may be, there will be failures, and sometimes disastrous ones.

Henry Reid, in his admirable work on Portland cement, says: "Chalk and clay, being capable of easy solubility, are charged in their progress through the wash mill with three or four times their weight of water, and theoretically this process appears perfect, but practically, as we shall endeavor to show, there is considerable inconvenience, if not danger, even under the most careful supervision. The difference in the specific gravity of the chalk and clay involves an irregular deposition of the washed mixture, not only in its final settlement in the 'back', but on its way along the shoots. In the most limited works this objection exists, and in the largest in a more aggravated degree, for the farther from the wash mill the liquid material has to be propelled the greater must be the amount of its irregular and eccentric precipitation.". Again he says: "The Portland cement maker has to reduce his raw materials to such a degree of fineness as will permit of their accurate combination, and this can be effected in two ways—the one chemical and the other mechanical. The former, the more expensive of the two, by converting the carbonate of lime into lime, and the silica into soluble silicates, and thus ensure an accurate result, but not one that a Portland cement maker can indulge in, and which we need not further discuss because of its costliness."

In speaking of the dry method, which is simply the mechanical reduction of the raw materials by means of suitable machinery, Mr. Reid says:

"When this is performed in a slovenly, careless or ignorant manner, much danger and expense arise. Doubtless this plan admits of no loose or 'rule of thumb' treatment. Chemically, the lines laid down must be implicitly adhered to, and mechanically, the reduction of the ingredients should be as nearly perfect as possible. There is a danger attending this method, which is sometimes a puzzle to the ignorant, and that is, the want of proper care in applying the necessary moisture to render the mass plastic enough for moulding into bricks (preparatory to calcination). If the water is carelessly thrown on, as is the case in tempering clay for brick making, there is a liability to separate the atoms of carbonate of lime from those of the silicate of alumina, and thus destroy the necessary accuracy of combination so essential to an effective kiln result."

Now here are the two methods employed in the manufacture of Portland cements, the wet method and the dry, and we have shown that both are attended with a danger that must ever be constant, so long as the matter of communition is entrusted to human hands.

While nature did not always deposit her natural cement rock formations in true combining proportions, no handicraft has ever yet excelled or even approached her in the art of mechanical combinations of clay and carbonate of lime, for with natural cements, however much the proportions of ingredients may vary as between the upper and lower layers, there is usually a large percentage of the bed that is so well proportioned as to yield a good cement when all are mixed together. And even the layers that are not properly proportioned, owing to their finely commingled condition, are not as dangerous an element in the mass as is that of an equal amount of an imperfect mixture in an artificial cement. There was imported into this country during the past year about 600,000 barrels of Portland cement, and it is safe to assume that there were not more than 15 analysis made from this enormous amount. That is one analysis for every 40,000 barrels, and, so far as I have been able to learn, no two of these are found to agree.

Furthermore, it is possible to adulterate Portland cements, and, if we are to believe the printed reports of the transactions of the association of Ger-

*Extracts from a Paper read before the Society of Arts of the Massachusetts Institute of Technology, Boston, Mass., by Mr. W. Cummings, of Buffalo, N. Y.

man Portland cement makers, adulteration with slag and other similar materials is carried on by some of the manufacturers to an alarming extent. No one ever heard of a maker of natural cement in this country adulterating his product. It would not pay, for there is no material, useful for that purpose, so cheap to him as the natural cement rock. Honesty, therefore, in this respect, is reasonably well assured.

An over-clayed natural cement will behave better under test than an over-clayed artificial cement. The cause of this is to be found in the much finer condition of the former. Neither of them will act well in frosty weather. An engineer uses what he may consider a first-class natural cement late in the fall, and finds it to scale and disintegrate. He uses Portland in the same way, and it remains firm, and he is more than ever convinced of the superiority of the Portland: But he has unwittingly drawn an unfair comparison. The natural cement that he had selected, however well it may have acted earlier in the season, was over-clayed, and therefore required more water than a well-balanced cement, and consequently it was more liable to expansion and disintegration by frost. It is an error to suppose that the natural cements of this country are all about alike, and that the testing machine will very quickly tell us of whatever differences may exist. A well-balanced cement will withstand the action of frost many years, while an over-clayed one will not, whether natural or artificial, and of this the testing machine gives no indication. If we take two cements, the one being natural and the other artificial, and so nearly alike in composition that a chemist could not distinguish any difference, both being made up of correct combining proportions, the artificial will test higher than the natural product; but can it be truthfully maintained that it is the better of the two?

If we are governed by the prevailing public opinion, we must admit it, for the testing machine says it is so. Had the chemistry of cement and the laws governing combining proportions been made more of a study in the past, we should not now see the whole question submitted to this crucial test, called tensile strain.

Commencing with the year 1825, when Portland cement was first produced, until 1858-60, the natural cements were sold at a price fifty per cent. higher than the artificial cements would bring in the markets of England. Then the tensile strain testing machine was brought into use, and, to the surprise of all concerned, it was found that the artificial products tested higher than the natural brands. This was a revelation that brought joy to the hearts of the heretofore languishing manufacturers, and produced a correspondingly depressing influence over the fortunes of the manufacturers of natural cements. If the Portlands were superior to the natural cements, it is a little strange that such engineers as Grant, Coulson, Mann and others had not discovered it in all those years prior to 1860. But the tensile strain fever had set in, and men argued then, as they do now, that if one cement sustains a higher tensile strain than another, it must be better because it is stronger. And this argument seems unanswerable, and, coupled with the fact that it is a quick and ready means by which the engineer may draw conclusions, has been the cause of its adoption to such an extent that to-day the engineer is considered behind the times who does not have excess to a testing machine.

Looking at this point from the standpoint of one who has had over 30 years of practical experience in the manufacture of cement; witnessing the entire rise and growth of this modern giant, the testing machine; always ready to adopt any and everything looking to an improvement in the the quality of hydraulic cement; studying the action of all the leading brands in the market under varying circumstances, and devoting much time to the deeply interesting study of endeavoring to discover the connecting link that ought to exist between high tensile test and first quality, and oftentimes seeing a cement that was notoriously over-clayed test 600 pounds to the square inch, while another cement nearly perfect in its composition testing barely 60 pounds, and the resident engineer deciding unhesitatingly in favor of the higher testing brand, without a thought bestowed on the question of analysis and combining proportions, and all that goes to render a cement capable of withstanding the changes incident to this trying climate with its extremes of heat and cold, we have sometimes been forcibly reminded of the old adage that "a little knowledge is a dangerous thing."

During the past summer a professor of high repute in one of our leading colleges condemned outright one of the best natural cements I ever knew, a cement that had been thoroughly tried in the construction of masonry in bridge piers, where the current was so powerful and the flow of ice in the spring so terrible that the late Col. Eads declared that no bridge piers could be built to withstand the shock. I mention this to illustrate the workings of the testing machine. If it can deceive a professor in one of our foremost colleges who can it not deceive?

Imagine the fantastic tricks it is capable of playing among the ranks of the city engineers throughout the land. First one brand forging ahead, then another. At last one is reached that shows so far ahead that it soon becomes a hot favorite, and he feels like tying to it. One more trial and it drops away in the rear, and the engineer scratches his head.

(To be Continued.)

A correspondent, writing to *Stone*, says: "It has been quite recently demonstrated that slate, ground up and bolted, can be made into a plastic mass, involving great pressure, and the product then subjected to great heat, changed into an enduring and solid stone. The paste can be formed into anything that can be formed into moulds or by the hands, and everything that is now made from the actual stone can be formed in this way."

GRANOLITHOS—A NEW BUILDING MATERIAL.

By G. F. Stalker.

It is always an advantage to architects to have brought to their notice the qualities and properties of any material, artificial or otherwise, that is intended to be used for building purposes. And as it is on their recommendation that any new material will be brought into general use, or meet with an early death, the inventors of such materials are naturally ready to afford architects every opportunity and facility in their power to satisfy themselves as to their merits. It is not sufficient that a chemical analysis and recommendation should be attached to a new cement or stone. That is good so far as it goes. So also is a proper scientific test of its strength. But to find favor in the right quarter, and to obtain permanence in its use, the new material must be capable of being architecturally treated. For lack of this, many building patents of recent years have made a short successful run, and have ultimately landed the patentees in financial difficulties. The same may be said of such materials as have been made to depend upon cheapness for their success, for some cheap things are very dear, and nothing that can be done with them will ever make them look anything but awfully cheap. At the same time, after being satisfied that a building material is all that has been claimed for it, the next question an architect wants to be satisfied upon is that of its cost.

Granolithos is the name that has been given to a new building material, and, as the name suggests, it is a granite stone. It is composed chiefly of pounded granite and Portland cement, and is, in fact, a similar composition to the granolithic pavement now so well known and so largely used. This should be a strong recommendation of its durability and toughness. And this, together with the fact that before it sets it is very susceptible to impression, induced the Canadian Granite Company to make experiments with a view to the production of a material possessing all the properties of first-class building stone. The nature of the experiments has been such as almost to make success assured. Steps and flight of stairs, with and without nosings, curbs, sills, and other portions of plain masonry were first attempted, and brought to a successful issue. Then diapers, rosettes and other methods of wall decoration so frequently employed in ornamental brickwork and terra cotta. From these to brackets, trusses and keystones successful progress was made, until now there is no kind of architectural detail, either plain or ornamental, which cannot be produced in granolithos, as well as can be done in stone or terra cotta.

The results, taken in connection with the strength and durability of the material, are eminently satisfactory. But granilithos possesses other and very important advantages in regard to its manufacture. It is quickly made, occupying less time in the production of plain or moulded work than stone treated in a similar manner. And, of course, when ornamental work is concerned, the saving of time in favor of granilithos is much greater. Again, it has been found, in the case of nearly every other artificial stone, only possible or safe to produce it in blocks of limited dimensions; whereas granolithos can be made in blocks of the largest dimensions necessary for building purposes. At the same time it can be made in blocks of the size of an ordinary brick; and, in this respect, it will be found a most serviceable material on account of its great hardness, for rounded or square corners, for archways, angles of bay windows and projections where damage is likely to occur. And, as in the process of manufacture, it is not subjected to the influence of heat or any other force having a tendency to warp or distort it, its lines are true and regular, and it suffers no shrinkage in the mass. In color it has been produced, so far, in grey, about the shade of ordinary blue-stone, and buff and red, very closely resembling those colors in terra-cotta.

But, with regard to the important question of cost, it is hardly possible to speak yet with any degree of definiteness. For with granolithos, as with every other material, the price will very much depend upon the amount of detail and ornament shown on the design to be produced in it.

THIS CANNOT BE REPEATED TOO OFTEN.

Stone should never be used immediately after quarrying. It should be exposed to the weather for a month anyhow before it is used. It thus becomes seasoned and will wear much better. When left to season the under side of the rock as it lay in the quarry should be exposed to the sun. When you buy stone for paving or similar purposes insist on its being turned over, that is reversed from the way it was in the quarry before it is laid. The reason for this is that the top surface is much softer, it being of later formation, stone forming from the bottom. *Stone.*

A discovery of sandstone has been made on an island in Johnson Strait, up the coast from Vancouver. The purchaser has, it is reported, bonded it to a Victoria firm for $60,000.

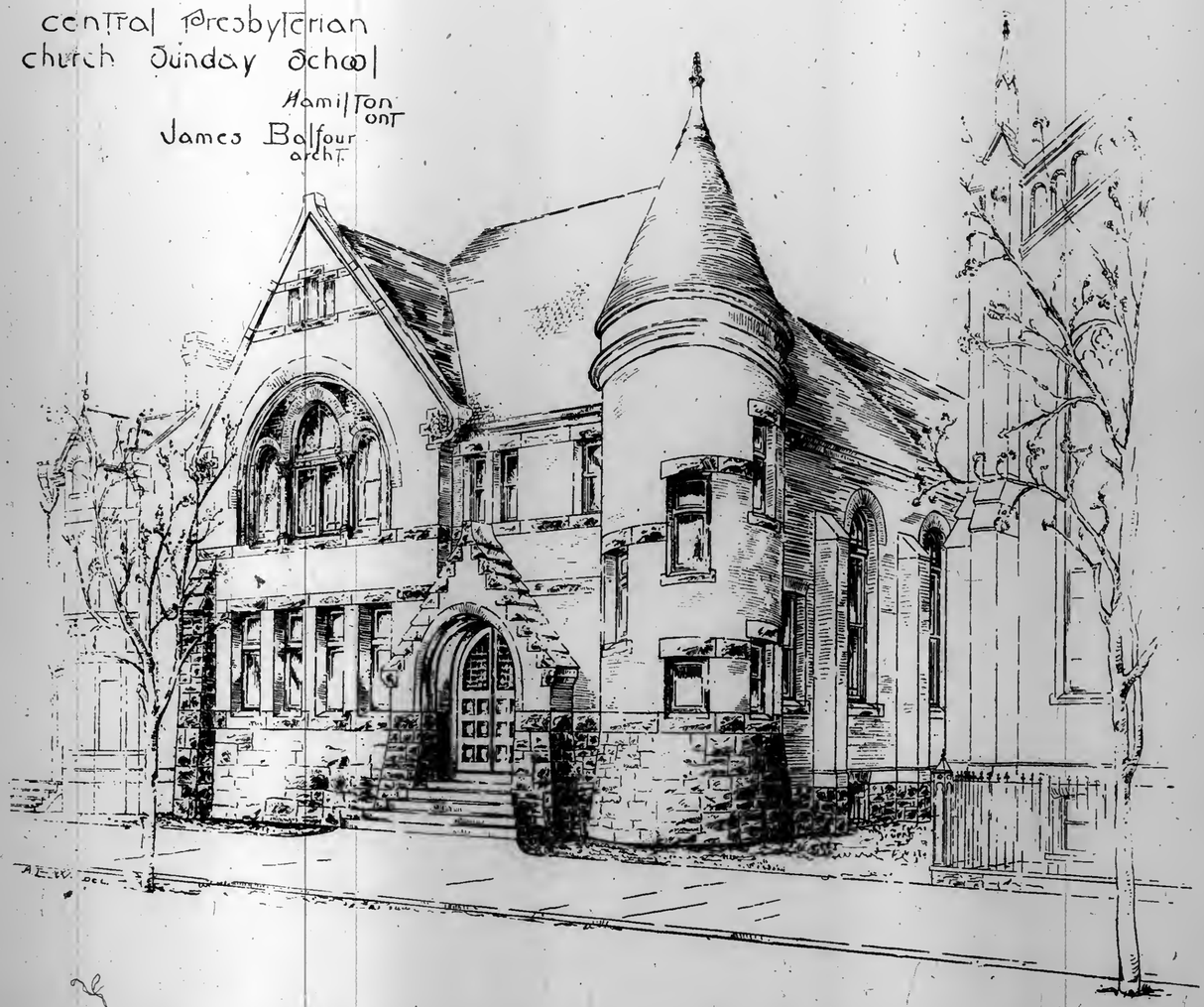
To give a cold chisel a good temper is a question that is somewhat perplexing. We submit the following rule, says the *Chicago Journal of Commerce*, which, if followed in detail, will be found to be the most practical in its results: Heat the chisel to a low heat, so as not to raise the scale, and dip into a brine of salt and water, in quantities of one and ten quarts respectively. Leave heat enough in the tool to allow it being run down to a required hardness, which is designated by the pigeon-blue color. The chisel should be made stout enough to resist a pressure which in using would tend to spring it when put to a test.

Vol. V.] The Canadian Architect and Builder. [No. 4

Residence of Mr. W. H. A. Massey, Jarvis St., Toronto.

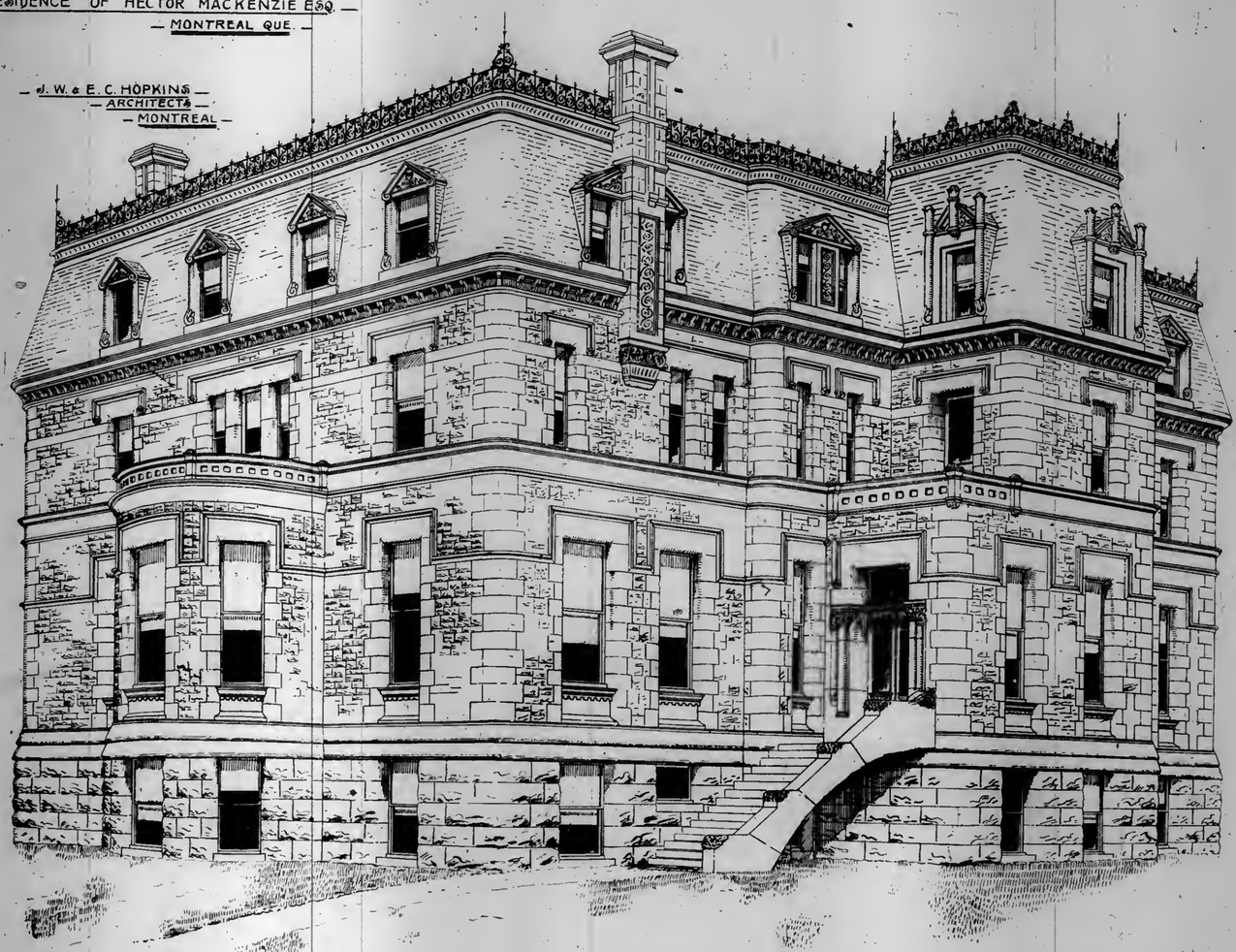
Wm. Young, Architect, New York

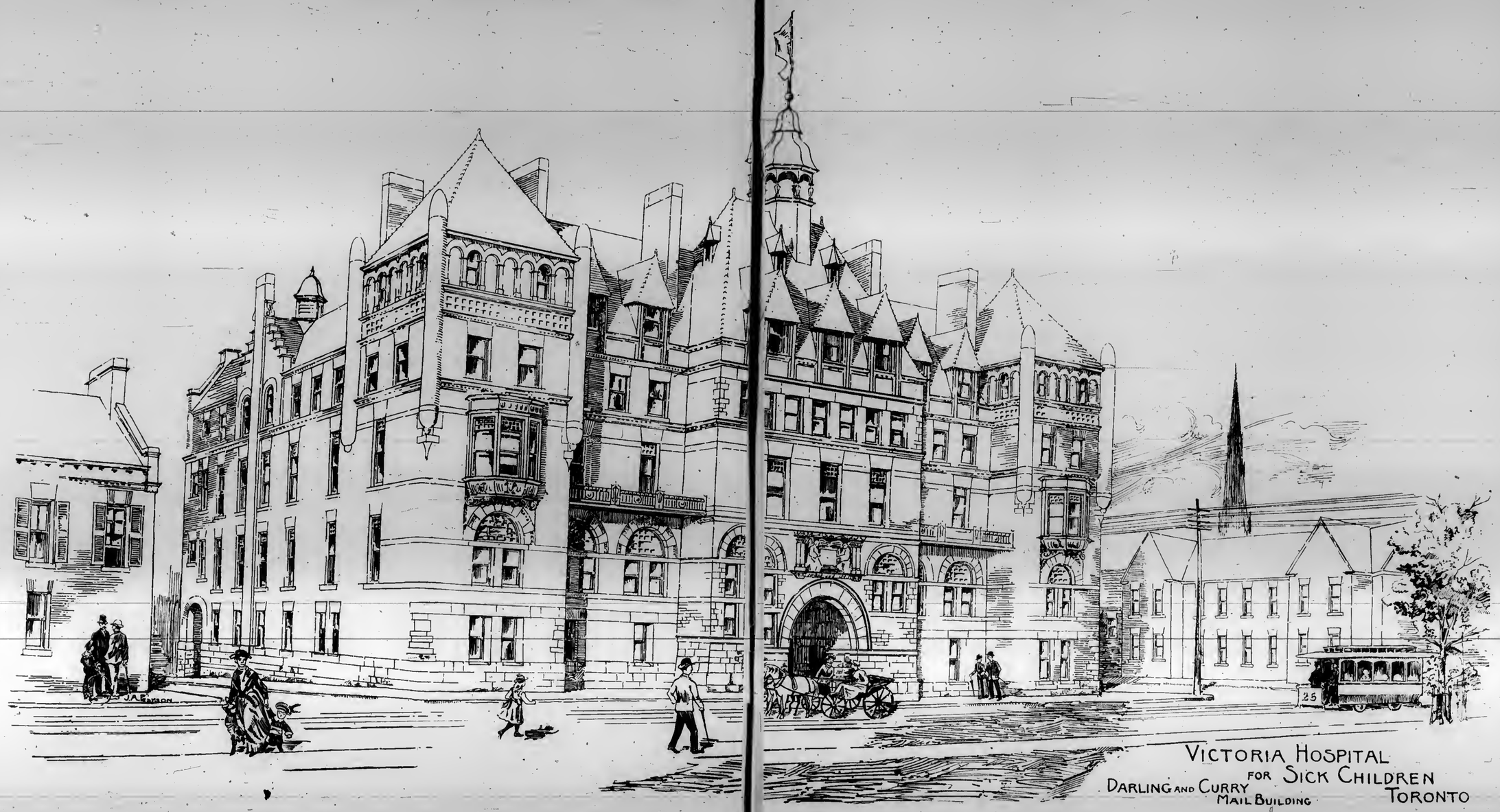
central Presbyterian
church Sunday School
Hamilton ont
James Balfour
archt



RESIDENCE OF HECTOR MACKENZIE ESQ.
MONTREAL QUE.

J. W. & E. C. HOPKINS
ARCHITECTS
MONTREAL





VICTORIA HOSPITAL
FOR SICK CHILDREN
DARLING AND CURRY
MAIL BUILDING
TORONTO

CANADIAN ARCHITECT AND BUILDER.

VOL. V.—No. V. TORONTO AND MONTREAL, CANADA, MAY, 1892. PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

14 King Street West, - TORONTO, CANADA.

64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	S. G. CURRY, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton.
TREASURER	D. B. DICK, Toronto.

COUNCIL:

WM. G. STORM	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
JOHN E. BELCHER	Peterborough.
EDMUND BURKE	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON — Merchants' Bank Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	F. X. BERLINQUET, Quebec.
1ST VICE-PRESIDENT	VICTOR ROY, Montreal.
2ND VICE-PRESIDENT	J. NELSON, A.R.C.A.
SECRETARY	C. CLIFT, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. C. HUTCHISON, R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
ALPH. RAZA	Montreal.
J. F. PEACHY	Quebec.

THE painters' strike at Winnipeg, referred to in our last issue, is ended. The strikers have returned to work at the old rate of wages.

THE United States Customs regulations require that to each invoice of granite exported to the States, there must be attached a diagram of each piece so exported and a sworn statement of the value. Enquiries are being made at Ottawa with the view to ascertain what method is employed by Canadian Customs officials to ascertain the value of manufactured granite exported by Great Britain and the United States to Canada.

THE brick manufacturers in Toronto and vicinity have organized an association, and have decided to reduce the scale of wages paid to employés. This action has been promptly followed by the organization of a brickmakers' union, and a determination on the part of the employés to submit to no reduction. The surplus stocks on hand are so large, and the building outlook so unpromising, that some of the manufacturers decided a month or two ago not to operate their yards this season. Under these circumstances, the probabilities are decidedly adverse to any satisfactory results being obtained from a strike of employés at this time.

AN effort will be made at the next session of the Ontario Legislature to have the Mechanics' Lien Act amended in several important particulars. At a recent meeting of representatives of the Toronto Builders' Exchange, Trades and Labor Council, and material supply men of Toronto, this subject underwent discussion. A committee was appointed to draft required amendments to this Act and submit the same for consideration at a future meeting. The discussion brought out the fact that the lien law of Ontario affords less protection to mechanics and persons supplying materials, than laws existing for the same object in many of the States of the Union.

THE Toronto Architectural Sketch Club might profitably follow the custom of English Architectural Societies in visiting in a body as frequently as possible during each summer buildings in course of erection, previously arranging with the architects of the building to be present to explain the points of interest connected with the construction. It is safe to say that one such visit may be the means of affording students more practical instruction than could be obtained from half a dozen lectures. A visit of this character was made to the Hospital for Sick Children on College street, and proved to be of great interest and value. It is to be hoped that a series of similar visits will be arranged for the present summer.

REFERENCE has often been made to the unfairness and sometimes the absurdness of the conditions of architectural competitions. The evil has possibly reached its limit so far as its effects upon architects is concerned. It seems, however, to be now trying to find its way into the engineering profession. The following advertisement recently appeared in the daily papers: "The town of ——— contemplates the construction of waterworks this year, and invites tenders, to be opened 30th inst. Those tendering to furnish their own plans and specifications at their own expense. The lowest or any tender not necessarily accepted. For particulars communicate with———." The above is so palpably a case of "heads I win, tails you lose," that we may presume no engineer will be so foolish as to enter the game.

THE question as to who shall fill the position of City Clerk of Montreal, has not at the time of going to press been absolutely decided, but there is very little doubt that Mr. L. O. David will be Mr. Glackmeyer's successor. He was nominated by the Finance Committee, and in all probability the matter will be decided at the next meeting of the Council. Mr. L. O. David is by no means an unknown man. He has been a prominent figure before the Montreal public for many years, having occupied platform after platform in the interests of the French-Canadian element of the population of the Dominion. He has not heretofore occupied any civic position, but his recommendation by the Finance Committee augrs well for his success in a post of such importance as that of City Clerk of Montreal.

In response to a number of requests, we have decided to publish in the CANADIAN ARCHITECT AND BUILDER for June, the examination papers in connection with the first O. A. A. students' examinations. In this number we present reproductions of a couple of the drawings submitted in these examinations, which will serve to indicate to students taking part in future examinations the character their drawings should assume.

THE Toronto Builders' Exchange is desirous of making some arrangement with the architects which will serve to avoid the delays at present experienced by contractor in obtaining certificates. A contractor who may be doing work for several architects, sometimes finds it impossible to get around to their offices and secure his certificates on certificate day, on account of being obliged to wait his turn in each office. It is suggested that this inconvenience could be avoided by the contractors notifying the architect of his desire to obtain a certificate for a stated amount previous to certificate day, when the certificate could be filled out ready to be handed to him when he might call.

THE Toronto Builders' Exchange, an account of the formation and objects of which was published in our April number, is making satisfactory progress. The membership has increased to such a degree that it has been found necessary to remove to more commodious quarters. These have been secured in the new premises now being fitted up at the corner of Victoria and King streets. The Exchange will take possession of its new home on or about the first of June, and will then have, in addition to a large exchange room, necessary committee rooms and secretary's offices. Mr. John Phillips has been appointed Secretary of the Exchange. It is believed the appointment will prove to be satisfactory. It has been decided to abolish the two classes of membership heretofore existing, and hereafter to allow all members to occupy the same footing. From the fact that during the past month further applications for information have been received from other cities desirous of forming exchanges, it would seem probable that the organization of the building interests throughout the country will be an event of the near future.

RECENT advices from Vancouver, B. C., point to indications of a busy season for the building trades. The unsettled conditions existing between contractors and mechanics, however, are said to be proving a check upon activity. Some of the contractors are reported to be desirous of increasing the working day from nine to ten hours, while others, rather than provoke trouble with the unions, are willing to pay union wages for a nine hours day. The employers very justly complain of the practice of the unions in demanding increases in the rate of wages without giving due notice which would enable them to embody in their estimates the increased cost of labor. These demands for higher wages are most frequently made after contractors have undertaken a large amount of work, the estimates for which have been based upon the prevailing labor prices. The contractors feel, so long as this unfair treatment is accorded to them by the unions, that they are justified in endeavoring to secure workmen from Eastern Canada and elsewhere, even though by so doing the local labor market should become overstocked. An effort should be made to come to an understanding, as is done in Toronto and other eastern cities, under which the rate of wages in the several trades would be fixed for a period of three or five years. Thus the conditions affecting employés, employers and investors would be settled for a definite period.

THE result of the examinations of the Ontario Society of Architects is in every way very satisfactory. They were held too late for us to give the results in our last issue, the reports of the examiners not being in. Since then the Board of Examiners has held its final meeting, made its reports to the Council, and the results have been made public to a certain extent, in the daily press. For our part we are glad to place on record in our columns the names of those who successfully passed the final examination, which we do in alphabetical order: Baxter, D. G.; Bayley, G. M.; Bond, C. H. A.; Brown, J. F.; Gregg, A. H.; Hynes, J. P.; Langley, C. E.; Matthews, H. E.; McCallum, R. J; Munro, W. L.; Smith, Eden, White, M. A.; Woolnough, J. J. The candidates, whether successful or not, have not been allowed, we understand, to know their marks. The examinations have been throughout conducted on the lines of the University examinations, where the marks are known only to the Board of Examiners. On the whole, the passing of thirteen out of nineteen is a very good proportion, and while we wish our new architects every success in the future, we would say to those who failed that there is no reason for discouragement on their part. In many cases to be plucked once is an advantage, and those who were plucked will no doubt set to work earnestly and prepare for a second attack, having found out their weak points. In the second intermediate, nine students passed out of twelve, and in the first intermediate, two out of four. There is to be a supplementary examination some time in September for the benefit of a few candidates in the first and second intermediate classes, whose work at the recent examinations, though not up to the standard, was fairly good, and these will be allowed another chance, that they may be able to take up another stage of examination in the following spring. This advantageous practice of a supplementary examination has a precedent in the procedure of most professional institutions.

TORONTO ARCHITECTURAL SKETCH CLUB.

THE second annual dinner of the Club, held at Webb's, on the evening of April 19th, was the occasion of much enjoyment. In addition to members of the Club, there were present the President and, Registrar and Messrs. Burke, Wickson, Gregg, Darling, Gordon, Bousfield, Simpson, Jarvis and Sproatt, of the Ontario Association of Architects. The School of Practical Science was represented by Mr. Wright, lecturer on architecture, and the contracting interests by a number of persons prominently identified with the various trades.

Mr. J. A. Pearson, President of the Club, presided.

The menu card was an unique affair, and occasioned much amusement. It read as follows:

THE TORONTO ARCHITECTURAL SKETCH CLUB

Specification of work to be done and material to be supplied and consumed in renewing the dilapidated condition of the students caused by the drainage system of the late examinations.

CONTRACTOR
HARRY WEBB

ALL MEMBERS TO COME IN
SPRUCE TIES, COLLARS, BRACES, AND CAST IRON SHOES.

SOUP
OYSTER SOUP, to be carefully lapped
FISH
BOILED LAKE TROUT with herring bone bridging
ANCHOVY SAUCE
POMMES PARISEINNE
BREAD AND BUTTER ridge ROLLS
ENTREES
CHICKEN PATTIES composed of stopcocks, bibcocks, and weathercocks
JOINTS
To be bolted
All carving to be done in an artistic manner
FILLED AND B OILED TURKEY
Well rubbed down under each coat
ROAST BEEF quarter cut, HORSERADISH SAUCE
BROWN POTATOES (Cabot's stain).
YORKSHIRE PUDDING,
All inside work to be well finished up after each course
VEGETABLES
To be filled in and well rammed down in layers not more than 12 inches deep
MASHED POTATOES and STEWED TOMATOES.
ENTREMETS
PLUM PUDDING mixed in proper proportions and stored up at least six months before using.
BRANDY SAUCE.
CHARLOTTE RUSSE with jamb linings APPLE PIE
LEMON MERINGUE PIE CELERY CHEESE
SWEETS
NEAPOLITAN ICE CREAM classic frieze
HARD BURNED CAKES assorted sizes and uniform color
RAISINS and FIGS up to DATE um line
FRUITS
APPLES ORANGES BANANAS
Nuts and Washers as follows
LEMONADE and COFFEE

The whole of the work on completion to be subjected to a smoke test.

The specification was declared to be a most complete and satisfactory one, all cheerfully complying with its conditions. It was observed that perhaps its most unorthodox feature was the provision made for extras. The carrying out of this specification was followed by an interesting programme of speeches and music.

Responding to the toast of "The O. A. A.," the President, Mr. S. G. Curry, referred to the recent student's examinations. Though not resulting as satisfactorily as might have been desired, yet considering that both students and examiners were without previous experience, they should be regarded as having been on the whole fairly satisfactory, and the knowledge gained would afford a basis for improvement in the future. One beneficial result of such examinations was that they served to direct the study of students in the proper direction. He felt assured that a feeling of timidity prevented many students at the late examinations from doing their best. Many absurd answers would have been avoided if the students had been careful to clearly understand the meaning of the questions. As an example of some of the absurd answers given, a student on being asked for a common test for finding impurity in air replied: "Climb upon the roof and put peppermint down the soil pipe." (Laughter). Another student who was asked what would be a

safe load to impose on ordinary clay soil, said: "A frame one or two storey house, or load up to 837 tons." Such answers he believed to be due, as already stated, to lack of proper consideration of the questions. These features of the examinations would doubtless in time disappear. At first it was thought the examinations might be concluded within two days, but it was found necessary to double the period. Even four days was much too short a time. It was not right that students should be compelled to write on an examination for three or four consecutive days. There should be time allowed for rest and study. Two weeks would not be too long a period. The examinations had revealed the fact that students who were supposed to be well up in certain subjects, in reality knew very little about them The O. A. A. should feel grateful to the students who had come forward to assist it in carrying out its objects. The speaker pointed to the fact that an Act was in a fair way to be passed by the New York Legislature under which no man would be able to call himself an architect without having obtained a license to practice in the State. At the next session of the Legislature the O. A. A. should endeavor to have the word "Registered" struck out of the Architects' Act, and by so doing secure a guarantee to the public that persons practicing architecture were competent to do so. The speaker concluded by expressing the hope that the members of the Architectural Sketch Club might be better able than the architects of the present day to do meritorious work.

In response to the toast "Canadian Architecture," Mr. Langton spoke as follows:

People who live in the older countries have inherited the results of the labor of many generations. They live as it were in a completed edifice and enjoy all its comfort and beauty, and, though in some respects life is therefore so much the less worth living, it cannot be denied that there is great pleasure and privilege in being posterity.

We, on the contrary, are ancestors. We are the early Canadians hard at work upon the foundations. We are not cribbed and cabined and confined like our kin beyond the sea, but, on the other hand the glories of our buildings are all in the future. Canadian architecture is rather a subject for speculation than criticism; we may say that Canadian architecture as an established fact as yet does not exist.

There has been much said during the last half century in England about the formation of a modern style. More recently in the United States there has been talk about an American style It was hoped that the late H. H. Richardson had created a style that would become national. It may be true what was said by an English reviewer, that since the architect of the Palace of Diocletian generated Romanesque architecture by taking the column of the Roman order and inserting it under the arch, no one man has done so much to develop a style of architecture as Mr. Richardson. Yet I think it has proved to be a mistake to found on his work the hope of an American style. The school of imitators are one by one turning their attention in another direction. The mark that Mr. Richardson has left upon American architecture is something much wider and deeper than the mere appropriation of the peculiar characteristics of one particular period of architecture. He taught us how to make use of the examples left us from former times by catching from them the spirit of the workman and doing our own work in the same spirit. He did no copying. What he took from an old example was not only adapted but usually improved. In the case of the most salient example of his reproduction of a model—that of the tower of Trinity church—I think we may fairly say that we should have heard very little of Salamanca Cathedral if the tower of Trinity Church had not been built to put honor upon the tower of Salamanca as the original.

I think then we may agree that the Richardsonian Romanesque revival had as much vitality in it as it is possible for a style revival ever to have. Not only was the style adopted made to live in our century but there seemed to be something in the theoretical view taken by approving critics that, inasmuch as the style adopted was an undeveloped style, there was the more hope that the natural law of development should have course with it now that it was revived.

However, the course of work in the United States seems to be moving away from it, retaining only the high standard of taste and the right feeling in design which were introduced into the country along with it, and which I think we may hope are part of the inheritance of American architects and of ourselves henceforth. The right spirit is abroad, and though the architectural world seems to one living in it to be a wild sea of conflicting determinations and shifting views, I think one who has even a slight acquaintance with history will recognize the condition from which have emerged all those results which have formed steps in the world's advance, from which succeeding generations take their start, and to which they always return for their basis. I think we may almost consider that the word style—though in an old country like England, where tradition has force, and where they are empowered by the excellence of the past, still retains its conventional usage as applied to architecture—may with us on this continent begin to have the deeper and better meaning of character, which includes the other and goes beyond it.

To say that a man or a woman has style, is to give to them the highest expression of admiration for their personal charm. Style is beyond beauty, though it often includes it—always includes it in the highest sense of the term. It is the harmonious compound of qualities which makes the man or woman who possess it strike the eye at once, and impress us as distinct. This is what we want in architecture. Not fashion in architectural clothing, but that the building have always distinction of character in accordance with its own programme of requirement, and the conditions of its circumstances. It must be a growth proceeding from the continual effort to satisfy the conditions of our mode of life, our means, our climate, and our material. I doubt if anything can permanently prevent the growth of a true style of architecture, but it may be delayed by temporary fashion quite enough to prevent any of us having the pleasure of seeing it in our life-time. So I want to enlist your sympathy on the right side. You will be soon starting out for yourselves—some of you this year—and your services are wanted in this matter. It is the work of the many, and with a common idea we can progress fast, helping one another by example, as iron sharpeneth iron. The English House of Commons as a body is said to be always wiser than the wisest man in it, and we have no need to wait for the advent of a genius to create Canadian architecture, if we only have in common the idea of making our architecture true. It ought not to be necessary to say much upon this subject so long after the acceptance by the architectural world that in art only truth is life. But we have only to look about us to see that its application still lags.

We have still amphitheatrical churches with a couple of storeys of society rooms and class rooms, all contained within an exterior which represents as faithfully as it can the mediæval church with its single spacious hall. We are are about to have a drill shed here which, inasmuch as it is Government work and the result of tradition rather than individual intention, we need not feel shy of criticizing. It is, of course, to be a castellated structure. In former days arms were kept in a castle. Must, therefore, the building that stores our arms nowadays represent a castle, however feebly? Are we to suppose that when Toronto is surrounded by the beleaguering host, our brave defenders will retire upon the impregnable drill shed and man the battlemented turrets and cornice? We might as well hold that because our grandfathers travelled by means of horses, we should, therefore, build our railway stations to represent as far as possible a stable. I do not want to turn this into a lecture upon truth in architecture, only to take the stand that this only is the course along which our architecture can develop.

There was a little dialogue in this morning's *Mail* which seemed to me to offer a good illustration of the point.

It is as follows:

Artist—"Those evergreens on the north side of your house have a delightful effect."

Farmer—"I should say they had. Them trees keep off the wind and save about $8 worth o' firewood every winter."

That is the whole thing in the nutshell. The farmer plants a row of trees where they are wanted. The trees have a delightful effect. And the more you perceive the usefulness of the trees, the deeper the effect of poetry which they produce. Art and matter of fact are inseparable.

If architecture is to satisfy, the plan must be convenient, and must be expressed in the composition. The construction must be suitable to the kind of building, to the material, and to the climate. This a brief recipe which, however, means a great deal. And I appeal to you if it is not more manly and more worth the devotion of one's energies than always trying to get away from your own problem in imitation of something entirely different.

It takes thought, of course, but you will have at first, when you begin practice a great deal of what has been called "God-given leisure," in which you can invent at your will. You will find also that you know nothing. It will surprise you to find this. It did me. You will have to learn much then, and will have to teach yourselves: and you may as well learn the right way while you are about it. The problems of architecture are limited after all. You must ultimately be at home with them in one way or another. If you will get into the way of handling them rightly you will be better architects, you will be better men, and you will be happier men. You will not find work wearisome as you grow older, but will find in it an interest that mere money making cannot give. And Canada will have buildings that will give pleasure to those who see them, which foreigners will recognize as Canadian, intimately associated with the life of the country—the Canadian style of buildings.

Mr. W. H. Elliott, responding on behalf of the contractors, said the interests of no two classes could be more identical than those of the architect and contractor. In fact, so close was their relationship, that like cats thrown across a rope, they sometimes got to fighting—about what, the architects only know. (Laughter). One lack in relationship would be supplied if architects would refuse to allow contractors to work for less than a fair price. If this rule were adopted, a better class of buildings would be the result. Architects sometimes congratulated themselves upon having secured a low price for their work, but he desired to tell them, if unaware of the fact, that it was impossible to beat the contractor. (Laughter).

Mr A. H. Gregg claimed that the contraction caused by the recent exams, followed by the sudden expansion on the present occasion, left him in no fit condition to respond to the toast to "The Coming Architects." In no way was the world's progress better illustrated than by the facilities for education which were being placed before the rising generation. There was a general

attempt to elevate the standard of all the professions and callings. This extended even to the ranks of the anarchists, who recently placed a charge of dynamite under the School of Architecture at Madrid, but whose plans, like those of many other reformers, were frustrated and their enthusiasm dampened by a callous caretaker. (Laughter). The students were deeply grateful to those members of the O. A. A. who had so disinterestedly sought to promote their welfare. The speaker pointed to the need of a better appreciation of the profession of architecture on the part of the public, and even of persons otherwise refined, and mentioned the case of a lady who was desirous that her son should enter one of the professions, and who brought him to an architect's office, with the remark that as he was somewhat deficient in education she had decided that he should become an architect. The speaker remarked that if the public glance could have rested on the bundle of papers required to be dealt with by the students at the recent examinations, and which, notwithstanding, were but the first fragment of the knowledge to be acquired, they might conclude that some degree of erudition was necessary to the architect.

Some excellent songs were sung between the toasts by Messrs. J. Francis Brown, E. B. Jarvis, R. Wilson, J. J. Woolnough, Geo. Self and Mr. Thomes. Mr. Woolnough also gave a piano solo, and Mr. Jas. Newton some well executed selections on the violin. A couple of recitations were given in creditable style by the President.

The assembly dispersed soon after midnight, having spent a thoroughly enjoyable and profitable evening.

A CASE OF ILLICIT COMMISSION.

The Council of the Ontario Association of Architects desire the publication of the following letter which has come into their possession :

To A. B. C., Esq.,
Architect.

DEAR SIR, I have been accustomed while working under architects in this city, as well as other places, to allow a commission to those who use their influence in my behalf, while letting contracts on alterations, repairs, etc., that they may have in hand. I intended to speak to you on this matter while in your office this afternoon, but failed to get you alone. I will be pleased to arrange matters between you and myself in this way, as I consider an architect and contractor can work together with profit to each other. The time has come when prices are so low that contractors require to scheme a little to come out square. My usual allowance has been five per cent. on all work and two and a half on all material. If these figures are worthy of any notice let us talk together. Yours truly,

Contractor.

It is this sort of thing the Association was originally designed expressly to prevent. The members of the Association are required to sign a declaration binding them to set their faces against illicit commissions in their own practice, and now that the feeling of the profession has been actively enlisted in the matter, contractors who seek to "come out square" by this manner of proceeding will find, sooner or later, that it is not to their own advantage.

OUR ILLUSTRATIONS.

PHOTOGRAVURE PLATE—RESIDENCE OF MR. R. B. ROSS, MONTREAL, QUEBEC—BRUCE PRICE, ARCHITECT, NEW YORK.

RESIDENCE OF MR. E. A. WILLS, GWYNNE STREET, TORONTO—J. FRANCIS BROWN, ARCHITECT, TORONTO.

From the grey sandstone foundation to the first storey window sills is built of red brick, laid in brown mortar, with Portage Entry sandstone trimmings; above this is finished in half-timbered work, starting from a heavy plate bolted to brickwork. The half-timber framing is constructed of 2"x2" studs placed at 12" centres, framed and braced, boarded with wrought boarding, covered with saturated building felt, battened and lathed. The exterior framing is secured to interior framing; the panels are plastered with cement mortar, constituted of cement and coarse sand, colored to harmonize with general color scheme. The interior is well finished in oak and pine. The rooms are spacious, well arranged and heated with hot water. The following contractors did the work: Carpenter and joiner's work, Davidson & Kelly; masonry, T. Self; plumbing, Fred. Armstrong; plastering, F. Beaver; painting and leadglazing, Faircloth Bros. galvanized ironwork, Tucker & Dillon; hot water heating, the E. & C. Gurney Co.

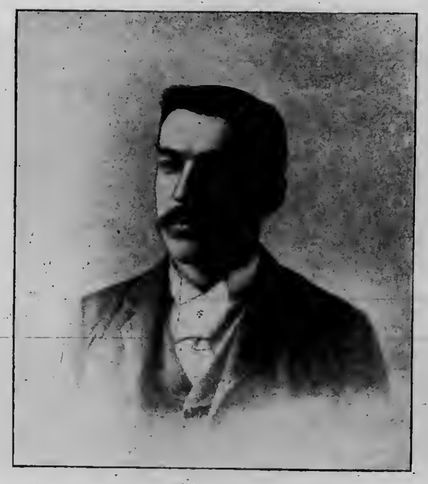
BAPTIST CHAPEL, WALMER ROAD, TORONTO—LANGLEY & BURKE, ARCHITECTS, TORONTO.

O. A. A. EXAMINATION IN DESIGN. SKETCH FOR CHURCH SUBMITTED BY J. FRANCIS BROWN, TORONTO; SKETCH FOR HOUSE SUBMITTED BY W. MUNRO, TORONTO.

We publish elsewhere a list of tests of the Thorold cement, which are claimed by the manufacturers to be the highest tests ever made of any Canadian natural cement.

CANADIAN CITY ENGINEERS.

VI.



MR. F. W. W. DOANE, CITY ENGINEER, HALIFAX, N. S.

Mr. F. W. W. DOANE, City Engineer of Halifax, Nova Scotia, was born at Barrington, Shelbourne Co., N. S., on May 31st, 1863, his father being Capt. Harvey Doane, well known in his native province.

The subject of our sketch began engineering work in 1882. From 1883 to 1891 he was assistant to the provincial government engineer of Nova Scotia. During that time over $1,000,000 was expended on highway bridges. The work of the Department also included railway surveying and construction, water supply, sewerage, laying out, construction and repair of public roads, and reclamation of land from the sea. In 1886, Mr. Doane was sent out on the survey of the Musquodoboit Valley and Stewiacke Railway; in 1889, on the Carleton Branch Railway and Western Shore Railway, and in 1890, on the Heatherton and Guysboro Railway and North Colchester Railway. In June, 1891, he was appointed City Engineer of Halifax, N. S. The duties embrace all kinds of city works, such as engineer and superintendent of water works, charge of public works, street grading, paving, repairs, &c., sewers, maintenance and repairs of city property, and all improvements.

Mr. Doane has recently recommended the construction of new sewers estimated to cost $75,000, and submitted a report to the City Council on a scheme for improvement in the city water supply. A new 27" main is to be laid, new dams and gate houses constructed, and storage capacity increased 275,000,000 gallons. The improvements are estimated to cost $200,000. There have also been inaugurated extensive street and sidewalk improvements, which it is expected will add greatly to the appearance and reputation of the city.

In co-operation with the Board of Health, the Engineer is thoroughly reforming the plumbing system and sanitary arrangements of the whole city (of which there was very urgent need).

Mr. Doane is probably the youngest member of the Canadian Society of Civil Engineers.

He has been a member of the Council of the Institute of Halifax since 1888, and is likewise a member of the Faculty of Pure and Applied Science of Dalhousie College and University, being lecturer on civil engineering and surveying.

ONTARIO ASSOCIATION OF ARCHITECTS.

The following is the official list of the results of the recent examinations :

Admitted to registration as members of the Association: Messrs. D. G. Baxter, G. M. Bayly, C. H. Acton Bond, J. F. Brown, A. H. Gregg, J. P. Hynes, C. E. Langley, H. E. Matthews, R. J. McCallum, W. L. Munro, Eden Smith, M. A. White, and J. J. Woolnough. Conditioned—Messrs E. A. Bird, W. G. Burns, W. W. Pease.

Second intermediate examination: Passed Messrs. F. P. Kelley, Wm. Rae, A. E. Wells. Conditioned: Messrs. Kenneth Gordon, T. R. Johnson, H. G. Macklin, R. B. McCiffen, J. V. Munro, Geo. M. Scott.

The supplemental examination for conditioned candidates will be held in next September.

It is not proposed in future years to admit candidates for the final examinations to a supplemental examination. On this occasion, as many of the students presenting themselves for the final examination have been obliged to wait for the instruction of the examinations, and so have served terms longer than required by the Association, the council has appointed a supplemental in order that the candidates may be hindered as little as possible in proceeding to practice.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Mr. J. A. Chausse, architect, is removing his office to No. 153 Shaw street.

Mr. A. Dubrueil, architect, has removed from No. 1639 Notre Dame street to No. 1608 on the same street.

THE Province of Quebec Association of Architects in a communication to the City Clerk, urges the importance of the office of sanitary inspector, and the consequent necessity for caution in the selection of a competent person to fill the position.

"L'Association de Secours des Ouvriers," is applying for letters of incorporation, with the object of assisting workmen or workwomen who through misfortune are unable to provide for their own maintenance. Applicants for such assistance must furnish if required a certificate of good behavior. The capital stock of the Association is to be $12,000. A number of prominent Montreal contractors are interested in the movement.

HOW TO ESTIMATE.

By W. H. Hodson.

BELOW are printed specification and bill of quantities for excavator, mason and bricklayer, accompanying working drawings of Baptist Church, Walmer road, Toronto, appearing in this number.

EXCAVATOR, MASON AND BRICKLAYER.

Erect the necessary hoarding in accordance with city by-laws. All vegetable mould to be put to one side for top dressing. Excavate the ground as required for the basement, footings of walls, piers and buttresses, and for drains. Excavation to be 9 in. clear of walls to permit of pointing and inspection. Fill in and ram to walls after inspection; level to grades shown. Any soil not required for levelling to be removed from premises. Execute drainage as shown with approved salt glazed vitrified pipe of Scotch or American manufacture, jointed in Portland cement and laid to proper fall with all necessary bends, traps, junctions, etc., complete. Put McGuire's cleaning out trap with connection for cleaning carried to within one foot of surface of cellar. Lay weeping drains, as shown, in boiler pit connected with main drain behind proper glazed pipe trap. Connect drain with sewer in street, paying all fees. Footings of walls to be of large flat stones not less than 6 in. in thickness and 4 in. on each side wider than the work above, and to extend to at least half the width of wall above. The footings of large piers carrying main columns to be in two courses of stone of approved quality, 8 in. thick and not more than two stones to each course. Footings of main chimneys to be similar, with not more than three stones to each course. The footings of tower to be similar. The bottom stones to be in length the full width of footing (5 ft.) and not less than 3 ft. wide, the next course to be similar, 4' 2" long, and the next 3' 4" long. All to be of even thickness, flat on bed and set on a one inch bed of one-third Portland cement mortar. All the footings of main walls and piers to be set in mortar of similar description. The stone walls above finished ground line on north and rear elevations and corridor to be finished with a narrow course of brown Credit Valley stone neatly pointed with brown mortar. The walls on east and west elevations and part of north, as shown, up to level of ground floor window sills, to be faced with the best Credit Valley brown stone in courses of varying heights, and well bonded into wall behind with at least one bond stone to each superficial yard of walling. Stones to be boldly rock faced with narrow margin drift at angles and laid up in dark brown mortar (Cabot's or Pecora) with deeply sunk joint. The walls above coursed work (on tower, east and north elevations) as tinted brown, to be of brown Credit Valley stone in random ashlar work of most approved description, well bonded into brick backing and laid up in similar mortar with similar joint as above. No stone to be more than 9" in height and a preponderance of long thin stone to be used. The reveals and weatherings to be neatly chiseled, and angles to be finished with narrow margin drift. The walls above the stone work to be carried up in good brick work, composed of the best hard burned bricks laid in the best prepared mortar, well finished up. The outside to be faced with best machine moulded dark red bricks of even color, laid English bond in dark brown mortar, similar to that for stone work, having a deeply sunk joint. The inside of porch and vestible at rear to be faced with similar bricks of lighter color in the dado; quoins, etc., and with picked white bricks in the walls, all laid American bond and to harmonize with work in present school building. The red bricks of the interior to be laid up in mortar colored with Cabot's red mortar stain, and the white bricks with mortar colored with Cabot's yellow mortar stain, all finished with a neat bead tool joint. The internal window sills to be finished with a course of plinth bricks. The capping of dado to be a plinth brick reversed. The walls of porch and vestibule to be hollow and two half bricks thick. Outer face to be well parged. Tie the half brick walls with stout hoop iron every fifth course and about one foot apart; iron to be bent ⊔ thus and dipped in tar. The outer 9" walls of dressing rooms and vestry to be built English bond. The walls of church to be also built with a 2" cavity tied with hoop iron as before mentioned, the inside face of outer wall to be carefully parged. The inside walls of auditorium, front vestibule, north stairway and tower (two stories) to be faced with No. 1 pressed bricks in the very best and most workmanlike manner, laid up in English bond with a narrow joint in putty mortar to harmonize in color with the bricks. The dado, the moulded bricks in jambs and arches of the west end and the belts and friezes at east end to be executed with pale brown bricks equal to sample in the architect's office, the walls above dado to be faced with bricks of a yellowish buff tone equal to sample shown. The capping of dado, the angles, jambs, sills, arch bricks and labels as shown to be executed with moulded bricks of approved design; supply moulded bosses, returns or stops where required. State reduction if all pressed brick work inside (except fireplaces) be omitted and walls (of hollow and similar thickness) left rough for plastering. The jambs, arches and labels of the three entrances in east elevation, windows adjoining and three windows above to be executed with No. 1 pressed and moulded dark brown bricks of approved design laid up in mortar of harmonizing color. The labels over windows in south elevation to be of moulded pressed bricks finishing to moulded stops. There will also be moulded stops to labels of three windows on east elevation. Dentil bricks at eaves of staircase to be moulded and pressed, jambs of staircase windows to be simply rounded.

Brick piers in cellar to be of hardest grey or red bricks, built perfectly solid and having neatly struck joints. The walls of boiler pit to be built with similar bricks in 4" stone footings, joints to be neatly struck. Carry up flues as shown, properly parge the same, and provide and build in cast iron slides to give access for cleaning smoke flues. Provide and build in 15" collar in smoke flue with chimney stack. Form fireplaces as shown, those in church to be faced with No. 1 pressed brick of color to harmonize with dado, and having moulded brick courses as shown. Turn arches on wrot. iron camber bars. Form ash dumps properly parged and furnished with cast iron soot doors in cellar. Build brick trimmer arches and level up with concrete to within 1½ of finished floor line. Build vent flues from below ceiling of gallery as shown, two to be carried up in walls of tower into pinnacles, two in south side to be carried into pinnacles of transept, that in north side to be carried into flue in vestry chimney stack, and that at n. e. staircase to be carried up to eave line. The openings in inside to be filled with 12" x 18" white enamelled valve registers provided and set by mason.

Arches to windows and doors, &c., to be cut and gauged. Turn proper relieving arches over all openings of at least two rings. Thoroughly clean down all walls (the internal ones with acid), removing all stains or defects, cutting out and replacing any discolored or broken brick, and leaving all perfect on completion. Bed in mortar all wood slips, wood bricks, stone or other work required to be set in the masonry or brickwork. The walls of vestry and dressing rooms will have strips built in for securing battens. Bed in mortar all lintels, plates, etc., and carefully point round all window and door frames. Cut all necessary grooves for flashing, and point up as required. Beam fill on all walls to underside of roof and floor boarding. Build areas of hard bricks in stone footings and pave with brick on flat. Build in carpenters' bolts for copings. Provide good and sufficient scaffolding which is to remain for the use of other trades as required. Take every precaution to prevent walls being discolored from splashings from scaffolding. Form foundation for boiler, say 40x12 ft. with flat stone 4" thick and on this lay hardest clinker bricks set on edge in sand and well flushed. Lay the boiler pit with similar bricks set in a 4" bed of sharp sand. The coal and ash pit and space adjoining as tinted grey will be concreted. Excavate to additional depth to allow for boiler. Form foundation with stone chips 6" deep and on this lay concrete floor 5" thick formed with coarse gravel, coarse sand and Portland cement in proper proportions and floated to a smooth and even surface. Provide and set on brick piers under the eight main columns squared and dressed approved stone 32" x 32" x 12" thick. The piers carrying six small gallery columns to be coped with approved stone 8" thick and those carrying beams with stones 4" thick. All to have dressed beds and to be correctly squared. Provide similar stones 8' x 12' x 4" under beams when resting on walls. Cope walls of ash and boiler pit with approved stone 9 in. x 4 in. thick in long lengths, dressed and carefully set in Portland cement. Cope chimneys with Credit Valley or other approved brown stone 9 in. thick, and in not more than two pieces to each stack, cramped and set in Portland cement. Sills of basement windows to be of Credit Valley stone (brown where exposed). Sills of vestry and dressing room windows may be executed in Beren or brown stone of approved quality, seated, weathered, throated and rock-faced. The heads, strings and sills of all other windows to be executed in the best description of Credit Valley brown stone, free from all flaws and defects, tooled or chiselled as may be directed, weathered, seated and throated. Sills at random work may be rock faced. The steps and landing at main entrances to be of same Beren or equally approved stone, carefully set in long lengths in Portland cement and joints thoroughly flushed. The coping of parapet of front gable to be of approved brown Credit Valley stone in long lengths, set in Portland cement and weathered, tooled and throated as directed. The carving of the four bosses at entrances and the finial on coping is reserved. Prepare for carving as required. The eight corbels, side walls under principals, and the two corbels at the east end carrying foot of principals, the four corbels under iron beams at tower and staircase openings, the four corbels under gallery brackets, the cornice at spring of arches at west end, and the heads of two fireplaces to be of light brown stone of approved description, moulded and rubbed. Sills and exposed stonework to be boarded over immediately upon being set.

BILL OF QUANTITIES.

EXCAVATION AND DRAINAGE.	$	c.
Board fence, etc., as per city by-laws		
1100 cubic yards of excavation, basement walls, piers, buttresses and drains; includes filling, ramming, levelling, etc., etc.		
101¾ lineal yards of vitrified pipe drain; includes bends, traps, junctions, etc.		
13 lineal yards of 4 in. weeping drain, complete		
Provide 9 in. continuation drain from sewer to street line at per lineal yard, complete, paying fees for same		
1 McGuire's cleaning out trap with connections		

NOTE.—Excavations are measured "cube," that is, length, breadth and depth, thus: 54 ft. 9 in. x 22 ft. 6 in. x 5 ft. 6 in. = equal to 6775 ft. 4 in. divided by 27, the number of feet in a cubic yard, gives 251 cubic yards, less (1 ft. 8 in). Tile drains are measured lineal, that is, running measure, as indicated in above items.

MASONRY AND CUT STONE.	$	c.
157 toise of masonry complete, including the footing laid in cement		
2080 supl. ft. of coursed Credit Valley brown stone, varying heights pointed in brown mortar, includes margin, draft, etc., chisseled reveals		
20 supl. yards of foundation to boiler 6 in. stone chips and 3 in. thick concrete, smooth surface		
131 lineal ft. of narrow coursed Credity Valley stone, pointed in brown mortar		
72 lineal ft. of Credit Valley brown stone coping in long lengths set in cement		
50 lineal ft. of Credit Valley brown stone coping, parapet of front gable, long lengths, set in cement		
18 Credit Valley cut stone sills, 6 ft. 6 in., weathered, throated and seated		
7 Credit Valley cut stone sills, 5 ft. 0 in., weathered, throated and seated		
5 Credit Valley cut stone sills, 3 ft. 6 in., weathered, throated and seated		
10 Credit Valley cut stone sills, 2 ft. 6 in., weathered, throated and seated		
7 Credit Valley cut stone sills, 2 ft. 0 in., weathered, throated and seated		
8 column stones, 32 in. x 32 in. x 12 in.		
6 coping stones to gallery columns, 8 in. thick, dressed		
6 coping stones to beams, 4 in. thick, dressed		
8 stones for beam rests, 12 in. x 8 in. x 4 in., dressed		
2 coping stones of Credit Valley to chimneys, in two pieces, set in cement and cramped		
26 light brown stone corbels front of principals, spring of arches, etc., etc.		
4 boss stones (for carving) and finial		
2 Berea stone steps and landing, main entrances, in long lengths set in cement		
4 double footing stones in cement mortar under iron pillars		
Boiler foundation, 480 ft. of flat stone 4 in. thick, covered with hardest clinker brick set on edge; well flushed		

NOTE.—Masonry is measured cube and the totals of dimensions added together, divided by 86, the number of cubic feet in a toise. The French measure per toise being 6 ft. x 6 ft: x 2 ft., equivalent to 6 ft. 4½ in. x 6 ft. 4½ in. x 2 ft. 1½ in. English measure, the French foot being ¾ of an inch longer than one foot English. Cut stone facing measured superficial, that is, square, thus: 5 × 5 gives 25 ft.

BRICKWORK.	$	c.
60,000 (A2) best hard burnt brick, with white, red and plinth, to sills, and reverse to dado, a proportion of pressed and pale brown brick equal to sample bricks, etc., smooth jointed		
27,500 machine made bricks, laid in brown mortar, tied with hoop iron at cavity		
6,100 (A1) red and white and pressed brick facing to porch and vestibule		
2,900 hardest grey bricks to piers		
2,300 bricks, moulded for dado capping, angles, jambs, sills, arches, lables, etc., etc.		
1,000 dentil moulded and pressed bricks to staircase window		
170 hardest clinker bricks to boiler pit, on bed of sharp sand		
23 supl. yds. of concrete; to coal and ash pit		
800 hoop iron ties dipped in tar		
50 relieving arches, double rims, throughout building		

	$	c
4 12 in. x 18 in. enameiled valve registers, complete		
2 cast iron slides to smoke flues		
2 15 in. collars to smoke flues		
Arches over two fire places and wrought iron camber bars		
Ash dumps and cast iron soot doors in cellars		
Trimmer arches and concrete to within 1½ in. from floor		
Vent flues from gallery ceiling, two to be carried up into wall of tower and one in vestry; chimney stack up to eave line		
Cleaning down walls, removing stains and defects, bedding timbers, building in strips for battens, pointing to windows and door frames, grooving for flashing, beam filling, bolts for coping, etc., etc., complete		
Scaffolding as required and remaining for other trades		
Deduction if A 1 and 2 is not carried out		
A 1 deduction, pressed brick ommitted and instead left rough for plasterer		
A 2 deduction, pressed brick omitted and instead left rough for plasterer		

NOTE.—Brickwork is measured cube and in Montreal the number of bricks given in estimating is 20 bricks to the cube foot, and is ascertained thus:

6 bricks long say 4" 0"
9 " high " 2' 0"
54 8' 0" = divisor.
3 brick thick

8 | 162 | 20 to the foot.
16

The openings are measured and deducted from the solid work. Concrete when not deep is measured by the superficial yard, thus: 3 ft. x 3 ft. gives one yard. Concrete in heavy work is measured cube, 3 ft. x 3 ft. x 3 ft., or 27 ft. to the cubic yard. Arches, etc., are given in numbers and other items noted as above.

(To be Continued.)

SANITATION & HEATING

VENTILATION.*

SOME extracts from various reports of scientific men on the subject of the ventilation of Halls of Assembly which from many years of study I believe to be the best solution of a very difficult problem:

Two systems of ventilation so far appear to have been adopted, viz., the upward or the downward exhaust.

The fundamental principles of ventilation are:

1st. Heated air is relatively lighter than colder air, and will continue to ascend and the cold air to descend so long as they are free to move.

2nd. More or less than a given quantity of air practically considered cannot occupy an apartment and cannot be introduced unless an equal quantity be withdrawn, or withdrawn unless an equal quantity be introduced.

These two simple and self-evident propositions will explain nearly all the phenomena observable in ventilation. The first method adopted by engineers and architects to give movement to air for the ventilation of mines and buildings was to heat an upflowing column, thus lessening its specific gravity and causing it to rise with corresponding force. That system was employed in the British Houses of Parliament, where in many of its towers a charcoal fire was kept burning and thus a force obtained to propel the air through the building. It has been practically demonstrated, however, that one pound of coal burned in the furnace of a steam boiler to drive a fan blower will generate as much force and consequently is capable of producing as strong a current of air as 38 pounds expended in heating a column of air to act by its diminished gravity. If heated air is introduced into an apartment containing air at a lower temperature through registers at the floor, it rises rapidly to the ceiling, and if there are openings at the ceiling it escapes without (except in a very slight degree) mixing with the air in the apartment. The air that passes off in this manner is absolutely lost and the heat imparted to it wasted. It does not remove the vitiated air contained in the lower part of the apartment, it does not form with it a homogenous mixture and does not communicate to it more than a small portion of its heat.

But if, instead of escape openings at the ceiling they are placed at the floor, the phenomena observed will be widely different. The heated air will as before rise to the ceiling, but instead of escaping, will press the colder air downward to the exit ducts and fill the apartment with pure warm air; the air vitiated by breathing will at once sink below the level of the mouth and in a few seconds will be carried off, no accumulation of foul air being possible.

Various opinions are given as to the amount of fresh air necessary to render the products of transpiration and respiration innocuous. These estimates made by distinguished observers vary from 2 to 50 cubic feet per minute. These estimates and are generally based upon the hypothesis that the fresh air introduced into an apartment mixes uniformly and homogeneously with the vitiated air and dilutes it to an extent to render it innocuous; but if instead of mixing with the air of the apartment, the warm pure air should rise to the ceiling and escape, all conclusions based on the hypothesis of homogeneous mixture would be fallacious. If the air that has once been respired could be immediately removed without being the second time taken into the lungs, it is obvious that so far as respiration is concerned no more need be introduced into an apartment than can be breathed; this amount is easily calculated.

At a temperature of from 65° to 70° Fahrenheit the following average results are given by Dr. Wetherill for the respiration of an adult: Number of respirations per minute, 20; cubic inches of air inhaled at each respiration, 20; cubic inches per minute, 400. The carbonic acid exhaled is stated to be 15 cubic inches per minute, and the surrounding air vitiated is 2½ cubic feet per minute. Four hundred cubic inches is less than one fourth of a cubic foot and this is all that can be taken into the lungs per minute.

The House of Representatives at Washington is provided with 60 cubic feet per man per minute, and yet the vitiated air is not removed. The quantity of air introduced is twenty times as great as the quantity that could be vitiated by respiration provided there was a homogeneous mixture. The facts which are daily observed prove that such a homogeneous mixture does not exist under the present system. If nineteen-twentieths of the heated air which enters the apartment escapes without being utilized, it follows that nearly all the fuel consumed in heating it has been wasted.

In the process of respiration 15 cubic inches of carbonic acid per man per minute are ejected from the lungs. This gas in course of time would diffuse itself throughout the apartment, but it is well known that its density is so great that it can be poured from one vessel into another, or if poured into an inclined trough it will flow downwards, extinguishing successively a row of lights.

The specific gravity of this gas is 1.52 or 52 per cent. heavier than air. Its tendency would therefore be when exhaled to sink below the level of the mouth and occupy the lower portions of an apartment near the floor, but it has been supposed that the elevated temperature at which it is projected from the lungs causes this gas to rise and escape at the roof; the fallacy of such an opinion can, however, be readily proved. Even if the temperature at which carbonic acid escapes from the lungs should be so elevated as to render it momentarily lighter than the surrounding air, it would soon part with the excess of heat and then seek the level due to its superior density—but in fact under the condition of things which actually exists there is only 20° difference in temperature between the air when first expelled from the lungs and that of the apartment. As air increases in volume 1-460 of its bulk for each degree of Fahrenheit, the effect of increasing the temperature 20° would be to reduce the specific gravity less than ten per cent., and the carbonic acid upon leaving the lungs would still be 40 per cent. heavier than the air of the apartment. It would seem impossible for this dense gas to rise to the ceiling and escape at that level without a violation of the laws of pneumatics, unless by powerful mechanical means.

Dr. Wetherill reports that each flame of gas consumes as much oxygen and gives out as much carbonic acid as five human beings.

General Morin reported that a ventilation of 14½ cubic feet per man per minute *principally downward* left no perceptible odor in a lecture room, while the upward ventilation of the Halls of Congress with 60 cubic feet per minute, is notoriously defective.

As regards the direction the products of respiration take after leaving the body, the evidence in support of the tendency to rise is from a report from the Smithsonian Institution; its author seems to have smoked a pipe at the Institute and the smoke ascended—but the objection to this experiment is that tobacco smoke is not one of the ordinary products of respiration. The experiment does not prove that the gray smoke which was seen to rise was carbonic acid. The experimenter does not state in what direction were the ventilating currents in the apartment or how produced, and there was nothing in the experiment to prove that with a gentle downward ventilation the smoke would not have moved downward instead of upward—in fact it proved nothing at all in reference to the direction of the products of respiration.

Lewis L. Leeds quite agrees with General Herman Haupt in conclusions both as to theory and the necessity for putting in practise a system of exhaust for ventilation from the floors of the house, and says very extensive practise and close observation for many years past have fully convinced him that the human breath, which is the great source of contamination tends first towards the floor in a still room of 70°, and that there is a probability in a closely occupied room that there will be quite an excess in the accumulation there. This applies to rooms warmed exclusively by heated air. The contrary opinion—that is the assumption that the breath and the impurities exhaled from the body rise to the ceiling and accumulate there—was advocated strongly in the ventilation of the English House of Parliament, and it is reported that some two or three millions of dollars were spent in endeavoring to heat and ventilate that building comfortably, and as the proceedings in regard thereto were spread over the world to an extent probably one hundred times greater than any previous publication or action in regard to ventilation of any public building, that theory of ventilation became strongly impressed upon the public mind as being the correct one. I consider that idea erroneous, hence all theories of ventilation based upon it are consequently wrong. In the majority of our rooms the heated air entering (which, of course, must assume to be pure air) does not enter warmer than the contained air one half of the time and probably not more than one quarter of the time. Mr. Leeds goes on to advocate an open fire and further states "I believe it would be at all times and under all circumstances very desirable to have a large amount of the air drawn from the floor as nearly as possible under or near each member's seat, and also from under the seats of all the benches in the galleries, but to know how or when and how much to draw from the ceiling would be a much more difficult question to decide. That there should be such openings we know from everyday experience, the necessity for opening doors or lowering external windows to relieve the upper part of a room when it gets too warm. The openings at or near the ceilings require to be closed or opened according to the varying conditions of the room. Heat applied within any building causes movements of the air with more or less force according to the difference of temperature of the external and internal atmosphere. The external wind is a source of considerable power. It is important in the application of power, either to make it conform to and co-operate with the natural forces and merely assist their action, or otherwise make it of sufficient power to entirely overcome all these natural forces—if much care is not exercised in the adjustment of these forces one just counterbalances the other and stagnation is the result. Scientific and medical authorities generally concur in the opinion that in-door air after heating should contain nearly the same proportion of moisture as the average of out-door air of the same temperature, but when air is brought in from out of doors at a temperature of zero and raised by heaters to 68°, it would require the addition of 4.343 grains of water per cubic foot of air to bring it up to the required degree of moisture. For the proper moistening then of fresh, warmed air introduced at the rate of 20 cubic feet a minute for each one of three hundred persons two hours, the air taken at zero and at an average degree of moisture, no less than fifty-nine gallons of water would be required to be added. Exactly how much vapor or what per cent. of moisture is the most healthy has not yet been determined. From much observation we have taken 65 per cent. of saturation as the amount most likely to prove healthy—the mean relative humidity of the air at Philadelphia for the year 1863 was 57.2, and the mean average for twelve years, 68.5.

Dr. Wetherill in his report on ventilation of the Capitol at Washington says: "Hood, ("Warming and Ventilation,") estimates the air required for ventilation by the amount needed to take up the moisture from the skin and lungs. The air required for respiration (*i. e.* oxidation) is very much less than that needed to hold in solution the vapor of the skin and lungs, which evolve 12 grains of water per minute.

If the temperature of a room be at 60° with a dew point of 45°, a cubic foot of air will absorb 2½ grains of vapor, or, in other words, the perspiration from the body will saturate 5¼ cubic feet of air per minute. If, however, we take the dew point lower, say not to exceed 20 or 24°, then 3¼ cubic feet of air per minute will be required to carry off the insensible perspiration, while, for the pulmonary supply one-fourth of a cubic foot will be needed, making a total of 4 cubic feet. In summer, as the dew point is higher, more air will be needed, viz., 5 cubic feet per minute for summer ventilation. In a foot note to the above it is stated that Seguin gives the exhalation of water from the lungs, 7 grains, from the skin, 11 grains, total grains, 18 per minute. If the dew point is maintained uniformly at 52° the following is the calculation of quantity exact for this case: A cubic foot of air at a temperature of 65° with the dew point at 52° will absorb 2½ grains of vapor, and if we take the mean of the two authorities above cited regarding the quantity exhaled by each person, we will have 15 grains per minute, and to absorb this under the above conditions will require 6 cubic feet of air. Add to this the one-fourth cubic foot required for breathing, and we have 6¼ cubic feet as the total amount vitiated per minute. The surface of an average man is about 18 square feet. If, therefore, we imagine such a man walking in the pure open air at the rate of two miles an hour on a perfectly calm day the air will be flowing past him at the rate of 176 feet per minute, and as he is one foot deep from front to back, the average thickness of the envelope of vitiated air which surrounds him may be found as follows:

Let A = The quantity of vitiated air per minute in cubic feet . . 6¼
B = The surface of the person in square feet 18
C = The extent of the person in direction of the current of air in feet 1
D = The velocity of the current in feet per minute 176
x = Thickness of envelope in inches

$$\text{Then } \frac{12\,A\,C}{B\,D} = x$$

and x = 0.018 or 1/55 of an inch.

In supplying air for the upward ventilation of a hall containing an assemblage of people, however, it is absolutely essential that the direction of the current should be vertical, otherwise that which has been vitiated by one person would be given to another to breathe and perspire into. If we now assume a man standing upright of the average height of 5' 6", and the velocity of the current at 5 feet per minute, we will have for the value of the terms in above formula: A = 6¼; B = 18; C = 5²/₃; D = 5; whereupon x = 4.16 inches.

If this envelope of 4" thickness be drawn upward, it is clear that the nose and mouth will be always supplied entirely with vitiated air, no matter how pure it may be one foot away, while if it is drawn downward those organs will always be supplied with perfectly pure air. This consideration alone is quite sufficient to determine in favor of downward direction; there are, however, some other advantages in the downward over the upward direction. The temperature of the human body varies 2° either way from 98°, a sudden variation of 5° or 6° being said to be fatal. If, therefore, the air is supplied at a temperature of 65°, it will be 32° cooler than the body. With a downward current the head will be in this cool air while the feet will be inclosed in an atmosphere nearly if not quite as warm as the blood within them, and to "keep the head cool and the feet warm" is one of the fundamental rules of hygiene as well as of comfort.

A current of air coming up through the floor will always bring along with it the fine dust which the greatest care cannot prevent accumulating there to an extent which renders it unpleasantly sensible in all assemblages supplied with an upward ventilation. With the downward ventilation it is only necessary that the dust shall be thoroughly removed from the inflowing air at the mouth of the inlet duct to maintain the hall perfectly free from dust.

Again, with upward ventilation the entire hall is filled with vitiated air, the vitiation having taken place near the point of admission, while with the downward ventilation the ventilation takes place near the point of exit and the whole upper part is full of pure air. In a hall say, 36 feet from floor to ceiling, and the fresh air is admitted through apertures well distributed in the ceiling—it has thirty feet to move before it comes in contact with the heads of persons on the floor. During this movement all eddying currents induced by the increased velocity with which it is necessary that it shall pass through the apertures have become quiet, and the whole mass descends with an uniformity impossible to obtain in the vicinity of persons ventilated with upward ventilation, and one of the most important considerations to be kept in view in ventilating an apartment is to avoid perceptible draughts. Mr. Goldsworthy Gurney, in his examination before a Committee of House of Lords, said: "We have found the down current always more agreeable; the up current is sometimes used, but it is not so pleasing and not so effectual."

One objection used against the downward system is that it is against nature to force air downward. Although this opinion is entertained by an extremely large number of otherwise well-informed persons, every engineer of ordinary attainments knows perfectly well that it is as easy to force air in one direction as another. Another objection is, that as air is additionally warmed at the same time it is vitiated, that which is vitiated and warmed has a tendency to rise whatever may be the direction of the general mass surrounding it. This is true, but this tendency is so feeble that its opposition to a current of 5 feet per minute would not be perceptible. It has been shown that with a vertical current of 5 feet per minute the mean thickness of the envelope of vitiated air surrounding a man of the average size when standing is 4", this more than two hundred times as thick as when he is walking at the rate of 2 miles an hour in a perfect calm. As, however, the air has to be brought from such a direction that mouth and nose are always supplied with air of absolute purity, to insure the control of its direction by mechanical means, a current of 5 feet per minute has been assumed for the minimum velocity to be given.

When the weather is fine, or in other words, when the outer air from which the supply is derived is in the desired condition as regard temperature and moisture, and no expenditure is required upon its conditions, then a maximum amount may be given, the minimum being employed when its condition as regards temperature and moisture has to be changed to the greatest extent. The only limit to the amount of air it will be advantageous to supply is that fixed by the rule that the currents past the person must not be sufficiently rapid to become sensible.

Some persons are sensible to currents of much less velocity than required to render others conscious of them. Most people can feel a current having a velocity of 150 feet per minute, very few can perceive one of 90 feet per minute. To be quite sure that no one, however delicate, should be conscious of being in a current, the maximum current would be safe at 50 feet per minute. But 10 feet per minute will give a bountiful fresh ventilation. The average thickness of the vitiated envelope will then be two inches, or one hundred times thicker than when walking out doors in a calm. With downward ventilation, however, the nostrils are in pure air equally as when walking, the vitiated air enveloping the lower part of the person only, leaving him unconscious of its presence.

Even when the weather is good and the temperature of the air delightful and the wind blowing with the most desirable force, an open window in the side of a great hall filled with an assemblage of people would furnish air to those furthest from the window filled with emanations of all the persons it has passed on its way.

That the air as vitiated has a tendency to rise has been a favorite theory among scientific men. Mr. Gurney was one of the first to stoutly deny the fact in his testimony before Committees of Parliament; he asserted that the downward propulsion which the breath received by the position and direction of the nostrils did not cease so far as the impurities with which it is laden are concerned, till it deposited them on the ground, also that on a frosty day the vapor from a person's mouth may be seen to describe a parabolic curve to the ground. But any one may see

* Paper by Thos. Fuller, Chief Architect, Dominion Board of Works, read by Mr. Billings at the Second Annual Convention of the Ontario Association of Architects.

the vapor of the breath driven from the nostrils taking at first a downward course; a breath of a fair strength, with the thermometer near freezing point, may be seen by its condensed vapor driven downward and slightly outward for a foot or more.

In this observation, a wind wheel (in air of 26° Fahrenheit), moved rapidly near the body, and steadily at a distance of six inches in front and also at two feet above the head. Notwithstanding this upward current, the breath was strongly marked by condensed moisture fourteen inches below the nostrils, and, would doubtless have been seen further down but for the dissipation of the moisture.

In a room with the air at 65° the same wind wheel was in motion close to the vital parts of the body, but stopped entirely at two or three inches distance from the body or above the head—this was anticipated, because the force that carries the wheel is the rising of the air in consequence of its greater heat and lightness than that of the surrounding air, and is proportioned to the difference of temperature. In order to determine the amount of heat operating to cause the air to rise, a thermometer was placed within the clothing near the vital parts of the body, where it was found to stand at 82°, while the person remained in air at 65°. On going into air at 20° with additional clothing, the thermometer stood at 76°. The air around the body in a warm room, therefore, would rise with a force not far from 17°, while in the outer air at 20° it would rise with a force not far from 56°. Probably the air would rise with a velocity somewhat less than these figures, but relatively they are nearly correct. A more sensitive instrument would have been affected at a greater distance, but the same wheel showed a distinct downward motion of the breath 15 inches below the nostrils in opposition to all the rising tendency by reason of the warmth of the breath and air about the body, and this motion would have been shown at a greater distance by a more sensitive wheel.

Let us now suppose, to be well within bounds, the breath to be moved 12 inches below the face, the downward motion having ceased, the upward motion should then begin, which is to carry the breath up out of the way. This old breath has about one second in which to rise from rest or reverse motion, more than 12" in order to be out of the way of the next inhalation. The difference of temperature necessary to give this movement of 12 inches in the first second, if the breath rises by heat alone, will surprise anyone not familiar with such calculations, it is not less than 180°, that is to say, the breath in order to start from rest and rise 12" in one second through air at 65°, would have to be at a temperature of 245°.

The absurdity to which this calculation and experiment reduce the idea that our breath is carried away from the face by its upward tendency from heat, is increased by the observations which every one may make, that a thermometer at 65° cannot be raised more than one degree by breathing upon it at 9" distance, and that at 10" no effect can be perceived. Under the most favorable circumstances all causes combined are not sufficient to carry the expired breath up out of the way before another inhalation, as may be seen on a frosty day, and it is evident that the air contaminated by the body, if carried upward must be inhaled.

We will consider the circumstances of a large hall of assembly and show the operation of the two systems. Suppose a floor well packed with people at the bottom of a cubical or hemispherical hall: suppose them to have entered at once, the hall being previously filled with pure air; directly the lower stratum of air in which is the audience, becomes contaminated by their exhalations and emanations. Now the problem is to get that stratum of air out of the hall before any of it can come into use again, and to replace it with fresh air of the right temperature.

It is obvious that it cannot be taken out sideways, because then many would have to breathe over again the breath of others—it can be taken only either up or down. If taken up, the fresh air that is to supply its place must enter at the floor from which the foul air rises, for no air will leave the spot till other air is ready to fill its place. In order to lift the whole of the foul air bodily from the floor, it is necessary that the whole floor should be open for the admission of fresh air. Wherever there is a piece of solid floor through which the air cannot pass, there will be a dead space of foul air above it which will not rise with the rest, but will remain to be gradually mixed with the fresh air entering around it. If the dead space is considerable, the whole amount of air required must enter in the limited space of the openings, and the velocity must be proportionately increased. According as the space is reduced and the velocity increased, the air entering has a force that carries it up beyond the place where it is to be used, and mixes it with the foul air passing off, a part of which mixture will return in counter currents and gradually replace the air in dead spaces.

Dr. Reid, of the House of Commons, England, the most scientific and experienced, perhaps, of the advocates of the upward system, seeing this necessity for introducing the fresh air through the whole extent of the floor, had the entire floor made of perforated iron. This was afterwards covered with hair-cloth carpeting, and through nearly its whole extent the fresh air was admitted. The result was, that on account of the rising of dust by the entering air, and still more on account of the uncomfortable draughts brought up against the members' legs, nine-tenths of the floor was covered with sheet lead under the carpet. When the entrance for fresh air was thus limited complaints became so loud both of strong currents and of foulness of air, that the whole matter of ventilation was turned over to Mr. Goldsworthy Gurney, who undertook it on the opposite system of introducing fresh air above and taking out the foul air at the floor.

It is very important in the warming and ventilating that the pure air to be supplied should be of the same degree of temperature and the same amount of moisture as that of an open space in a pleasant time in summer.

With respect to the actual degree of ventilation necessary for health there is great difference of opinion. The following volumes of air in cubic feet per person and minute have been assigned by different experimenters: Dr. Arnot, 2 to 3; Tredgold, 4; Mr. Toynbee, 10; Dr. Bell, 10 to 25; Peclet, according to circumstances, 10 to 20; Peclet, at least 5; Roscoe, (insufficient in Barracks), 10; Roscoe requires at least 20; Dr. Reid, minimum, 10; Dr. Reid requires according to circumstances, 20 to 60; Vierordt, 2½; Hood, ("Warming and Ventilating") estimates the air required for ventilation by the amount needed to take up the moisture from the skin and lungs. The air required for respiration (*i. e.* oxidation) is very much less than that needed to hold in solution the vapor of the skin and lungs which evolve 12 grains of water per minute. If the temperature of the room be at 60° with a dew point at 45°, a cubic foot of air will absorb 2¼ grains of vapor, or in other words, the perspiration from the body will saturate 5¼ cubic feet of air per minute. If, however, we take the dew point down say not to exceed 20 to 24°, then 3¼ cubic feet of air per minute will be required to carry off the insensible perspiration, while for pulmonary supplies ¼ cubic foot will be needed, making a total of 4 cubic feet. In summer the dew point is higher, more air will be required, viz., 5 cubic feet per minute for summer ventilation.

Professor Miles in his report on ventilation of houses and schools assumes that if the temperature of the air ranges from 65° to 70 degrees Fahrenheit, we have the following average results from the respiration of an adult: number of respirations per minute 20; cubic inches of air inhaled and respired 20; cubic inches of air inhaled per minute 400; cubic inches of oxygen each respiration 4; cubic inches oxygen each minute 80; products respired: 1. damaged atmosphere with nitrogen in excess; 2. fifteen cubic inches of carbonic acid gas; 3. three grains of vapor of water.

The surrounding air is vitiated by the mixture of the products of respiration with it at the rate of 2½ cubic feet per minute. The total average loss by the lungs and skin in twenty-four hours is almost 3½ pounds of water, of which somewhat more, ⅔ say 2½, are furnished by the skin, of these 2½ pounds (only 1 6) is furnished by the vital process of secretion by the sweat glands, for the greater part of the moisture transudes through the skin by simple evaporation. For health the body must evaporate a quantity of water within certain limits; the amount evaporated is influenced by the hygrometric condition of the air and by the state of the body itself. The evaporation is increased by muscular action and by a dry atmosphere, it is diminished by repose and by a moist air.

EXTRACT FROM THE REPORT OF A SELECT COMMITTEE ON THE VENTILATION OF THE HOUSE OF COMMONS,

LONDON, PRINTED MAY 31ST, 1886.

"The plan adopted and worked for many years under the superintendence of Dr. Percy consisted in drawing the fresh air into the House and the vitiated air from the House by means of heated shafts in the clock tower and in Victoria tower. By this exhaust process the air in the House was placed under a somewhat lower pressure than the air outside, and a pull thus created which caused the entry of foul air from any accidental source of impurity within reach of this pull, as from closets, etc. Since this plan was established many years ago much progress has been made in the art and science of ventilation, especially in mechanical appliances for the purpose, and by means of these, greater efficiency and certainty, as well as increased economy in working was attained than was possible under the older system.

The great advantage of mechanical ventilation is that as the air is pumped in, a slight excess of pressure exists in the ventilated spaces over that in the outside, and therefore any section of air from impure sources, such as imperfect soil pipes, closets, etc., is avoided. The Committee, for the above reasons, are of opinion it is advisable to cut off the exhaust so that the air pressure may be above rather than below that of the external atmosphere." But it appears by evidence given before the Select Committee of the House of Commons on ventilation, June 1891, that the recommendation in the previous reports had only been carried out to a limited extent, and that the system of extracting the vitiated air at the ceiling is still in operation the witness stated that air drawn from the Court Yard passes by steam batteries by which it is warmed—it then passes down the floor of the house which is perforated all down the centre and in various other parts, there it ascends through the ceiling and passes down four shafts about 700 feet in length to the basement and then horizontally through the basement for a considerable distance and discharges into the Clock Tower where there is a very powerful up cast, which must require a very much larger consumption of fuel than would be necessary if the exhaust were from the floor of the House by mechanical means.

POSITION OF HALLS.

Some adverse criticisms having been made with respect to the House of Representatives at Washington being surrounded by rooms, and not having any contact at the sides with the external air. In a report to Congress the objection is thus met, "It is supposed by many that the inclosure of one building within another, the inner one being the hall, is a serious defect in the construction with a view to equable temperature and a healthy ventilation; on the contrary, it is a great advantage. If the hall approached the exterior wall it would be subject not only to all the internal changes of temperature and elements disturbing the ventilation, but also to all those of the external atmosphere and the weather. Almost every one of the disturbing elements that have been named would be greatly aggravated if the hall approached the exterior. External influences like those of noises, winds, and storms would make themselves felt disagreeably which are now altogether excluded. There is no doubt that the more perfect the ventilation is the more perfect the acoustic properties of the hall will be. A pure atmosphere being favorable to the speaker's health and strength, will give him greater power of voice and endurance, thus indirectly improving the hearing by strengthening the source of sound, and also enabling the hearer to give his attention for a longer period.

In compiling the foregoing remarks, the various reports to Congress by A. C. Stimers, Naval Engineer, General Haupt, L. W. Leeds, Capt. Meigs, E. Clark and others, have been freely quoted, also reports of Select Committee on Ventilation of the House of Commons, London.

After many years of study and experience I am strongly of opinion that the most efficient system of ventilation for halls for the assemblage of large numbers of people is by the introduction of fresh, pure air heated by passing over steam or hot water pipes in chambers and driven and exhausted by the most approved appliances, introducing the pure fresh air at the ceiling and exhausting at the floor, which may be termed the downwards draught and plenum system.

SANITARY PLUMBING.*

By Cesare J. Marani, Grad. S.P.S.

(Continued from April Number.)

That in so far as it lies within our power, the waste pipe system be freed from any tendency to retain decomposing matter, giving off gaseous products known to be detrimental to health, or these very gases when generated elsewhere.

From the mechanical side I should say, have the work done by a thoroughly reliable and competent workman, one who knows and realizes the importance of honest workmanship in connecting pipes, in ventilating traps, etc. To place the work in the hands of an admittedly good man, a thorough mechanic in hims lf, but one who always employs undermen to do his "jobs," and then to rest at ease with the false idea that your share of the work has been performed, and that the workmanship will turn out as desired, reminds me of the story of that simple-minded housewife, who, after placing her marketing of game and fowl on the table of her cottage, and then firmly securing the windows as against the ingress of eagles and other birds of prey, went off leaving the cottage door wide open. During her absence, the fable goes on to say, bears, and other beasts, entered and carried the marketing away.

It is the duty of the architect to determine whether the men actually doing the work are competent or not; and further, he should insist that the work be done by competent men, and competent men only, otherwise all kinds of defects will crawl into the system and prove beyond detection when the work is finished.

Recesses due to badly constructed joints, beads, and strings of solder, or the ends of gaskets in the pipe, all tend to retain filth. Bad connections between vent pipes and traps, destroy the efficiency of the latter. Unnecessary traps, or want of sufficient grade, are again, blunders for which the architect or designer of the plumbing system is alone to blame.

The sizes of the soil pipe and waste branches have also an important bearing on this point. For unless they are so proportioned as to be self-cleansing, the interior surface of the whole system will coat over with a greasy slime, known to give off pestiferous gases ten times more abominable than those found in the main sewer.

Ventilation, while indispensable as a diluter and safe remover of any gases forming or collecting in the system, tends furthermore to arrest, and to a great extent destroy, such gases forming. The free ventilation of the whole system, therefore, demands our most careful consideration. This brings up a point still at issue among leading sanitary authorities:—"The whether a trap should be placed on the house drain before it empties into the street sewer, or not." I am inclined to side with those who h ld that, while there may be some doubt as to the policy of omitting such a trap in cities, for instance like Toronto, where in the first place the main sewers have been ill constructed, and still more badly ventilated; that, even in the case of only tolerably good sewers, such arguments are only valid that advocate the omission of such traps. It is a fact that such traps arrest the flow of the waste liquids along the pipes, and therefore destroy in a measure their scouring properties, besides reducing the efficiency of carriage of the said liquids.

They also end to complicate the system by rendering it necessary to introduce a fresh air inlet pipe, on the house side of their water seals, in order to provide for ventilation.

At the best this additional pipe, when brought a few feet above the ground, certainly does not add to the artistic effect of a building, and may sometimes prove dangerous to children who may be playing in its vicinity. For since we have the pressure of this obstructing trap on the one side, and sometimes a descending column of water in the soil on the other, any gases thus confined between the two, can only escape by this so called "fresh-air inlet pipe."

Besides, I feel fully convinced that the best and most uniform ventilation for our lines of pipes and drains can only be secured when we open one end into the larger street sewer beneath the ground, and the other towards the starry firmament above the roof.

That every part of the plumbing be visible, whenever possible, and conveniently situated as against accidents and repairs.

It is not long since you could not find a single fixture in even the most costly of dwellings, that was not tightly cased in wood. This was particularly so with the water closet. Sanitarians pointed out the dangers to health arising from such a practice, and to-day one can judge of the general improved tone of public opinion on the matter, by just simply looking though any of the numerous descriptive catalogues issued by manufacturers of plumbing fixtures, etc., who, of course, study the demands of the market.

The public taste is certainly tending in the right direction, when marble topped wash basins, supported merely by open brackets or brass legs, and water-closets free from all woodwork save for an oak or mahogany top, are being introduced into the better class of dwellings.

Still we find that certain parts of our system, just as important to the efficient working of the whole, but because of less pretentious appearance than the wash basin and water closets, often seem to have been sadly neglected in the apportionment of the plumbing expenditures. I refer to the all important kitchen *sink*, and servants' hopper.

One often finds that while care and judgment are manifest in the selection and arrangements of the other fixtures of a house, any cheap concern has been accepted to pass for the kitchen sink. But, as if instigated by some secret feeling of doubt as to the justifiableness of such a course, and as if ashamed of the uncanny result, we find that the owner, or architect, has had it securely encased in carpentry.

Not only are the waste pipes, traps, and joints thus cut off from view where they most require watching, but as the dark foul space underneath the sink is invariably utilized for the storage of cooking utensils, mops, rags, old shoes, coal oil cans, scrubbing brushes, boot blackening, grease, and other matter certainly never calculated to aid sanitary conditions.

The same might be said of the servants' hopper, which should be free from all wood work.

It should be placed where a quantity of light and ventilation can be had at all times, and not carefully and gingerly confined to a little cubby hole somewhere beneath the staircase, or in a dark unventilated closet, where it works mysteriously in a mysterious darkness.

A word with regard to the soil pipe in the basement. The best practice of the day is justly tending to do away with the burying of the soil pipe within the house, and underneath the concrete or wooden flooring of the cellar. That this was a pernicious habit it is needless to explain.

Should an obstruction of any kind take place within the house, it might necessitate the tearing up of yards and yards of flooring. And then again, a line of pipes so placed could not be tested and examined as effectually as if raised clear of the floor, and open to view, leaks and other imperfections announcing their presence, and being detected much more readily, in the latter case.

That all parts be of sound material, free from flaws, blemishes, or other defects and of the kind of material best suited for their special purpose.

In the last few years wrought iron has been introduced in the plumbing of buildings, under what is known as the "Durham system of house drainage."

The great advantages claimed by Mr. Durham, a civil engineer, for his system are that "wrought iron pipes are elastic and cannot be broken, and that when lengths are screwed together in a wrought iron coupling, the joint is as strong as any other part of the pipe; furthermore, they will stand up vertically from a solid base to the height of any building without lateral support, and being much lighter are more easy to handle."

Mr. Durham goes on to say:

"By the use of wrought iron-pipes and screw-joints we construct a drainage apparatus within the building, which is gas and water tight as regards the joints; rigid, yet elastic; entirely independent of walls or floors for support, and absolutely invulnerable. As a structure it will last as long as any building will stand, and without any outlay for repairs." The thorough reliability of screw joints, and the uniformity of thickness and strength which can only be secured by the use of wrought iron soil pipes, seem to be the chief points in favour of this system.

Cast iron pipes, when of sufficient thickness, make good soil pipes. This is easily determined by their weight, and the only quality, known on the market as "extra heavy," can be safely recommended.

Even this class of pipe sometimes displays a marked unevenness of thickness on he opposite sides of a cross section, and therefore being in its weakest part no better than light pipe.

The bells on the "extra heavy" have sufficient strength to stand the caulking necessary to insure a trustworthy joint, which is not the case with the lighter class of pipes.

Lead is of course unfit for soil-pipes, and should not be used even for waste pipes when a diameter of over two inches is required. For smaller waste and vent pipes, lead can be used to great advantage, for it bends, cuts, and manipulates easily.

The thickness of any lead pipe, or in other words the weight per running foot, should always be determined with reference to the work it is intended to perform.

Cast lead traps are objectionable, drawn lead being preferable for that purpose.

Traps and pipes made by hand of sheet lead are of course out of date.

Brass is also used in ferrules and in the best forms of traps. It is also used, either polished or nickle plated, for those portions of the plumbing system that lie exposed in connection with the better class of fixtures.

Cast brass traps, are among the very best and most efficient, and to my mind a great improvement on lead traps.

Glass, when used as a portion of a trap, is objectionable, as it is so liable to break by a number of causes.

With regard to the fixtures of this system, I might say that the water closet should be of earthenware or porcelain ware, in one piece, and connected to the soil pipe by the brass flange method. Any of the washout closets are good, though the more recent siphon closets, as for instance the Sanitas, and also such improved hopper closets as the "Trent wash down," are considerably better. For the respective advantages of these I must refer you to works on the subject. Baths and basins should be of porcelain ware. When a bath of this kind should be found too expensive, a "porcelain-lined iron bath" of the Imperial class will answer well; and hoppers and kitchen sinks should be preferably of English brown ware, or Yorkshire ware. Porcelain-lined wash tubs are good, though they do not last like the porcelain ones.

That the whole system be put tightly together in the best approved manner, and possessing uniformity in strength and durability.

This comprises a very wide and important field, for, not only must the mechanical part, *i. e.*, the cutting, bending, fitting, wiping, soldering, caulking, etc. (which go to make the Art as distinct from the Science of plumbing), come under consideration singly; but the whole work must be previously thought out, with a view to uniformity of strength and durability of the entire system. While the most approved practical methods may be understood by the scientist, it takes the practical workman to carry them out in part or in whole, and for this fact a good mechanic is indispensable. For the tightness and safety, then, of our system, we have to depend on the mechanical ability of the men we employ. No matter how scientific and commendable our plans, if the workmanship prove below the mark, miserable or defective, we must expect to meet with disappointment or failure. I therefore fail to see the force of the arguments seemingly based on the

*Lecture delivered before the Engineering Society of the School of Practical Science, Toronto.

assumption that the science is everything, and the art a very secondary portion of our subject.

That this was the tendency among sanitarians in Great Britain, when sanitary plumbing received a fresh impetus some ten years ago, may be seen from the following remarks by S. Stevens Aellyer :

"If I were going to build a house for my own occupation, I should prefer the plumbing work to be done by the man who was more skilled in the science than in the art of his craft—that is to say, I should prefer a poor joint wiper to a clever one, providing the former knew what the latter did not, viz., how to select and arrange the trap, pipes, and fittings, so that they would be 'self-cleansing'; what kind of traps to select, and how to ventilate them so that they would not lose their water seals, how to ventilate the waste-pipes, soil pipes, and drains, so that the air within them should be constantly changed—know, in short, how to execute his work on sanitary principles."

In these days of *specializing* and *high speed*, it would almost be impossible to find a man who might be considered equally competent to lay out both a system of plumbing for you, and construct the same from cellar to attic with his own hands. We do not expect it. We do not want it. But we do insist on the joints being well wiped, the bends properly made, and the bells tightly caulked.

That the whole system be as simple as possible and consistent with convenience, efficiency, and security.

I think this appeals to all scientific minds, though I know of certain plumbers in this town, who, if judged by their works, certainly could not be said to agree with me in this respect.

However, I am glad to notice that there is a strong tendency towards simplification in plumbing work throughout this continent, which will tend to make good plumbing more popular and less costly, and I firmly believe that a judicious use of anti-siphonic traps will prove one of the greatest factors in simplifying the house-plumbing of the future.

While I do not admit that they are preferable in *every* case, and for *all* fixtures, still I will say this, that the better kinds are more trustworthy, and less liable to get out of order than architects and sanitarians imagine, and further, that for certain cases they are undoubtedly the only traps that meet the requirements to any degree.

Owners should be advised against such fads as, for instance, having a basin, or other fixture, placed in some remote corner of the house, and at a considerable distance from any of the main pipes of the plumbing system. Such arrangements greatly increase the number and complication of pipes, not to speak of the cost, and the fact that security is being sacrificed, in a measure, for trifling convenience.

At present the vent-holes in water closet fixtures are made too small. A water closet trap should be vented with nothing less than a 3-in. vent pipe, and running traps under basins, etc., should be vented with vent-pipes at least of the same size as their wastes, and in most cases a little larger diameter is preferable.

Sanitarians seem to forget that while ventilating pipes are useful in preventing the siphoning of traps, their principal work is to ventilate. Experiments have shown that they cannot do this *effectively*, unless they are made large enough.

As sink wastes have a tendency to be too large, we may therefore expect to see, in the near future, the diminution of the diameter of certain wastes, and the enlarging of certain ventilating pipes, and thereby the increasing of the efficiency of both.

That the appliances used be economical, reliable, and adding materially to the comforts of the inmates of the building.

In conclusion, I may say that the number of fixtures in a dwelling should be kept down as much as possible. Not merely from a consideration of economy, but from the more important standpoint of health. The oftener traps are used the better. Where a house has a large number of basins, some may be rarely used, and their traps are liable to evaporate away. Wherever overflow-pipes can be done away with, it is for the better.

Basins provided with the Boston plug, which acts both as a plug and as an overflow waste in itself, are the best fixtures of the kind on the market to-day. Wastes from refrigerators, cistern, safes, etc., of course should never be connected directly to the plumbing system, but all these secondary points are well treated in any of the more recent books on the subject.

After all, the underlying principle of "sanitary plumbing," is to secure such an arrangement of pipes, traps, and fixtures, that any solids, liquids, or gases can readily and speedily find an entrance into the plumbing system, at any of the openings in the house; but that having once gained an entrance, they can never-more return to injure the health of the inmates of that dwelling. When this fundamental principle is thoroughly understood, it should not prove a hard task to determine upon a sanitary system of house drainage.

The Hobbs Hardware Company, London, Ont., will start a bevelling, silvering and plating factory.

Mr. E. R. Burpee, is at the head of a company which proposes to establish granite polishing works at Calais, N. B.

Mr. Peter Nicholson, one of the oldest contractors of the city of Montreal, died on May 3rd from injuries caused by a runaway horse. Deceased, who was seventy-one years of age, was a native of Castleton, Caithness, Scotland. He was a resident of Montreal for thirty-four years.

MANUFACTURES AND MATERIALS

HYDRAULIC CEMENTS—NATURAL AND ARTIFICIAL, THEIR COMPARATIVE VALUES.*

(Continued from April Number.)

The Board of Public Works, or the city engineer advertises for cement. The specifications call for a certain fineness, and so many pounds tensile strain—1 hour in air and 23 in water.

Then up comes the great unwashed army of cement-makers, who, unlike the engineers that sit in judgment over their hard-wrought products, have not yet awakened to the wondrous advantages of association, having no "A. S. C. E." (American Society of Cement Experts), through which to elevate their calling to the dignity and standing it deserves. And so they scramble up to the engineer's office each with his pockets filled with testimonials proving his cement to be the best manufactured in the United States.

And what of the engineer? We notice a peculiar gleam in his eye, that we never observed before. Serenely he surveys the group of uneasy cement-makers before him. He opens the bids, and as usual, the figures are all bunched closely together. The cement-makers are anxious. Not so with the engineer, for with a sardonic smile he vouchsafes the blood-curdling information, that the board had ordered a testing machine.

In the course of time it is announced that the contract has been awarded to Mr. A., as his cement stood the highest in the test. Then another city advertises, and the same operation is repeated, and B gets the contract, because his cement stood the highest in the test. And so with one city after another, and the cement-makers from A. to Z. all get a chance, and all are satisfied, for each has found a place where his cement has tested the highest, thus proving conclusively that each brand was the best.

In our search for the key, with which to unlock the door of discovery of the connecting link, that as we have said ought to exist between high tensile strain and first quality, we have traveled up and down the whole line, commencing with cement containing 50 per cent. clay and 50 per cent. lime, and following along up through its varying mixtures until pure white lime with no clay is reached.

These we have studied under every conceivable manner of manufacture and subsequent manipulation. Studying the varying properties, with all their bewildering and mystifying contradictions; plodding through the thousand and one phrases that are continually being developed in the course of a long experience in the study of the natural cements of this country, no two brands of which are alike in their proportions of lime, magnesia, silica and alumnia; searching the tables of tests made by prominent engineers from time to time; comparing the tables with the analyses of the brands tested; weighing carefully every feature that gave the slightest promise of throwing light on the subject; and now, after all these years, we are compelled to admit that we have not been able to discover the slightest relationship between the high test and good quality. We cannot tell what the future may have in store for us. Some genius who may not have devoted more than his spare moments to the subject, may tell us all about it.

Practical experience teaches that we can find both good and bad cements that will sustain a high tensile strain, and that we can find both good and bad cements that will test low.

Portland cement has not been in use in this country long enough to earn the position it now occupies, but owing to some peculiarity in its molecular construction, it will test higher than our American cements and will get harder. Yet hardness is no evidence of durability; with equal exposure, a flint stone will disintegrade much more rapidly than a soft magnesian lime stone.

But the demand is for a higher testing cement, and the engineer who years ago, used American cements in a sewer or bridge, without a thought of failure and with no signs of failure yet in sight, will incline to the belief that he ought to use a better cement, and so Portland is used in what are called trying places. But the fact that he once used American cements successfully in places just as trying, is dismissed, for he does not care to take any chances of that kind again, and so public opinion has been built up, and it would be a rash man indeed who would dare to stand up against it.

Even the manufacturer of a first-class American cement, who may have grown grey in the business, looking back over the field, calls to mind the work done with his cement. Here is a costly bridge with its piers reaching far down below the surface. There is a tunnel running through the base of a mountain. He recalls the great bridges over the Niagara, the water works tunnel under Lake Michigan at Chicago; the great bridges spanning the Ohio, Mississippi and Missouri; the thousands of miles of railroads with their innumerable culverts and bridges; the sewers in all the cities of the country, amounting in the aggregate to hundreds upon hundreds of miles. With all these marvelous engineering works of the past to look upon, consuming upwards of seventy-five million barrels of natural cement—all manufactured in this country, and none of these works requiring renewal on account of the poor quality of the cement used, yet the manufacturers of this enormous amount of cement are daily reminded that their cement is an article, good enough perhaps of its class, but it is only a common cement at the best.

(To be Continued.)

*Extracts from a Paper read before the Society of Arts of the Massachusetts Institute of Technology, Boston, Mass., by Mr. W. Cummings, of Buffalo, N. Y.

WE

Want every builder to become familiar with Adamant. It is the only fire-resisting water-proof mortar on the market. Its many advantages

ARE

obvious. It works easier, is harder, cleaner, and in the end more satisfactory than any plastering compound known. Our references are

THE PEOPLE!

Adamant Mfg. Co.,

100 Esplanade East,

Telephone 2180. - TORONTO.

Portland Cements

All the best known brands at from $1.80 per cask.

ROMAN CEMENT **KEENE'S Coarse, Superfine and Parian CEMENT**

SEWER PIPES, Standard and Scotch,

Fire Bricks Fire Clay Flue Covers Chimney Linings and Tops

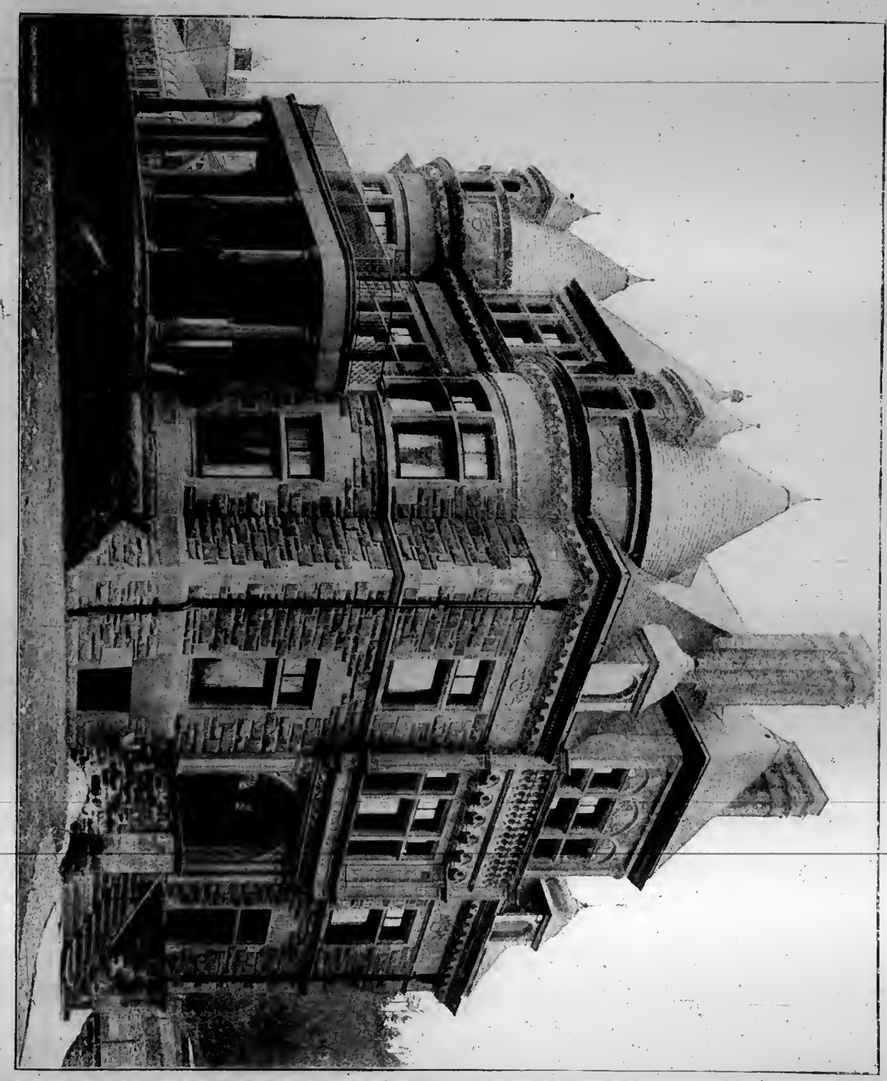
CALCINED PLASTER We are Agents for the best Nova Scotia makers.

Scotch Derricks, Building Sandstones, and all kinds of **BUILDERS' and CONTRACTORS' SUPPLIES**

THE LARGEST STOCKS IN CANADA OF THESE GOODS, AND AT BOTTOM PRICES.

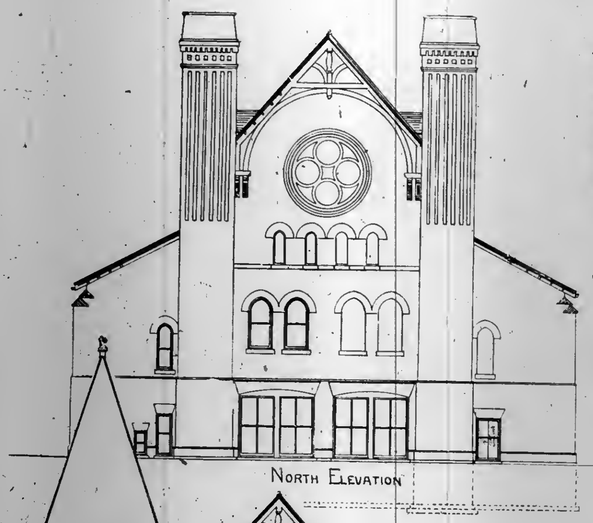
W. McNALLY & CO.

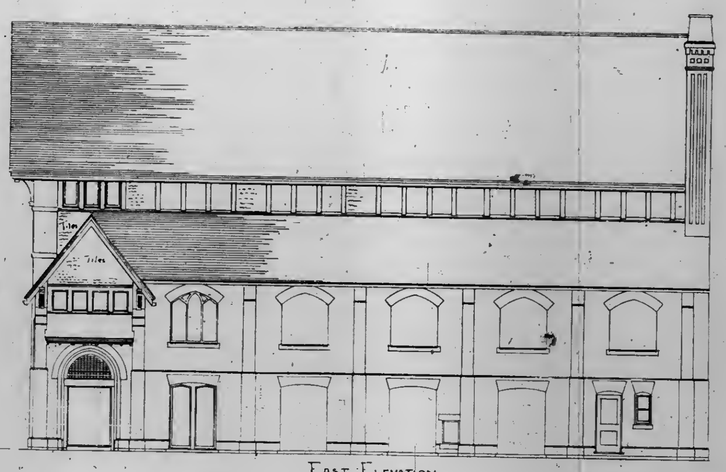
ESTABLISHED 1875.) - **MONTREAL.**



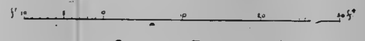
RESIDENCE OF R. B. ROSS, ESQ., MONTREAL.

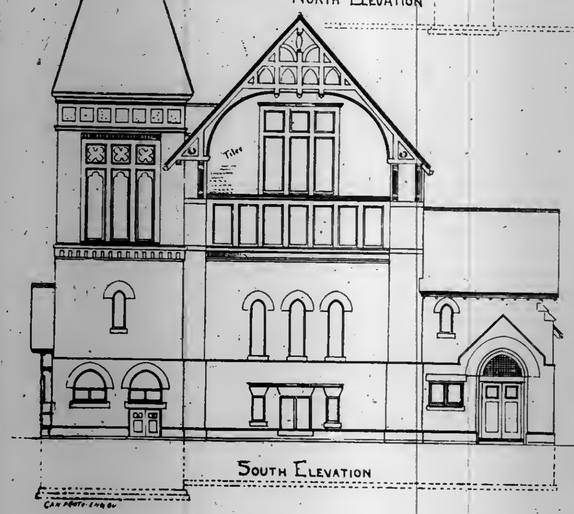
BRUCE PRICE, ARCHITECT, NEW YORK

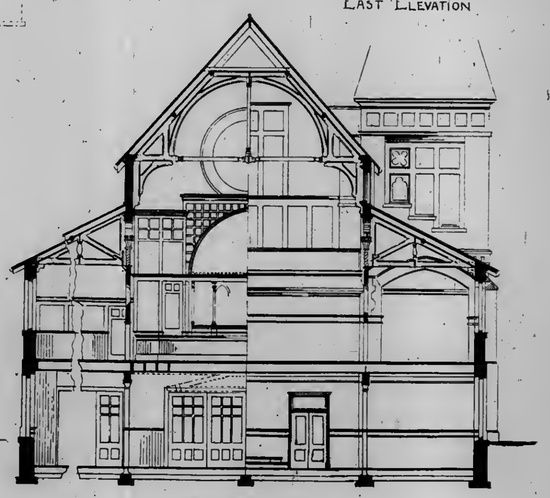




Langley & Burke
Architects
Toronto



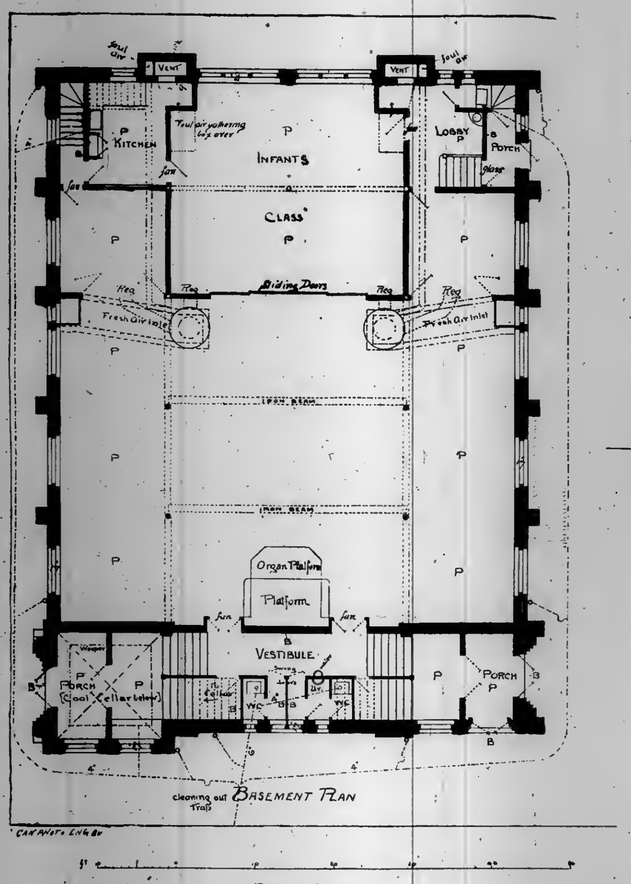




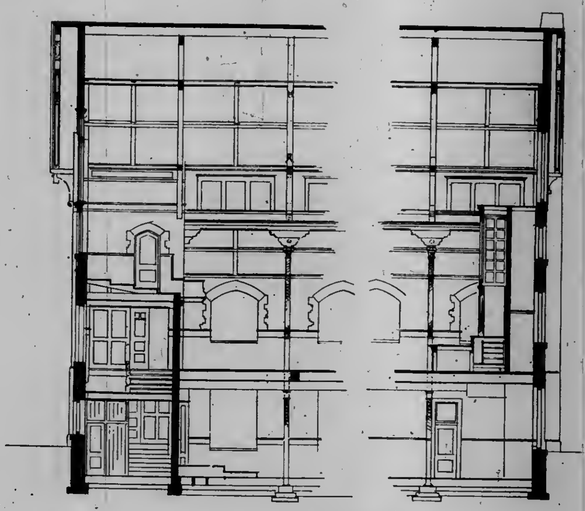
Baptist Chapel, Walmer Rd., Toronto—Langley & Burke, Architects.

(Illustrative of Article on "How to Estimate," in this Number)

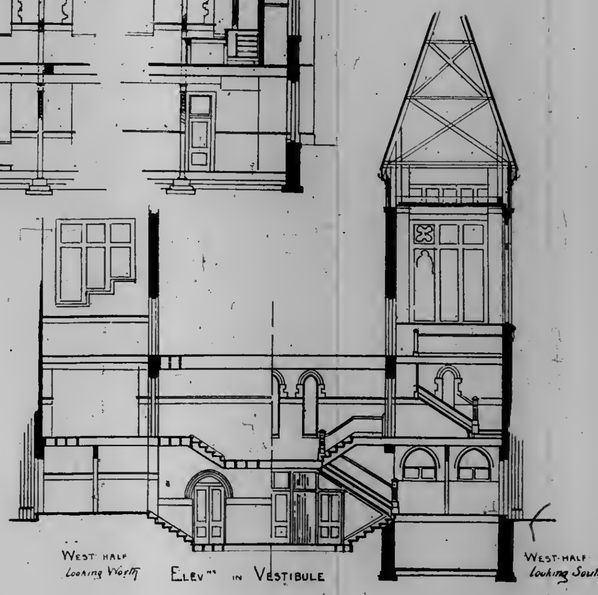
Baptist Chapel Walmer Rd Toronto

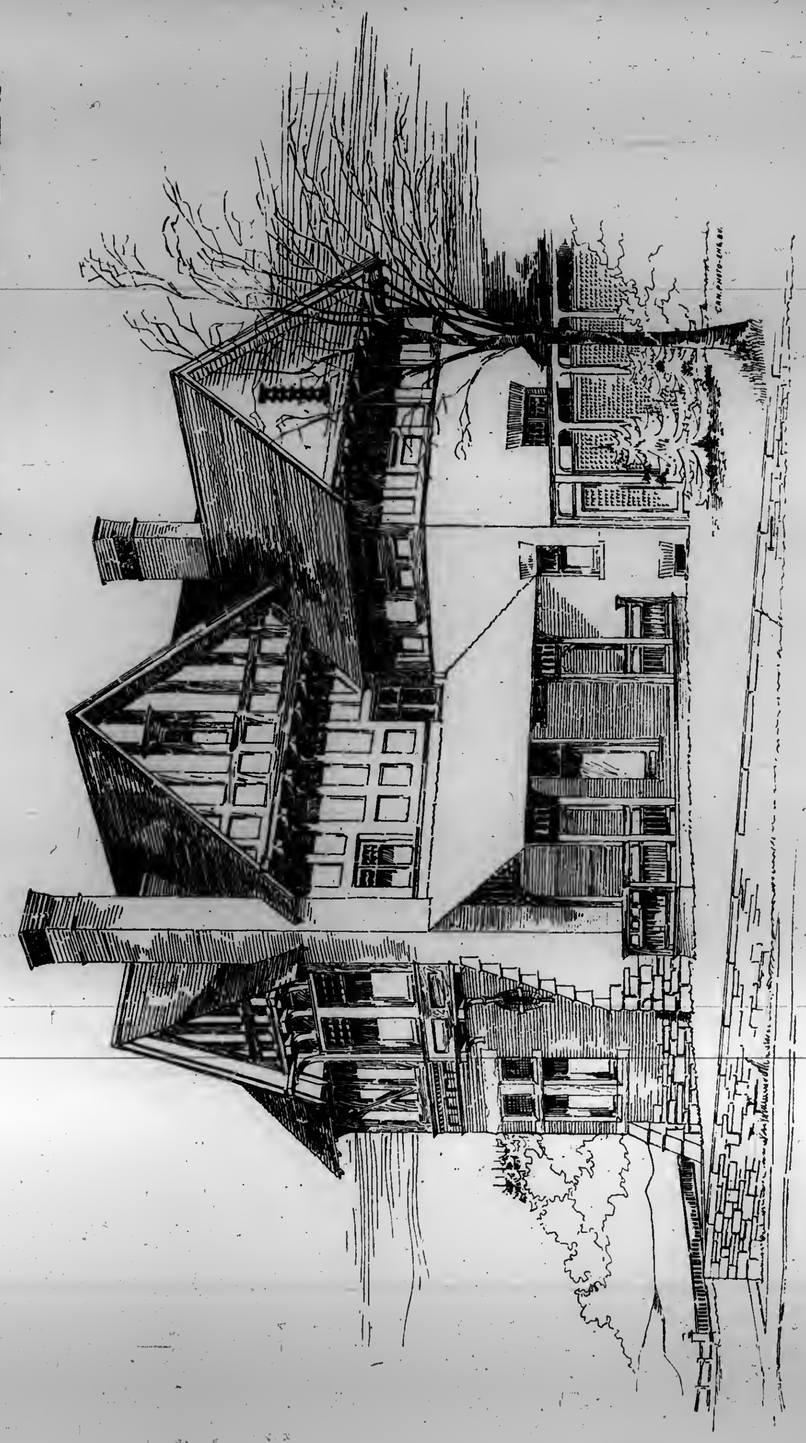


Scale of Feet



Langley & Burke
Architects
Toronto





HOUSE FOR E.A.WILLS, ESQ. TORONTO,
J. FRANCIS BROWN, ARCHITECT. BOARD OF TRADE BUILDING.

J. FRANCIS BROWN, DEL.

FRONT

Sketch for a Church—Submitted by J. Francis Brown, Toronto.

Sketch for a House—Submitted by W. Munro, Toronto.

O.A.A. EXAMINATION IN DESIGN.

CANADIAN ARCHITECT AND BUILDER.

VOL. V.—NO. VI. TORONTO AND MONTREAL, CANADA, JUNE, 1892. PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

14 King Street West, - TORONTO, CANADA.

64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	S. G. CURRY, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton
TREASURER	D. B. DICK, Toronto.

COUNCIL:

WM. G. STORM	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
JOHN E. BELCHER	Peterborough.
EDMUND BURKE	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON — Merchants' Bank Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	F. X. BERLINQUET, Quebec.
1ST VICE-PRESIDENT	VICTOR ROY, Montreal.
2ND VICE-PRESIDENT	J. NELSON, A.R.C.A.
SECRETARY	C. CLIFT, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. C. HUTCHISON, R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
ALPH. RAZA	Montreal.
J.-F. PEACHY	Quebec.

A DICTIONARY of Architecture has just been published which has been in course of preparation in England for more than forty years. With the exception of some twenty copies the edition which has been published has been sold to subscribers. As the work is said to be most authentic and complete, it is hoped a new and cheaper edition may be published.

THERE died in one of our Canadian cities recently a gentleman who delighted to call himself the friend of the widow and orphan. His will, which has just been admitted to probate, disposes of property valued at nearly half a million dollars, yet strange to say, not a single dollar thereof has been devoted to the benefit of widows and orphans or any other benificent object. It is to be regretted that so few bequests are made by men of wealth in Canada for charitable and educational purposes. It is true that some very handsome endowments have been made by wealthy citizens of Montreal to institutions in that city, notably the Royal Victoria Hospital and McGill University, but the number of philanthropists is by no means as large as it ought to be.

A BY-LAW respecting the construction of building scaffolds has recently passed the Toronto City Council. The by-law simply indicates the materials of which scaffolds should be built and stipulates the method of their construction. The City Commissioner is empowered to prosecute any person who may proceed with the erection of buildings using scaffolding which is not constructed in accordance with the by-law, or in the event of finding a scaffold which in his opinion is unsafe, any person who, after due notice, neglects to make the same satisfactory. The penalty for violation of the by-law is not to exceed $50 for each offence. It will be observed that the proposal urged upon the Council some months ago for the appointment of an expensive corps of scaffold inspectors has wisely been disregarded. The by-law in its present form will not be likely to prove very objectionable to builders.

AT the time of going to press, the city council of Toronto had not appointed a City Engineer. Unless Mr. Jennings could be induced to again take the position at his former salary, we doubt whether the Council will be able to appoint a more satisfactory man than Mr. C. H. Rust, at present acting City Engineer. Mr. Rust has been connected with the Engineering Department of the city for upwards of fifteen years. For several years he has had the entire charge of the construction of sewers, and in this capacity has done satisfactory work and proved himself to be possessed of the requisite executive ability. If Mr. Rust has given the city good service in the past, and is capable of filling the larger position, it would be unfair to give the appointment to an outsider. Should circumstances occasionally arise calling for engineering experience and ability of the highest order, the temporary assistance of an expert consulting engineer could be obtained. Such occasions are not likely to be frequent, and consequently should not involve large expense.

WE learn from the *Brickmaker* that there is much indignation expressed by Hudson River brick manufacturers over the action of the United States government in stopping French Canadians from going over the line to work on the brick yards under the Contract Labor Law. It has been the custom for years for these men to work in the brick yards during the summer, over 1,000 of them being employed every year. They spend most of their wages in the States, and before going home to work in the woods in winter lay in their supplies. The effect is, the manufacturers say, to cripple the yards, without benefiting the country, for the places of these men are gradually being filled by Arabs from the Holy Land who will carry the money paid them out of the country. The Alien Contract Labor Law, and some other measures recently enacted by the government of the United States, have to a large extent brought the statesmanship of the Republic into contempt before the world. Without attempting to detract from the many admirable characteristics of the American people, it can truthfully be said that as a nation, the United States has stooped to petty meannesses which no other country of importance on the face of the earth would be guilty of. In some instances the self

respect of the nation has been dragged in the dust by politicians anxious to make themselves and their party "solid" with certain vote controlling elements.

THE removal of St. Andrews Church, Toronto, from its present situation, at the corner of King and Simcoe Streets, to an up-town location, has been decided upon. No doubt, from the standpoint of the church's interest, the decision is a wise one. The building is situated at too great a distance from the modern residential part of the city, and in consequence, some of its members are forced to attend other churches. The removal of this church will deprive the city of a piece of street architecture which for nearly twenty years has stood an object of pride to the citizens and of admiration to visitors. The site on which the building stands was deeded to the trustees on the condition that a church would be erected thereon within a fixed period. When the limit of time had nearly elapsed a competition was held with the object of securing suitable plans for a building. The plans submitted by Mr. W. G. Storm, of Toronto, were chosen, and the building erected therefrom at a cost of $100,000. An illustration of the building, which is in the Norman style, is published in the present number. Tenders are now being asked for taking down the church and for its re-erection on a new site. It is estimated that the depreciation in the material would amount to about twenty-five per cent.. It is not the intention we understand in re-erecting the building to make any alteration in the design. It is to be hoped that proper care will be taken to select a site which will display to not less advantage than at present its beauty of design.

CANADIANS should make the most of the opportunity afforded by the approaching World's Fair to make known to the world the capabilities of this country and its people. We are pleased to notice that in agricultural, manufacturing and other lines, steps are being taken in this direction. It would seem pertinent to enquire what will be done to show the status of Canadian architecture. The desirability of making a Canadian architectural exhibit will hardly be questioned. Such an exhibit would tend to attract to Canada persons of refinement, many of whom have been imbued with prejudice against it in consequence of misconception regarding its climate and the status of its civilization. Canadian architects should lose no time in preparing for this exhibit designs which should exemplify their best talent. They should be sufficiently patriotic to devote whatever time and money may be necessary for this purpose. So far as time is concerned, the prevailing dullness has left many members of the profession with abundance of leisure which could not be used to better advantage. We are pleased to be informed that some prominent members of the profession in Toronto have already decided to exhibit their work either individually or in conjunction with other exhibitors, as circumstances may direct. It will of course be necessary to decide the conditions under which the exhibit should be made; that, however, is a matter of future arrangement. As the preparation of suitable drawings may be presumed to occupy several months, it is very desirable that a commencement should be made at once.

A COMPETITION was instituted last year for designs for an Episcopal Cathedral to be erected in Victoria, B. C. The limit of cost was fixed at $150,000, a sum very inadequate for the purpose. The competition closed on the 31st of December last. The competitors numbered fifteen or sixteen, and were almost equally divided as between English and Canadian architects. Three prize were offered, the first being $750 and 5 per cent commission on the cost of carrying out the work; the second, $500, and the third $250. Sir Arthur Blomfield was appointed to judge the designs. His award has just been announced. The first prize is given to Messrs. Evers & Keith, of Victoria; the second and third prizes will, it is said, go to two of the English competitors whose names have not yet been disclosed. The Canadian competitors, being situated at such a distance from the place of award, had two weeks less time than their English competitors in which to prepare their drawings. In consequence, some of the Canadian designs had to be forwarded in an incomplete condition. The accepted design is said to be in the style of the XIII century. The total length is 236', height of spire, 275', internal height of ceiling of nave 72'. The cross has been retained as the basis of the plan, the transepts being shallower than in most of the old examples. The tower has been placed in the centre of the west front. On the east side of the east gable rise two turrets 93' in height. The walls will be of stone with cut stone finish, ceiling of cedar and roof of slate. The total seating capacity is 1468, 3'3" x 1'1½", being allowed for each person. The enterprise may be regarded as an English rather than a Canadian one, as it is understood that two thirds of the cost will be defrayed out of subscriptions of well known English philanthropists.

SCIENTIFIC men and the general public have indulged the belief that of late sanitary science has been making satisfactory progress. In his paper on "The Free and Liberal Ventilation of Sewers in its Relation to the Sanitation of our Dwellings," read before the Royal Society of Canada, on May 31st last, Mr. Chas. Baillairgé, City Engineer, of Quebec, puts himself squarely in opposition to some of the most important doctrines of modern sanitarians. He says: "A host of unemployed would-be-scientists in each city, are constituted a 'Board of Health,' elect a President, Vice-Presidents, Secretaries, Treasurers; appoint health officers, inspectors, etc., and this galaxy of hygienists, to give themselves an air of public usefulness, prove over zealous in clamoring against the falsification of alimentary substances, in advocating and filtering of water, in conjuring up microbes, bacteria and contagious diseases, in battling for vaccination, disenfection, ventilation and the like. They fancy they are serious and in the end become so, and would convince people that a thousand precautionary measures are at present indispensable, of which no one ever dreamed in the past, and without in any way suffering therefrom." And again: "let me say in one word, to have done with these preliminaries, and show that in many cases, the evil is not nearly as great as it is said to be, that while we are crying out for ventilation, nine tenths of the human race do without it and appear to be none the worse for ignoring it. A thousand precautions are sought to be enforced in the drainage of our houses. Thousands of towns and villages, the wide world over, ignore the thing entirely and live quite as long as those who at such great cost give themselves the luxury of sanitary modes of removing their excreta; and during epidemics, as during normal times, there is no more, no less sickness, there are no fewer, no less deaths in the one case than in the other." These opinions, from which most persons will feel inclined to dissent, are to some extent modified by those following, in which the importance of providing for the exclusion of sewer gas from dwellings is discussed.

CHARACTERISTICS OF ARCHITECTURAL STYLE.

BY G. F. STALKER.

SINCE the Queen Anne revival, and to a large extent on account of it, there has been more energy and individuality displayed in the architecture of Great Britain, her colonies and America, than has been the case in any similar period of the world's history. It is a noticeable fact at the same time, and probably also attributable to the same cause, that during this time style in architecture has got somewhat mixed. The misfortune in regard to the Queen Anne revival was not on account of any lack of genius on the part of the architect who was the chief mover in it, but that the Queen Anne style (if style it may be called) was essentially debased and impure. During the latter part of the reign of Queen Anne, when the kind of building which bears her name was in vogue in all its pristine impurity, architecture was at as low an ebb as it well could be. The knowledge of art, in any of its branches, had departed; but the belief that Rome was the mother of art and Italy its home, possessed the minds of the people; and consequently nothing that had not a smattering of Roman or Italian art would pass muster. And, as generally happens under such circumstances, the least pure features of the Italian renaissance, with its broken backed, curved or twisted tympani, its disproportioned mouldings and obtrusive carving, were copied and stuck on to buildings in England, without any regard as to fitness or congruity. And in these latter times the absurdities, and the outgrowths of the ignorance displayed in the days of Queen Anne have come to be looked upon as quaint, piquain, or artistic architectural adornments. But there is properly speaking, no style in them. A cool headed architectural critic would pass over the Queen Anne period without the slightest notice. A much better revival and one more likely to be lasting, is the Norman. This is often but most erroneously called "the modern Romanesque," but there is nothing Romanesque in it, excepting that the semi circular arch is used, and this was also the dominant feature of the Norman. Everything else in this revival is peculiarly Norman, and consequently it is based upon a style of great purity. Herein, then, lies the great difference between the two. In the latter, modern architectural expression has been founded upon a distinct language, in the former it rests on a poor kind of patois. These two revivals are noticed here merely to show the effect that a clear knowledge of architectural style will have upon any attempt which may be made to found a new development, or departure, in architecture, upon any style which has previously existed. To take as a model the class of buildings that were erected at a time when architectural knowledge was meagre, and the outcome of it in consequence debased, may create a fleeting fancy, but will have no lasting beneficial effect on architecture. While, on the other hand, to take as a model a period when architecture was studied and practiced as a fine art, the result cannot fail to have a good and permanent influence.

The question of inventing a new style of architecture is often raised by unlearned men; and architects are often taunted with the fact that they are unable to accomplish this object. But then no man ever did invent a style of architecture or a language. They are both the growth of centuries, having in them the distinctive marks of the people amongst whom they have sprung up, and have been developed and perfected, but bearing also upon them traces more or less definite, of international influence. It is, therefore, no disgrace to a young country like Canada, that she has not yet reached that fulness of architectural stature, to claim for any of her buildings a truly

and distinctly national character. At the same time, the tendency of architects in the Dominion is happily in this direction. And this being, the case a consideration of the characteristics of architectural style may not, at the present time, be deemed inopportune or unimportant. It is a matter of uncertainty to fix the dates of some of the older buildings of the world, or even to be very positive in asserting what nation has the first claim to have had a national style. On these points the doctors disagree, but the majority of writers are of opinion that, in the architecture of Egypt, we are taken further back in the history of the world, than in that of any other nation. It is now known, beyond question, that some of the pyramids were erected at least 3000 years B. C., and when the great mechanical ingenuity displayed in these wonderful structures is taken into consideration, together with other evidences of the high state of civilization the Egyptians had attained at that early period, we are absolutely at a loss to ascertain how far back their history as a nation extends. For the purpose of this paper, however, it is sufficient to start with the pyramids, as the earliest architectural monuments known to us in the world.

In these, as in all other buildings which have been discovered in Egypt, the great predominating feature is mass. The Egyptians were essentially builders, and they built for eternity. It is nowhere found in any of their buildings, not even in the tombs or temples, that the details are emphasized in such a way as to detract from the massiveness of the whole composition. Simplicity and stability were with them of the first importance, and where ornament and color were introduced, their introduction did not in any way lessen the sombre grandeur, or the eternal purpose of the structure. But being kept in subjection and painted or carved with remarkable fidelity and truth, they served the double purpose of affording relief to the eye, and giving scale to the buildings.

In many of the chambers of the pyramids, and particularly in the tombs and temples, color was freely used; not as an after thought, (as decoration is arranged for in our own day) but as an essential part of the original design. And though the colors were always brilliant and lustrous, the general harmony was maintained so perfectly that the effect was always pleasing. The subjects chosen for these mural paintings were generally scenes from their daily life; and so from these we have a more accurate history of this people than we have of many nations that came into existence when ancient Egypt had almost or altogether disappeared. Sculpture also, was very largely used, and wherever it was applied, like painting, it formed part of the original conception. And these sculptural representations may always be taken to be most faithful portrait. No flattering touches were permissible. The sculptors were required to adhere most scrupulously in every line and feature, to an exact representation of the original. Some writers on Egyptology even go so far as to assert that rigid accuracy both in painting and sculpture, wherever the human form was concerned, was not so much an artistic as a religious necessity. In the more strictly architectural ornamentation of their columns, doorways, cornices and other portions of their buildings, however, although their ornament was generally based upon natural objects immediately at hand, it was invariably conventionalized. And when color was applied in these cases, it was so arranged as to contribute to the harmony of the whole composition.

The remarks which have been made have reference, as any one may see, to the great public buildings of Egypt. But with regard to the domestic architecture of the country, very little is known. Even from the solitary example now remaining at Medinet Habou (this being a royal pavilion) we can form only a faint idea of the general character of their domestic work. But we can well imagine that the people who erected, with such taste and skill, pyramids, temples, tombs and palaces, which were intended to defy the destructive forces of time, must have exhibited the same refinement in their domestic work, although they may have built their houses with more perishable materials.

A very singular and noticeable fact with regard to Egyptian architecture, is the continuance of the national features and characteristics of the style right on until the time when it may be said that Egypt ceased to build. The Egyptians were conquered by the Greeks and afterwards by the Romans, two great building nations, but, unlike any other people who fell under their domination, their influence on the architecture of Egypt is nowhere visible. Many great and notable buildings were erected both under the Greeks and the Romans, but they were carried out in every detail just as if neither Greek nor Roman had ever seen Egypt. This is very strong evidence that those two great peoples saw in the architecture of the country they had conquered, its absolute suitableness to that country, for, though they both imitated and grafted on to the styles which bear their names, features essentially Egyptian, they left the architecture of the country, during the period of their occupation, altogether untouched.

Following the Egyptian period, in point of antiquity, we reach the Chaldean, in which, however, must be included the Assyrian and Persian styles. The oldest buildings of these people so far as can be ascertained, date back to about two thousand five hundred years before the Christian era. Unfortunately the materials used were mostly of a very perishable nature, such as wood and sun-dried bricks, so that the remains of them are, in most instances, nothing more than heaps of shapeless ruins. But during the reigns of the Assyrian and Persian monarchs, more durable materials were manufactured or imported, and then many palaces and a few temples were erected of gigantic dimensions, and in all the gorgeousness of eastern show and splendour. Symbolism and allegory, having always been the most natural expression of the mind of the western Asiatic, are, in the Chaldaic buildings, employed to their fullest extent. As a necessary consequence they are more decorative than architectural, in the strict sense of the word, always gorgeous, though sometimes having a leaning to the barbaric. Some of the architectural forms they invented, were, however, turned to good account by the Greeks, and are better known to us in their European than in their Asiatic dress. At the same time the remains which have been, and which, it is to be hoped, will yet be discovered and explored (such Nineveh, Persepolis, etc.) must always be of vast importance and interest, although more to the historian than to the architect.

Unfortunately, the Jews had no style of architecture whatever that they could call their own. The greatest buildings that were erected in Judea, even during the time when they endeavoured to mark their prosperity and importance on the history of the world, were the conceptions of foreign architects, and the execution of foreign builders. Probably this is due to their too literal interpretation of the second commandment. But whether this is the case or not, the fact remains the same, that there is nothing essentially Jewish to be found in the whole history of architecture.

ONTARIO ASSOCIATION OF ARCHITECTS STUDENTS EXAMINATIONS.

In response to a number of requests we publish below the examination papers used in the above examinations:—

Practical Knowledge of Building Trades.

FINAL.

APRIL 5TH.

MR. E. BURKE, *Examiner.*

NOTE: *120 Marks will be the maximum number possible to be obtained and 60 per cent. the minimum to pass.*

Values.

10 1. Name a simple method of "squaring" in laying out the lines for the erection of buildings. What are "batter boards"? and what is their use?

15 2. Draw to a scale of ½" to the foot, a section of a cellar wall of rubble stone 18" thick, showing proper construction, with footings and methods of keeping the walls dry and of removing water of soakage and springs. Write explanatory descriptions.

15 3. Draw to scale of ½" to the foot, to carry an iron column, a brick pier 2' 3" square, 8 ft. high, with double footing course. Show also plans of two consecutive courses of the brickwork. Wood beams 10"x12" will rest upon two sides of the pier, one foot below the top, in such a manner as not to weaken it.

15 4. In constructing a heavy tower wall of stone, in connection with a lighter stone wall abutting upon the same, what precaution should be taken to prevent unequal settlement which might occur even when the footings are properly proportioned to sustain the superimposed load.

12 5. What is underpinning? and how done? Give explanatory sketch. How would you support a brick wall when inserting a breastsummer? Show sketch with explanatory remarks.

12 6. Indicate the construction ½ size of the joint of an 8" cast iron pillar of x section set upon a cylindrical pillar of cast iron 9" diameter. The latter also carries two beams 8"x12".

12 7. Draw ½ size proper method of superimposing wood posts carrying beams, so that the latter may burn or fall out without endangering the whole building. Show also connections of beams to walls with the same object in view.

15 8. Draw section to ¼ scale of a Queen Bolt Composite roof truss of 50 ft. span and pitch of 30 to 40 degress. Show details ½ size. Indicate parts in compression and tension.

20 9. Indicate construction of iron floor beams and posts showing method of fire proofing.

15 10. Show approved construction of a first class veneered door. Show to an inch scale a horizontal section of a boxed window frame with inside folding blinds in boxes.

10 11. Describe and sketch two methods of forming valley and hip flashings. Also method of flashing a slate roof of ½ pitch at a parapet wall.

15 12. Describe three coat plastering, mentioning points in regard to each coat. How should successive coats of paint be treated to gain a proper surface. Show a section of the leads in lead glazing and method of inserting and holding glass.

Strength of Materials.

FINAL.

NOTE: *100 marks count a full paper.*

Values.

15 1. What would be the proper Form of Cross-Sections for a Beam of (*a*), cast iron; (*b*), wood; (*c*), rolled steel; giving your

reasons in each case. Explain the circumstances governing the selection of a factor of safety in each case.

15 2. Explain fully what is meant by the following terms : (*1*), Beam ; (*2*), Short Post ; (*3*), Long Post ; (*4*), Cantilever ; (*5*), Strut ; and (*6*), Tie-rod.

10 3. Explain at length what is meant by (*a*), Shearing Force ; (*b*), Bending moment at a vertical cross-section of a beam.

10 4. How are the Normal and Shearing Stresses distributed over the vertical cross-section of a uniformly loaded horizontal wooden beam.

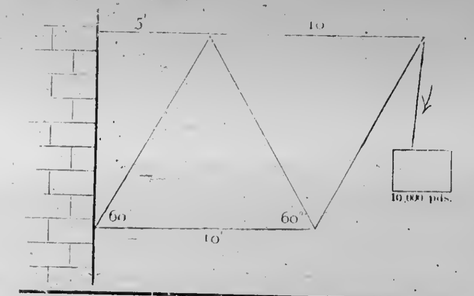
15 5. Explain the principle governing economy of material in bolts and rivets. Find the pitch of the rivets in a plate butt-joint, with a pair of cover plates, double rivetted in terms of the diameter of rivet and thickness of plate.

20 6. What is meant by the terms : Modulus of Elasticity and Limit of Elasticity. Explain fully.

10 7. State clearly the various conditions upon which the strength of posts depends which are long enough to be liable to flexure.

15 8. State and explain the equations of equilibrium for forces acting on a rigid body in one plane.

20 9. Calculate the Stresses in the following truss : (*a*), Analytically ; (*b*), Graphically.



Structural Ironwork.

SECOND INTERMEDIATE.
APRIL 6TH.
MR. E. BURKE, *Examiner.*

NOTE : *100 marks will be the maximum obtainable and 50 per cent. the minimum to pass.*

Values.

10 1. Draw a section ½ full size of a flitch-girder, the timber for which was taken from a piece of 10"x12" stuff. Write description and comments.

5 2. What is the best description of iron for beams? Give reasons.

10 3. Draw a section ½ full size of a cast iron lintel or beam 8" deep and indicate portions which are in compression and which in tension.

10 4. Draw a section ½ full size of a rolled iron girder 12" deep. Show connection of 9" wrought iron beam, both the bottom flanges being level.

10 5. Draw a section to 1" scale of a one and one half brick wall carried on I beam.

12 6. Indicate by a sketch ½ full size such a method of anchoring a 10"x12" wood beam to an 18" brick wall, that the wall will not be pulled over should the beam drop out by burning or otherwise.

10 7. Draw a section to scale of cast iron columns of **H** & **X** pattern and name the parts, with comments.

10 8. Draw section ½ full size of connection of a 9" diameter cast iron column to cap and base plates and name the parts, with comments.

10 9. Draw sections ½ full size of 8" diameter, rectangular and octagon columns built up from rolled iron plates or bars.

15 10. Draw to a scale of 4 ft. to the inch an iron roof truss of ¼ pitch 25 ft. clear span between brick walls. Indicate members in compression and tension.

12 11. Draw to a scale of 4 ft. to the inch a trussed breastsummer formed with 4 pieces of 3x12 joisting, having a clear span of 15 ft. and a space of 2 ft. from top of beam to underside of window sills above.

12 12. What is understood by the terms washer, nut, upset ends to tension rods, torsion, core, cold shot. Draw or describe.

History of Architecture.

FIRST INTERMEDIATE.
THURSDAY, APRIL 7TH.

NOTE : *The Candidate is expected to answer three of the following questions. Drawings are to be neat and to a scale of not less than ½ an inch to 1 foot but they are not required to be finished. The scale used must be mentioned.*

1. Sketch, in outline, the Orders of Classic Architecture ?
2. In what country was the Arch first used as a feature in Architecture ?
3. Name the various styles of Architecture since the introduction of the Arch down to the present day.
4. Describe and illustrate by sketches the leading features of each of these styles.
5. Give an approximate date for each of these styles.

SECOND INTERMEDIATE.
THURSDAY, APRIL 7TH.

NOTE : *Drawings are to be in outline only, neat and well arranged and are not required to be finished. The scale should be not less than ½ an inch to the foot. The scale used must be mentioned.*

1. Draw the Grecian Orders.
2. Draw the Roman Order.
3. What do you understand by the term Romanesque Architecture.
4. Illustrate by drawings the characteristics of Norman, Early English, Decorated and Perpendicular styles of Architecture.

FINAL.
THURSDAY, APRIL 7TH.

NOTE : *The Candidate is expected to answer questions Nos. 4, 8, 9, 10, 14. Additional marks will be given for additional answers. Drawings are to be in outline only and are not required to be finished. The scale should be not less than ½ an inch to 1 foot and must be mentioned where used. It is to be borne in mind that it is not the drawing so much as what the drawing indicates of the Candidate's knowledge, that is required. But neatness of drawing and good arrangement will be taken into consideration.*

ANCIENT ARCHITECTURE.

1. What country may be called the birthplace of Architecture.
2. Through what countries is the history of Architecture to be traced prior to the rise of the Greeks as a nation.
3. Give an outline of the history of Architecture in these countries.

NOTE : *The Candidate is expected to answer one of the above questions.*

GRECIAN AND ROMAN.

4. Name and draw in outline *only* the Orders of Greek Architecture and give an approximate date for each.
5. Draw in outline only the plan and front elevation of a Greek Temple in any order.
6. Explain illustrating by sketches the development of the Ionic Capital.
7. Mention one Greek Temple in *each* Order.
8. Draw the Roman Order.

ROMANESQUE.

9. Sketch the leading characteristics of Romanesque Architecture.

GOTHIC.

10. Sketch a portion of a nave in Norman Early English Decorated and Perpendicular giving the date of each style.
11. What is the practical use of the flying buttress and of the pinnacles ?
12. What is "Flamboyant" Architecture ?
13. What do you understand by Renaissance Architecture ?
14. Describe the main characteristics of the style you have chosen illustrating them by sketches in outline. Give a portion of the plan of a building in this style, sufficient to show the characteristics ; give a section of the roof shewing the form of vaulting, shew the form of the windows, arcading and any other feature specially illustrative to the style.

Mouldings, Features & Ornaments.

FINAL.
APRIL 7TH.
S. H. TOWNSEND, *Examiner.*

NOTE : *150 marks will be considered a full paper.*

Values.

15 1. Show by a diagram how you would arrive at the entasis of a Doric Column.

20 2. Sketch a Triglyph, and show in what way the Greek and Roman examples differ.

25 3. Draw to half inch scale a Greek Conic Capital, and sketch some of the ornament to a larger scale.

15 4. Sketch a "trussed rafter" roof.

15 5. What are Cusps ? during what period were they first introduced. Sketch two examples, one of early and one of late date, and point out the main points of difference between them.

30 6. What are the general characteristics of the mouldings of the period you have sketched, give examples showing how they differ from the periods immediately preceding and following.

20 7. Sketch to a scale of ¼ of an inch to the foot, one of the buttresses against the side wall of an Early English Church, to be 21 in. wide on face, to project 36 in. at the base, and to have three weatherings. Height from the ground to the underside of the eaves cornice twenty feet.

10 8. What do you understand by plate-tracery ? In what styles was it used. Give examples.

15 9. Sketch some foliated ornament in the style you have selected.

25 10. Sketch two examples of string courses in the Norman, Early English, Decorated and Perpendicular styles. One example in each style to be placed under the ground floor windows of a college building and the other at a height of twenty feet from the ground over the main entrance doorway.

30 11. Sketch a doorway in the style you have selected, giving Plan, Elevations, and section through jamb and head.

Algebra.

FIRST AND SECOND INTERMEDIATE.

NOTE : *100 marks will be considered a full paper.*

Values.

15 1. Simplify

(*a*) $$\frac{x}{1-\dfrac{x}{1+x+\dfrac{x}{1-x+x^2}}}$$

(*b*) $$\frac{a^2}{(a-b)(a-c)}+\frac{b^2}{(b-a)(b-c)}+\frac{c^2}{(c-a)(c-b)}$$

(*c*) $$\frac{x+y}{y}-\frac{2x}{x+y}+\frac{x^3-x^2y}{y^3-x^2y}$$

15 2. Two numbers differ by two. Show that the difference of their squares is twice their sum.

20 3. Solve the equation $ax^2+bx+c=o$. If α, β are the roots of this equation prove $\alpha+\beta=-\frac{b}{a}$ and $\alpha\beta=\frac{c}{a}$

20 4. Solve the equations :

(*a*) $x-y=1$
$xy=12$

(*b*) $$\frac{x+3}{2}-\frac{x-2}{3}=\frac{3x}{12}+\frac{5}{4}$$

15 5. Factor :

(*a*) $a^2+b^2-c^2-d^2-2ab+2cd$.

(*b*) $a^2+9ab+20b^2$.

(*c*) $bc(b-c)+ca(c-a)+ab(a-b)$.

20 6. State and prove the rule for finding the Highest Common Factor of two numbers.

10 7. Find the Least Common Multiple of x^2+2x-3 ; x^3+3x^2-x-3 and x^3+4x^2+x-6.

15 8. In a mixture of wine and water the wine composed 30 gallons more than half of the mixture and the water 10 gallons less than a third of the mixture ; how many gallons were there in each ?

Trigonometry.

FIRST AND SECOND INTERMEDIATE.

NOTE : *100 marks will be considered a full paper.*

Values

15 1. (*a*) Define an angle according to the usage of Plane Trigonometry.

(*b*) Define the common units of angular measure.

(*c*) Express in sign and magnitude in any two of the units, the angle described by the minute hand of a clock between the times 9h. 05m. and 11h. 25m.

20 2. (*a*) Explain fully the meaning of $\sin A$, $\cos A$ $\tan A$, and $\sec A$.

(*b*) Discuss the changes in them as A changes from o° to 360°.

15 3. Prove the foll.—

$$\tan A=\frac{\sin A}{\cos A}$$

$$\sin^2 A+\cos^2 A=1$$

$$\sin(A-B)=\sin A\cos B-\cos A\sin B$$

10 4. Express the other trigonometrical ratios in terms of the tangent.

15 5 Prove the foll.

$$\sin(\alpha+\beta)\sin(\alpha-\beta)=\cos^2\beta-\cos^2\alpha$$

$$\sin A=2\sin\frac{A}{2}\cos\frac{A}{2}$$

30 6. What is the logarithm of a number ? Of what use are logarithms ? Prove the statements you have just made.

15 7. Prove $\frac{\sin A}{a}-\frac{\sin B}{b}=\frac{\sin C}{c}$

15 8. Given $a=47.97$, $b=54.23$ and $A=57°\ 34'$. Find B, c and C.

NUMBER—	MANTISSA	RATIO	L
5423	.734240	sin 57° 34'	9.926351
4797	.680970	sin 72° 35'	9.979618
		sin 72° 36'	9.979658
4344	.637890	sin 49° 50'	9.883191
4345	.637990	sin 49° 51'	9.883297

Euclid.

FIRST AND SECOND INTERMEDIATE.
PART 1.

1. (*a*) Triangles upon the same base, and between the same parallels, are equal to one another.

(*b*) E is a point in the side AC of a triangle ABC. Construct a triangle $ECHD$ equal to ABC.

2. If a straight line be divided into any two parts, the square on the whole line is equal to the squares on the two parts together with twice the rectangle contained by the parts.

3. The angle at the centre of a circle is double of the angle at the circumference subtended by the same arc.

4. The opposite angles of any quadrilateral figure, inscribed in a circle, are together equal to two right angles.

FIRST AND SECOND INTERMEDIATE.
PART 2.

5. If a side of any triangle be produced, the exterior angle is equal to the two interior and opposite angles, and the three interior angles of every triangle are together equal to two right angles.

6. In any right angled triangle the square which is described on the side subtending the right angle is equal to the squares described on the sides which contain the right angle.

7. To describe a square that shall be equal to a given rectilinear figure.

8. The bisections of the three angles of a triangle meet in one point.

Foundations.

FINAL.

Values.

10 1. Name one of the best soils for building upon. Is it safe to build upon a clay soil ; state your reasons for the answer you give.

11 2. In building upon a soil which has not level strata or which has portions of clay or loose gravel, what should be done to prevent uneven settlements.

15 3. Where the foundations of a building are not at the same level what means should be taken to prevent uneven settlement.

20 4. If you were putting in the foundation of a building and came upon a soft piece of ground what would you do to obtain a good foundation and prevent uneven settlements ?

20 5. What is meant by the detached pier system of foundations ; when should it be adopted and what are its advantages ?

20 6. In putting in foundations for a building what means would you take to prevent uneven settlements on the part of the supporting soil.

15 7. What are sand piles and under what conditions is it advisable to use them ?

10 8. What would be safe load to place upon a good hard clay soil ?

20 9. What should be done to make a safe foundation where the soil is running sand ?

10 10. Enumerate some of the different forms of piles.

20 11. How would you obtain a large surface support for a building where it is impossible to obtain such a support in the ordinary way by projecting the footing courses.

20 12. Is it advisable to use inverted arches in foundations ; if so under what conditions ?

20 13. State the proportions of a good concrete for filling trenches under foundation walls.

10 14. Should concrete be placed in the trenches or should it be thrown in from a raised platform.

Architectural Jurisprudence.

FINAL.
APRIL 7TH.
S. H. TOWNSEND, *Examiner.*

NOTE : *100 marks will be considered a full paper.*

Values.

20 1. The penalty clause in contracts as it is usually termed, provides that in the event of the Contractor's failure to complete the work, or building to be executed, within the stipulated period he is to forfeit and pay to the employer a specified sum per day or per week, for each and every day or week as the case may be which shall elapse between the stipulated and actual date of completion. The sum of money so forfeited by the Contractor is sometimes spoken of as a "penalty," although in most contracts it is expressed to be as "liquidated damages." Distinguish between these two terms, and give a simple illustration of the difference.

25 2. Does the approval by the client of the drawings and specifications estop him from afterwards alleging that the Architect has failed to exercise proper skill in the preparation of these documents ? If so, to what extent ? and in regard to what matters ?

20 3. What are "torts ?" Do you know of any law or rule of the courts in regard to tort-feasors, liable to effect the liability of an Architect to parties other than his client ?

25 4. State what you know of the responsibilities an Architect incurs in the event of the failure of buildings constructed from his drawings and under his supervision, and say to what extent these responsibilities are shared by the builder and owner.

10 5. State what you know of the relative effect of progress and final certificates.

30 6. A contract provides that the certificate of the Architect shall be a "condition precedent" to payment, and that his decision shall be final, and further that the contractor must obtain written orders signed by the Architect for extra work before such work is commenced. (*a*) What is meant by a condition precedent? (*b*) If the Architect includes in his final certificate extra work for which he is not given a written order or work which has not been properly executed, must the proprietor pay the full amount certified for? If so, why so? If not, why not? (*c*), What will be the effect to the builder if the Architect refuses to grant him a final certificate. 1 Because he honestly believes the work to be improperly done, when as a matter of fact the work is done in a manner that would be accepted by another Architect. 11 Because the proprietor told him he had not the money to meet a certificate, and induced him to delay granting the certificate in consequence.

20 7. To what extent has an Architect power to order changes in the work shown by the drawings and specifications? If for instance the drawings and specifications showed that the foundations were to be piled, and the contract provided that the contractor was to make such additions or omissions as the Architect directed, and the Architect finding piling unnecessary directed the builder to build the building without piling would the court recognize this order? Or if the Architect considered a wall specified to be built of brick would be better if built of stone, would he be justified in ordering the change without the express assent of his client? If he did order it, without such consent, would the court recognize the order?

Heating and Ventilation.

FINAL.

Values. HEATING.

25 1. Name the different ways in which heat may be transmitted and explain clearly how heat is given off in each case.

30 2. (*a*) State the advantages and disadvantages of hot air heating.

(*b*) State the advantages and disadvantages of hot water heating.

(*c*) State the advantages and disadvantages of steam heating.

20 3. In what position should a hot air furnace be placed in relation to the rooms to be heated?

20 4. What precaution should be taken in the running of the hot-air pipes so that hot air may be carried equally to the different rooms on all floors?

5 5. What is the average temperature of the surface of a hot-water radiator when the system is working properly on a cold day?

25 6. State the reason why a hot-water plant cannot be piped similar to steam. That is, what precautions are necessary to ensure that all radiators may obtain an equal supply of water?

20 7. What is meant by the water line of a steam boiler and what relation must it bear to the positions of the supply and return mains for the proper working of a gravity job?

20 8. What is a false water line in a steam heating job and is it a satisfactory method of overcoming differences in levels?

5 9. What is the usual pressure on the boiler of a first class gravity system of heating?

10 10 What is meant when it is stated that a building is heated by (*a*) exhaust steam

(*b*) live "

10 11. In piping a building for heating by exhaust steam what precaution must be taken as to the position and size of the steam main?

5 12. What service is performed by a Nason steam trap?

5 13. What service is performed by an Albany steam trap?

5 14. What is meant by the one pipe system of piping?

5 15. What is the cause of noise, etc. in a steam plant and how may it be avoided?

5 16. In a two pipe system of steam heating in what direction should the main steam supply fall?

10 17. Should the safety valve on heating boiler have a lesser or greater opening than on a high pressure boiler?

5 18. What is the object of a check valve on the main return?

10 19. Which is the better method to carry the return mains under the floor or above? State seasons for your reply.

25 20. What should govern the amount of heating surface to be placed within any room to be warmed?

5 21. Is any moisture given off to the air of a house by a hot water or steam heating plant?

VENTILATION.

10 1. What is the usual method of detecting impure air?

10 2. Why does a column of air pass up or down a flue?

5 3. When should an out-let register be placed in a room heated by hot air?

10 4. Does impure air rise to the ceiling, drop to the floor or does it do either?

5 5. What is the highest speed at which air can be brought into a room without causing a draught?

15 6. Is one opening out of a room for ventilation purposes better than two or more openings or not?

5 7. What is meant by upward ventilation?

5 8. What is meant by downward ventilation?

10 9. Which is the more satisfactory and why?

20 10. What amount of floor area and cubic space should be allowed in a school room per pupil?

Sanitary Science.

FINAL.

Values.

25 1. State briefly the general sanitary principles which govern the present system of plumbing work.

25 2. State what are the conditions governing the proper drainage of a house where waste, subsoil and roof water must be disposed of.

25 3. Draw on the accompanying plan the different drains which you would put down to drain and carry off all waste products of a house including subsoil and rain water.

5 4. What is the weight of extra heavy soil pipe?

5 5. Why is it necessary that soil pipe should be heavy?

10 6. What provision would you make for running the waste water from a refrigerator?

5 7. What is meant by the water test as applied to plumbing pipes?

5 8. What is meant by the smoke test as applied to plumbing pipes and fixtures?

15 9. How would you dispose of the waste matter from the plumbing system of a country house.

15 10. Give a sketch of a cesspool suitable for the reception of the matter of a country house.

10 11. State the advantages and disadvantages of back venting traps in plumbing work.

10 12. State the advantages and disadvantages of a breathing pipe.

10 13. How should a urinal be set up in a semi-public place?

15 14. Describe the best method of setting up plumbing fixtures in a private house.

10 15. How should the waste pipes of a plumbing system be set up?

15 16. What measure would you take to prevent any danger to health arising through emanations from the ground beneath a house?

15 17. What are the causes of damp basements in clay soil and how would you provide against such dampness?

15 18. What is an earth closet and what are its advantages and disadvantages?

10 19. What is an anti-syphon trap and what are its advantages?

10 20. How may a trap become unsealed?

10 21. What constitutes a good trap?

The Elements of Building Construction.

SIRST AND FECOND INTERMEDIATE.

APRIL 8TH.

MR. E. BURKE, *Examiner.*

NOTE: *In 1st intermediate 110 marks will be the greatest number obtainable and 50 per cent. the minimum to pass. In the second intermediate 130 marks will be the greatest number obtainable and 50 per cent. the minimum to pass. The Questions enclosed in brackets are not required of the first intermediate students.*

Values.

10 1. Draw to scale of ½" to the foot a section of a rubble stone Cellar wall 18" thick, showing footing course in proper proportion. Show how wall is built in Section and Elevation and indicate description of work in writing upon the drawing.

10 2. Draw to 1" scale plans of two Successive Courses of a one and a half brick wall at the angle of a building showing Flemish bond on exterior and English on interior face.

15 3. Sketch in Elevation a random coursed wall of squared rubble having a rockfaced plinth, quoins with margin draft and weathered coping. Also sketch section showing bond.

25 4. Show Elevation of a window to ½ inch scale 3'0" wide 6'0" high in a one and a half brick wall with Segmental Arch—one half the arch to be "bonded" 1½ brick in height and the other to be "rowlock" same height. Indicate on the elevation in a series of four courses each, three different kinds of bond. [Show ¼ full size section of jamb, head and sill. Sashes to be hung with weights.]

10 5. Show a flat stone arch over a 4 ft. opening with the stones joggled. What is a cramp?

10 6. Sketch a Scarf Joint 3'0" in a 6" x 8" timber. [Showplan and elevation and fastenings of a beam spanning 22 ft., the largest timber available being 3" x 12", stuff 16 ft. long, beam to finish 9" thick.]

25 7. Show Section of a brick trimmer-arch with trimmed joints, flooring and deafening.

15 8. Draw Section to ¼" Scale of a King-bolt roof-truss, having a span of 30 ft. Indicate the names of the different members.

10 9. Sketch section of Gutter and Eaves, wood or metal, suitable for the Canadian climate.

10 10. Sketch section of flat roof, (felt or gravel), at parapet wall and method of flashing.

10 11. Show a section, to a scale of 2" to the foot, of jamb and sill of an external door in 1½ brick wall, the frame being 6x4, and the door 1¾ thick, pannelled on the outside and bead flush on the inside.

17 12. What is understood by the terms: beam filling, brick-nogging, damp-course, bats, corbelling, grouting, template, parging, deafening, strapping, plugging, housing, morticing, tenoning' bridging, key (in plastering), wiped joint.

Nature and Properties of Materials.

FINAL.

APRIL 8TH.

MR. E. BURKE, *Examiner.*

NOTE: *80 marks will be the maximum number of marks possible to be obtained and 60 per cent. the minimum to pass.*

Values.

12 1. Name the source and method of obtaining lines. Name two different kinds and the nature of each.

12. 1. In Building a wall in a damp situation what should be the composition of the mortar? and why?

10. 3. What are the uses of Concrete and what is its composition.

12 4. Name at least four different species of stone in general use in buildings and the distinguishing composition and qualities of each.

10 5. Name the distinguishing features of a good brick.

10 6. Name at least five kinds of roof coverings and the relative advantages and disadvantages of each.

12 7. What are the principal merits of cast and wrought iron? and in what way are they most effectively employed?

10 8. Describe the character of a good quality of timber for building purposes.

12 9. Name two kinds of glass and wherein are they different What is the composition of good Oil Paint and of Varnish.

Technical Terms.

FIRST INTERMEDIATE.

NOTE: *100 marks will be considered a full paper.*

Values.

50 1. Define: Abacus, Fillet, Acanthus, Verge-board, Boss Coping, Voussoir, Cavetto, Chamfer, Architrave, Base Coping, Aisle Crockets, Mullion, Extrados, Console, Patua, Groin, Dais, Clere-storey, Transept, Surbase, Beak-head, Astragal.

10 2. What is a Chamfer Stop? Sketch one.

15 3. What is a Rose Window? Sketch one.

20 4. Sketch, roughly, any Gothic Roof principal, and name the various timbers.

10 5. What do you understand by a Broach Spire?

25 6. Describe the main features of any Church you know, using the proper technical terms for all parts.

20 7. Sketch a Classic Conice, and give the proper names to each member.

SECOND INTERMEDIATE.

APRIL 8TH.

S. H. TOWNSEND, *Examiner.*

NOTE: *100 marks will be considered a full paper.*

Values.

15 1. What is a Corbel Table?

50 2. Define: Cyma-recta, Fillet, Surbase, Gargoyle, Torus, Transept, Abacus, Mullion, Apse, Console, Flamboyant Bowtill, Voussoirs, Crockets, Achlar Annulet, Triglyph, Extrados, Boss, Caryatides, Clere-storey, Dais, Cavetto, Architrave, Astragal.

15 3. What are Chamfer Stops? Sketch one in the Norman and one in the Early English style.

20 4. Sketch three examples of Norman Plain Mouldings and name the members.

25 5. Describe any Church you know, using the proper technical terms wherever possible.

25 6. Sketch roughly a Column and Entablature in any order. Name the order, and each of the members.

FINAL.

APRIL 8TH.

S. H. TOWNSEND, *Examiner.*

NOTE: *100 marks will be considered a full paper.*

Values.

10 1. What do you understand by "long and short work?" Sketch an example and say where and when it was used.

35 2. Define: Tympanum, Trefoil, Echinus Apse, Cusp, Label, Mitre, Bowtill, Flamboyant, Corona, Console, Donjon, Cyma-recta, Fillet, Surbase, Squint, Throating, Torus, Gargoyle, Transept, Squinch, Extrados, Abacus, Modillion, Caryatides Dais.

10 3. What is a Broach Spire? Sketch one.

20 4. Of what members do Norman Plain Mouldings consist? Sketch three examples of Norman enriched mouldings, and give the proper name to each.

10 5. What is an "Impost"? Sketch one.

10 6. What is a Rose-window?" Sketch one.

20 7. Sketch a column entablature in any of the Greek orders, and name the members.

10 8. What is a Corbel Table? Sketch one.

25 9. Describe the roof and main entrance door of any Church you know, using the proper technical terms and names for all mouldings, fixtures, etc.

ILLUSTRATIONS.

RESIDENCES ON DORCHESTER STREET, MONTREAL, FOR MESSRS. SHEARER AND BROWN.—WRIGHT & SON, ARCHITECTS.

The above houses are situated on the corner of Dorchester street and Atwater avenue, and the view is taken up on Atwater avenue, looking on the front on Dorchester street. They are built of Nova Scotia red sandstone furnished and built by Mr. J. H. Hutchison, contractor.

They are lined on the front with terra cotta blocks.

In the plumbing the very best materials have been used, and all is fitted up very complete. The buildings are wired for electric light.

The flat portion or hollow roof is covered with Sparhani cement and the mansard with best red slate, cut round. Firewall, covering, nosing, etc., are all cold rolled copper, as well as all the hip rolls and terminals.

The ground floors are finished in oak, the first floor in whitewood and the balance in pine. All the interior detail is made to correspond with the interiors tone work. The front is richly carved.

The contractors for the work were as follows: Masonry, J. H. Hutchinson; carpentering, J. Shearer; plastering, P. C. Wand; plumbing and electric wiring, Robt. Mitchell & Co.; roofing, Campbell & Co.

PHOTOGRAVURE PLATE—ST. ANDREW'S CHURCH, TORONTO. W. G. STORM, ARCHITECT, TORONTO.

HOUSE IN ROSEDALE.—E. B. JARVIS, ARCHITECT, TORONTO.

ALEXANDRIA SCHOOL FOR GIRLS, EAST TORONTO.—HENRY SIMPSON, ARCHITECT, TORONTO.

HOW TO ESTIMATE.

By W. H. HODSON.

Following is a portion of the balance of the specification and bill of quantities accompanying the drawings of Baptist church, Walmer Road, Toronto, published in the CANADIAN ARCHITECT AND BUILDER for May. The remaining portion will appear in our next issue:

CARPENTER AND JOINER WORK.

Provide and fix all necessary centerings and turning pieces, none to be removed until authorized by the architects. Provide cambered lintels 6 in. in depth by the thickness of wall where required. Framing lumber to be of good white pine free from large or loose knots, shakes or other imperfections and to hold the full sizes shown or specified when fixed in the building. The portion showing below plaster line must be carefully selected free from dark knots, stains and cracks. The joists and rafters may be of sound well seasoned hemlock. The joiners' work to be executed (unless otherwise specified) with good quality of clear and well seasoned white pine lumber suitable for carving. The woodwork of front of platform and baptistry, panelling and tracery at back of platform, gallery front and casing of gallery beam, vestibule screw and the doors and jambs in auditorium and front vestibule, and strings of stairs to be of well seasoned black ash, kiln dried, and of best quality. The turned pillars in gallery front to be of black birch. The carpenter to hoist and set the iron columns and girders which will be delivered at the building by founder, who will assist carpenter in putting columns together, supplying and fixing the necessary bolts and doing any drilling required. Board over stone sills and weathering as soon as set. Provide seasoned slips 2½ x ⅞ in., to be laid on walls under bearings of joists, and elsewhere as required for fixing trimmings and at every 2 ft. in height of dressing room and vestry outer walls to which to nail battens &c., and provide all necessary wood, bricks, &c. Batten outer walls of vestry and dressing rooms with 2 x 1¾ batten at 16 in. centers (walls of church and vestibules will be finished in brick). Ground floor joists to be 12 x 2 in. at an average of 16 in. centres resting on walls, and on 10 x 2 in. beams. Beams to rest on walls and on brick piers, joists of porch, rear vestibule, dressing room and vestry, 10 x 2 in. at 16 in. centers. Gallery beams to be composed of ten 12 - ⅞ dressed boards breaking joint and well nailed. Gallery joists to be 10 x 2 at 16 in. centres; outlooks of same 2 x 6 in. Form rising plates with 2 x 4 in. stuff as shown. The rear gallery beam is to be carried in four dressed and chamfered brackets as shown; brackets to rest in stone corbels, and to be bolted to walls with ¾ in. bolts built into brick and well anchored. Deck joists of vestry &c., to be 10 x 2 at 16 in. centres, made up with 2 in. stuff to form slope of ½ in. to the foot. Form curves for skylight with 2 in. stuff 10 in. above roof, and line in inside with narrow matched and jointed sheeting with bend at ceiling line and moulding at top. Trimmers at stairs, flues, windows, &c., to be 4 in. thick. Put a course of 2 x 2 in. bridging between each bearing. Joists of tower to be 12 x 2 at 16 in. centres. The run beams or plates of main roof resting on iron columns to be formed with five thicknesses of 2 x 10 in. stuff breaking joint, and in lengths to span two bays—to be well spiked with 6 in. wrot. iron spike at 3 ft. spaces with double ⅜ in. wrot. iron bolts at all joints. Walls of clere story to be formed with 10 x 2 in. studding at 16 in. centres, resting on 6 x 10 in. dressed and chamfered beams cutting in between iron columns. Plate above this beam receiving ends of aisle rafters to be 2 x 10 in. spiked to studding wherever practicable; the framing timbers may be made up to several thicknesses of stuff instead of being solid. In such cases joints must be properly broken and work thoroughly spiked and bolted. Principal rafters, collars, tie beams, queen posts and wall pieces to be of the sizes figured on detail sheet, dressed and stop chamfered or turned and moulded as shown. Purlines 6 x 8 in., checked into principals and stop chamfered. Ribs on ceilings forming panels to be 2 in. thick, rounded at angles, curved ribs to be made up of several thicknesses of stuff, breaking joint and well glued and nailed. Carpenters to supply and fix all the bolts, straps, iron-rods, nuts, washers, stirrups, &c., in connection with the framing of roof and as directed. Common rafters and collars 6 x 2 in. at 16 in. centres, collars to be well spiked to rafters. Rafters of pinnacles to be 4 x 2 secured to 4 x 4 in. mast, built into brickwork. Case the run beams &c., with ⅞ in. stuff, forming frieze having angle moulding as shown. Form moulded cornices in wood cutting in between principals. Put moulded fillets or cornices wherever necessary at junction of wood or plaster work with finished brick walls.

Roofs, sloping and flat, to be sheeted with ⅞ in. matched boarding well nailed to rafters in widths not exceeding 8 in. laid to break joint. Put proper 3 in. rolls to ridges. Eaves and gables to have ends of rafters dressed; dressed and beaded soffit, dressed facia and moulding against wall. Eaves of pinnacles and buttresses to be moulded as shown. The foul air trunk connecting galvanized iron vent tube in loft of church to tower to have 6 x 2 joists, 4 x 2 studding and rafters; walls and roof to be boarded for slating, soffit to be sheeted with ⅞ matched and V jointed stuff, and floor laid with ⅞ in. matched stuff; hinged batten door in east side fastened with good bolt. Provide a valve in the same of light stuff, hinged at top and worked with rope and pulleys from gallery stage of tower. Carry this duct with matched sheeting into belfry as shown, and form small door, hinged and bolted, in the same. Sheet walls of clerestory on outside with ⅞ matched stuff. Lay ground gallery floors with good quality of well seasoned ⅞ in. grooved and tongued boarding, blind nailed to joists

and properly cleaned off on completion, boards not to exceed 4 in. in width. Form steps at gallery passages. Partitions shown on plans by a yellow tint to have 4 × 3 in. heads and sills, common studs 4 × 2 at 16 in. centres; door posts 4 × 4 in.; braces 4 × 3 in. Truss partitions where necessary. Stairs in tower and N. E. staircase to have 1¼ in. close strings, beaded, with moulded capping and string mould, 1½ treads, rounded nosings, cavetts, and fillet, ⅞ in. risers, 7 × 6 in. turned red oak newels, 5 × 3 in. moulded red birch rail, and 1¾ in. turned birch balusters. Stairs in tower from gallery level to next stage to be generally similar, but with 5 in. newels and 4 × 3 in. rail. Enclose at head with ⅞ matched and jointed sheeting with panelled door hung with 4 in. butts and finished with good mortice lock and porcelain and plated furniture. Stairs to have all necessary carriages, brackettings, &c., &c., complete; sheet soffit of stairs with narrow and jointed stuff. Stairs to basement to have 1¼ treads, no risers, rounded nosings, 1¼ strings, rounded rails. Stairs to tower belfrey from upper floor to have 1¼ strings and treads, rounded rail and 4 in. newels. The windows of vestry and dressing rooms to have proper boxed frames with all necessary lines, weights &c., 1¾ in. moulded sashes fastened with Berlin bronze automatic fasteners and furnished with brass ring window lifts. All basement windows to be protected by wire guards of stoutest wire well secured to frames. Windows of church tower, vestibules, &c., 10 have solid moulded and rebated frames with stops to secure lead lights and beaded fillets outside and inside as shown, ventilators and gablles to have chamfered frames and ⅞ in. louvres. Put hinged batten doors on inside, fastened with bolts. The doors to basement area to be 1¼ in. thick bead and butt hung with 6 in. butts and furnished with two 8 in. barrel and two 8 in. square bolts to each leaf; provide strong hooks. Frame 4 × 6 chamfered and rebated 2 in. rounded oak sill. Door at back of west porch to be 1¼ panelled and chamfered, hung with 5 in. Berlin bronze butts, furnished with 5 in. good mortice lock, bronze knobs—4 × 6 chamfered and rebated frame, 2 in. oak sill. The entrance doors on east front to be of oak 2½ in. thick, panelled as shown, with rounded stiles and raised panels. Doors to be hung with 3 best 6 in. butts to each leaf, furnished with heavy square bolts to both leaves, and ecclesiastical escutcheons and drop handles of selected design. Provide and set also ornamental cast iron hinge plates according to detail; frames to be rebated and moulded with stiff bead and moulded tracenid fanlights with stop to secure glass. Provide heavy wrot. iron hooks to hold doors open. The swing doors immediately inside of the foregoing to have moulded frames finished above with crwon mould. Doors to be 1⅛ in. thick, panelled, moulded, veneered with black ash and prepared with stops for glazing; to be hung with Chicago double action spring hinges, nickel plated, and furnished with 12 in. polished copper finger plates, both sides. The other swing doors from vestibule to tower and staircase to be similar, also that from rear porch to vestibule, except that the latter will be of pine and will have japanned hinges and porcelain finger plates. The swing doors opening into gallery will be similar to those in front vestibule, but without glazing. The external doors of porch at rear of church to be ⅞ in. matched and beaded boarding 2½ in. framed and chamfered stiles and 1¼ inch back-rails, hung with three pairs of 5 in. butts to 4 in. rebated and chamfered frames, having 2 in. oak sills, and furnished with 8 in. spring and 10 in. barrel bolts and best heavy rebate mortice locks and 2 in. bronze knobs. Fasten back doors with strong brass hooks and eyes. Doors from church to rear vestibule to be 1¾ in. panelled and moulded, to be hung to moulded and rebated with two strong 5 in. Berlin bronze spring hinges to each leaf, and furnish with best 5 in. mortice locks, heavy copper bronze handles on one side, and copper iron finger plates on the other; standing leaf to have 12 in. bronze flush bolts, and strong hooks to hold both leaves open. Doors from church to vestry to be generally similar, but hinges not to be spring. Substitute also bronze knobs for handles and finger plates. Doors from front vestibule to church to be similar to those to rear vestibule in every respect, but prepared for glazing. Doors opening on to platform to be hung with three 4 in. Berlin bronze hinges to each and furnished with best 4 in. mortice locks, copper bronze knobs and furniture. All hardwood doors to be veneered. The doors in vestry and dressing rooms to be 1¼ in. panelled and chamfered, hung in proper rebated and beaded frames with 4 in. Berlin bronze butt hinges, and furnished with good 4 in. mortice locks, brass bolts and keys, porcelain and plated furniture. Doors in plastered partitions to have ⅞ in. simply moulded architraves 4½ in. wide with hand mould. Walls on ground floor leading to dressing rooms and vestry to be sheeted to height shown with ⅞ in. matched and V. jointed sheeting of the best quality, in widths not exceeding 4 in., blind nailed to grounds, and finished with moulded capping. Dressing rooms, lavatories and vesrry to have 8 in. moulded ⅞ base and 5 × ⅞ moulded, chair rail. Put fillet at junction of floor and base. Vestibule screen to be according to details, to have moulded posts or frames, boxed for weights. Dado of 2½ in. x ⅞ matched V jointed sheeting, double, forming pocket into which sashes may slide; sashes to be 2½ in., prepared with stops for lead glazing, hung with the very best sash cord over heavy brass pulleys and heavy weights, and bronze lifts as required. Form baptistry with proper studding and joisting, and sheet floor and sides with narrow matched stuff; curb to be moulded with moulded capping—proper detached solid steps in baptistry. Form turned and moulded columns at baptistry with moulded cornice, traceried panneling, &c., as shown. Pulpit platform to have 6 in by 2 in. joisting on proper supports—floor as church—front to be of panelling as shown, with rounded stiles and moulded capping and base. Put steps to platform as shown. Gallery front to be according to detail; turned balusters and traceried panels will be of black birch, also turned portion of newels at foot of stairs to platform. Provide and fix cut iron brackets on stays at about 5 ft. space well secured. The traceried panels will be at about 10 ft. centers. String mould rail balustrade of stairs from gallery to platform to be a continuation of gallery front as shown; form proper carriage and bearers of these stairs and prepare for plastering. Steps at side entrance to be 2 in. by 3 in. slatted and dressed 3 sides, 2 in. strings resting in cedar bearers, slat walk in front of same of similar stuff in cedar sleepers and having rounded curb. Partitions in lavatories to be of ⅞ matched V jointed sheeting 7 ft. high in 3 in. widths, finished with capping. Doors to be kept up 6 in. from floor, to be panelled and furnished with brass bolts and hung with 3½ butts. Plumber will supply seats of closets. Partitions forming dressing doors to be similar but extending to ceiling. Cope areas with 1¾ in. bevelled plank secured to brick work with ⅞ in. bolts 2 ft. long. Trim for registers and cut for steam fitters, pipes, &c., as required. Form side of coal bin with 2 in. plank on proper girth. Allow the sum of $100.00 for contingencies which will be deducted at final settlement if not required. Attend on other trades as required in the execution and for the perfect completion of the work.

IRON FOUNDER.

The iron columns to be delivered at the building, and the carpenter will hoist and set the same, assisted by founder, who will do any necessary fitting, drilling for bolts and supply all connections, fastchings and bolts. All bearings to be turned and columns to have top and bottom plates where required. Provide two basement columns under pulpit platform 4 in. diam. ½ inch metal. Provide six columns under gallery 4 in. diameter ⅝ metal, having moulded caps and shaft enriched with a diaper pattern of approved design. Provide and fix on ground floor eight columns, 10 in. diameter, ⅜ metal, having diaper pattern as above. Caps will be of plaster. The second stage of column will be ◯ shaped 10 in. diam. ¼ metal. Caps will be of plaster, as shown. The third stays of column will be 4 10 in. diam, 1 in. metal. All to have the necessary brackets, bolts, stays, &c., according to detail. Gallery front will be of wood. Provide and set across baptistry recess one 12 in, 1 be 10, 22 ft. 6 in. long, weighing 40 lbs. to the foot, and one 6 in. I beam 11 ft. long weighing 16 lbs. to the foot to carry back wall of organ recess. Provide and set two pairs of rolled iron girders across openings under gallery at tower and stair case, each girder to weigh 21½ lbs. to the foot and to have yokes and bolts with ornamental washers. Drill for screws securing wooden fillet on soffit to cover gap.

GALVANIZED IRON.

All the main eaves of nave and aisles to have 5 in., and eaves of tower, vestibule and staircase and vestry building square formed No. 28 galvanized iron, gutters properly secured to facias with wrot. iron brackets ⅝ × 1 in. and stiffened with 7/16 7/16 wrot. iron bars in best manner. Put fifteen 3 in. octagon galvanized iron down pipes properly connected at eaves with gutters and at foot with drains 1 ft. below surface, and having proper caps to pipes, secure to wall with ornamental wrot. iron hold fasts not more than 8 ft. apart. Put two stacks of similar pipes to tower eaves to waste on main roof and put 2 in. branches from the gutters in the other two sides connected to the 3 in. pipes. Flash at walls of church at deck of vestry building with galvanized iron 10 in. wide let into joints of brickwork cemented and turned down over felt. Cover wreathing of projection well on west elevation with No. 28 galvanized iron, lapped tacked and soldered. Provide and set glazed with rough plate two galvanized iron skylights having ventilators with valves opened by cords and pulleys. Provide and set on ventilating openings in ceiling of church ornamental register gratings and carry from the same to box near tower No. 28 galvanized iron ducts of sizes shown, carefully stayed and made secure and tight. Cover belfry floor of tower with No. 28 galvanized iron, lapped, tacked and soldered, and line with scupper and shoot to waste over church roof. Carry the iron 9 in. up on to wall and cement into joints of brickwork. Put galvanized iron shield in front of duct opening over roof of N. E. staire use held in place by wrot. iron brackets.

SLATER.

Line valleys with galvanized iron 15 in. wide. Cover saddle at back of tower with No. 28 galvanized iron carried up 2 ft. on to roof of church. Cover ridge rolls. Flash under sill pieces at junction of clear-storey walls, aisle roofs. Cover the sill pieces also and carry the iron well up behind in all tiles—say 5 in. Step and cloak flash at chimneys, tower, gables, &c. as required. Cover walls as shown and roofs of pinnacles, tower and stair case, with hard burned dark red tiles of best quality (Ontario or Toronto Pressed Brick Co's.) of patterns to be selected. Form hips at tower and pinnacle roof and provide and set terra cotta finials as shown bolted with iron rods to wood work of spire, &c. Cover the other sloping roofs with medium sized Canadian slates from the Rockland quarries laid on heavy felt. Put a double course at eaves. Slate the weatherings in west elevation, also the walls and edge of gangway to tower. Cover flat roof of vestry building with best felt pitch and gravel roofing, guaranteed for five years in writing. Repair and make good after other trades and leave all perfect and complete.

BILL OF QUANTITIES.

CARPENTER AND JOINER WORK.

	$	c.
6,600 ft. of pine timber (board measure) in beams, purlines, plates, etc.		
25,300 ft. of hemlock timber (board measure) in joists, rafters		
11½ squares (100 ft.) of 2"x1¼" battening, outer walls of dressing room and vestry		
12 squares (100 ft.) of 10 in. x 2 in. studding, clear story		
50 squares (100 ft.) of 2 in. ribbed work, in roof, ceilings, forming panels, curved at angles		
72¼ squares of ⅞ matched roof sheeting, 8 ins. wide		
9 squares of ⅞ matched sheeting to clear story		
1⅛ squares of ⅞ matched floor		
1½ squares of ⅞ matched and v jointed sheeting		
120 lineal ft. of platform fronts, best quality black ash, kiln dried		
72 lineal ft. of baptistry panel work, tracery and gallery front, kiln dried		
24 lineal ft. of casing gallery beam		
262 lineal ft. of run beam on iron columns, 5 thicknesses 10 in. x 2 in. and ⅞ freize casing, bolts spiked, etc.		
262 lineal ft. of dressed chamfered 6 x 10 beam		
160 lineal ft. of forming cornices mould at principals, and junction of wood work and plaster at brick wall		
232 lineal ft. of 3 in. rolls to r dges		
430 lineal ft. of dressed eaves and beaded soffit, etc.		
147 lineal ft. of pinnacle dressed eaves		
12 black ash doors and jambs, auditorium, vestibule, etc.		
5 pairs roof principals wrought and moulded, as per section		
10 pairs roof principals similar, wrought and moulded to aisles		
1 hinged door in tower floor bolted		
1 valve hinged and with ropes and pullies, to belfry, and with small door hinged and bolted		
173 stair steps finished, etc., as specified, different widths, strings black ash and open treads to basement		
4 black birch turned pillars, gallery front		
4 dressed and chamfered brackets to gallery beam, on stone corbels, ¾ iron bolts in brick wall, anchored		
11 rows of 2"x2" bridging		
Provide and fix centres, etc., throughout, provide cambered lintels, 6 in. wall thickness, hoisting and setting 16 iron columns, 6 beams and girders, to receive assistance from iron founder		
Boarding over stone sills and weathering, etc., as required		
8½ squares of ⅞ in. G and T gallery floors, 4 in. wide, stepped at passages		
34 squares of stud partition, trussed where necessary		
7½ squares of 4 in. x ⅞ in. v jointed wall sheeting mould, capped		
30 lineal ft. of vestibule screen mould, frame boxed for weights, etc., complete		
192 lineal ft. 8 in. mould base and chair rail		
78 lineal ft. ⅞ in. matched v jointed sheeting, double for pocket to slide sashes, complete		
28 lineal ft. dado, 2½ in. x ⅞ in. matched, v jointed, 7 ft. high, capped part up to ceiling, complete		
40 lineal ft. of area coping, 1¾ in. bevelled plank		
1 panel door head of tower stair complete, as specified		
2 1¾ in. doors to basement area, head and butt, hardware, etc., complete		
1 1¾ in. paneled door, west porch, hardware, etc., complete		
2 2¼ in. oak entrance panel, and faplight door, double hardware, etc., complete		
2 1⅜ in. swing entrance panel door veneered with black ash, hardware, etc., complete		
2 2¼ in. rear porch door, framed and filled with ⅞ in. matched and beaded boards, hardware, etc., complete		
6 1¾ in. panel doors, from church to rear vestibule, for glass, vestibule to church and vestry, finer plates, hardware, etc. complete		
2 platform doors, hardware, etc. complete		
4 1¾ panel doors in vestry and dressing room, complete		
4 doors to lavatories 6 in. up from floor, etc., complete		
7 basement doors and 1 large borrowed light, hardware, etc., complete		
4 sliding doors, per plans, hardware, etc., complete		
7 2¼ sashes, stops for lead glazing, sash, cord, pullies, weights, etc., complete		
6 2¼ sashes over same, south elevation		
4 windows (English) to vestry and dressing room complete		
7 windows, church towers and vestibules, stops for lead lights and heads, fillets inside and out, ventilator, etc., complete		
25 basement windows and wire guards complete		
36 clere story windows complete		
1 large brief window, north elevation, complete		
1 pulpit platform, panelling round stiles, mould cap and bases, steps, etc., complete		
1 2 in. plank coal bin		
Trimmers for registers, and cut for steam fitters pipes, etc., attend on other trades and leave work complete		
Straps, iron rods, nuts and washers, stirrups, bolts, spikes, etc., in the above work as specified		
Add $100. for contingencies, (if not required deducted at final)		

NOTE.—Beginning with bearing timbers, (undressed) the measure, thus: joist 30 ft. x 10 in. x 3 in. = equal to 6 ft. 3 in. cube to bring into board measure; multiply by 1 (for a foot square) gives the board measure 75 feet. Flooring, roof boarding, studding, furring, &c., measured length and breadth, thus: 25 ft. x 16 ft. gives = 400 ft., equal to 4 squares of 10 ft. x 10 ft. Lineal measure of running feet applies to cornices and dressed work generally, the sizes stated either in quantities or specification. Items in numbers, such as doors, windows, &c., as above.

IRON FOUNDER.

	$	c.
2 ½ in. metal columns under pulpit platform 4 in. diameter		
6 ⅝ in. metal columns under gallery moulds and ornaments 4 in. dia		
8 ¾ in. metal columns on ground floor, 10 in. diar. caps and plinths		
1 beam 22' 6" long, 40 lbs. to the foot		
1 beam 11' 6" long, 16 lbs. to the foot		
2 pairs rolled iron girders 21½ lbs. to the foot		
Yokes, bolts, ornamental washers, drill for screws, etc., as required		

GALVANIZED IRON WORK.

	$	c.
577 lineal ft. of 5 in. No. 28 G. iron gutters, branches, etc., complete		
380 lineal ft. of octagon G. iron down pipes, 3 in.		
150 lineal ft. of No. 28 G. iron ducts, stays, etc.		
2 squares (100 ft.) No. 28 G. iron covering, belfry floors, cemented, and shoot to over church roof		
2 galvanized iron skylights, ventilators opened by cords and pullies		
4 ornamental registers, gratings to ventilating ducts		
1 G. iron shields to duct opening and brackets complete		
Flashing to walls at duct, and projections lopped, nicked and soldered		

NOTE.—The measurements for this work as given above, lineal.

SLATER.

	$	c.
19¾ squares (100 ft.) dark red tile covering walls, roof of pinnele, etc., approved		
75 squares (100 ft.) Rockland slating on 1 ply tarred felt		
50 lineal ft. Rockland valleys, 15 in. wide		
140 lineal ft. flashing clere story covering sills, etc.,		
152 lineal ft. of step and cloak flashing, chimnies, tower, gables, etc., complete		
100 lineal ft. of slate weathering, west elevation		
1 saddle covered with G. iron at tower		
1 terra cotta finial bolted to wood work		
Repairing and making gooth after other trades		

NOTE.—Measured, and contents given in squares, before mentioned lineal measure, also, and the sizes as above.

HYDRAULIC CEMENTS NATURAL AND ARTIFICIAL, THEIR COMPARATIVE VALUES.

(Continued from May Number.)

To be sure, the Portland costs twice as much, but it tests twice as high; therefore it is to be expected to cost accordingly. We are apt to lose sight of the fact that both classes of cements sells for just about the same price at the mills, and that the increased cost of Portland is due to ocean freights, duties, dock charges and importers' profit, and even the most zealous advocate of Portland cement cannot claim that these charges can, in anyway, enbrace the intrinsic value of that cement. But higher price generally means better quality and backed by the testing machine, the engineer is perhaps justified in his opinions.

The testing machine is a good thing if put to its legitimate use. It is the abuse of it that we object to. It should occupy a subordinate place. If this were thoroughly understood, all would be well, but unfortunately the resquisites to a thorough understanding of a proper use of the machine requires more time and study than it does to learn to make and test a briquette. It consists in knowing soinething of the chemistry of a cement; in knowing what a table of analysis means; in having a knowledge of true combining proportions, and the effect of variations therefrom. Then the testing machines become a valuable auxiliary, for its readings will then have taken on a new meaning. The student will find that many of the rules and regulations governing tests, that have been built up within the past few years, are unsound and need revision.

The testing machine reveals many curious freaks, and taken on the principle that "Everything is for the best." it may yet reveal to us that a cement may test too high, that this modern demand for high-testing cement and the tremendous struggle on the part of the Portland cement manufacturers to supply it, striving by every conceivable means to beat the record, is all wrong.

This may sound strangely at first, but a study of the tables of long-time tests of Portland cements, as complied by such engineers as Clarke, of Boston, and MacClay, of New York, and others eminent in the profession, reveals the rather startling fact that briquettes of neat Portland do not test as high at 3 or 4 years as they do at 1 or 2 years old. Clarke says: "They become brittle with age and are apt to fly into pieces under comparatively light loads." If this is the result with neat cement at that age, what is to prevent the same results with sand mixtures at 15 to 20 years or so? I have seen walks that were made with Portland cement concrete remain in perfect condition for 8 years, and during the ninth year go all to pieces. An examination of the broken pieces shows the concrete to be exceedingly hard but brittle.

The ten years' tests of Portland cement made by Dr. Michaelis of Berlin, show that the maximum strength was reached at the end of two years, and this point held fairly well until the end of the seventh year, but from that time until the end of the tenth year there was a remarkable falling off in values. "We do not recollect ever having seen any table of long-time tests of Portland cement that did not exhibit similar results, and it is more than probable that it may yet be shown that our natural, slow-setting American cement may, in 10 or 12 years' tests, surpass any artificial cements. The excellent condition of some of our old work, done many years ago with American cements, would seem to indicate as much.

At all events, we have no proof that the Portland is superior in matter of durability, and we do not beleive that clay and lime can be suddenly thrown together, and kept there by any skill of man, that can in any manner compare with the staying qualities as found in first-class natural cements where the clay and lime have existed in the most intimate contact for countless ages.

During the past summer the engineer in charge of the Aberdeen harbor sea works, reported a serious failure in the Portland cement concrete work at that point; after only 15 years immersion it went to pieces, while the natural cement contrete, at the *same place* and *same age*, was in good condition. He states that every care had been taken in the Portland concrete used; the cement had withstood the *mechanical tests*, and the concrete had set hard. After a thorough examination by a Board of Engineers, assisted by Professor Brazier, of Aberdeen University, it was concluded that "Portland cement cannot resist the action of sea water." The Professor further states that "A chemical action had taken place between the sea water and the Portland cement in the concrete, causing an expansion and softening of the concrete." The harbor engineer also reported that "the Portland cement concrete entrance walls of the dock had expanded 2¾ inches in the height of the walls, and their surfaces had cracked and bulged, and the joints of the caisson Quoin-stones had opened up, causing considerable leakage."

Another case is that at the harbor of Dundee, reported upon during the past summer. In this instance the Portland cement concrete had softed in sea water and natural cement was used to protect it if possible from further distastes.

The investigations of Professor Tetmajer of the Federal Polytechnical School at Zurich, developed some interesting information. It has long been noticed in Germiany that Portland cement of certain kinds, when exposed for several years to the air, loses its consistency and crumbles. This danger had become so serious that the German Minister of Public Works issued a circular in 1885, restricting within narrow limits, the use of Portland cement in work exposed to the air.

Since that time Professor Tetmajer has devoted himself to investigating this matter, and, according to his statements, the cause of the disintegration of Portland cement exposed to air is to be found in a want of proper preparation of the materials, particularly in the lack of sufficient grinding together of the chalk and clay to ensure the complete silfication of the lime during the process of calcination.

But the best brands of Portland cement, which had withstood the action of water for several years, became soft on exposure to air. He says also, that "air especially attacks sharply (heavy) burnt cements, which imbibe a great deal of carbonic acid, and decay in water is caused by an excess of matters which undergo an increase in volume by oxidation and imbibing of water." The Professor found about 10 per cent. of the brands tested in this condition.

In the light of this exposition of the characteristics of both the English and German Portland cements in the countries where they are manufactured and where they have been the longest in use, it would seem that no other or better evidence is needed to prove that artificially-made cements, however high they may test, are not true cements, and the people of this country who of late years, are using Portland cements with such unlimited confidence in the superiority of those brands over our own natural cements, a confidence born of the testing machine and nurtured in the belief that tensile strain can be as unerringly applied to cements as to iron or steel, may yet awaken to a sad realization of the deceptive character of such tests, for it may well be predicted that in a very few years, we shall see evidences of disintegration and decay in many of the important works now being constructed of Portland cement in this country. When we compare these early indications of decay on the part of these new-born artificial cements with the splendid record made by natural cements that have successfully withstood the action of sea water for over a century—and the still more trying action of the air for centuries—reaching nearly if not quite as far back as civilization itself, we are inevitably led to the conclusion that man has not yet succeeded in compounding the materials essential to the production of a first-class cement, that can surpass, in durability and general excellence, that which nature has so bountifully bestowed upon us.

ERRATA.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—I find that a printer's error occurs in the description of Mr. E. A. Well's house illustrated in your last number. It should read, "The half timber framing is constructed of 2 in. x 6 in. studs," instead of 2 in. x 2 in. studs as appearing in your publication. Kindly correct same and oblige.

Respectfully yours, J. FRANCIS BROWN.

The Adamant Mfg. Co., of Syracuse, N. Y., having recently purchased the property and business of the Northwestern Adamant Co., of Minneaplis, has been reorganized with a capital stock of $50,000 under the name "Adamant Mfg. Co. of America." The new company has branches in New York, Milwaukee, West Superior and Toronto. The latter branch will continue under the same management as heretofore.

THE GUELICH SILICA BARYTIC STONE CO.
OF ONTARIO, LIMITED
WATERPROOF FLOORS
For Malt Houses, Breweries, Slaughter Houses, Stable and Cellar Floors, etc.
STREET PAVING AND SIDEWLAKS A SPECIALTY.
Estimates given promptly on application.
WALTER MILLS, General Agent. CHAS. E. GUELICK, General Manager
Head Office: INGERSOLL, ONT.

ROOFING AND PAVING MATERIALS

TARRED FELT, 2 and 3 ply,
BUILDING PAPERS,
COAL TAR, PITCH,
DEAFENING FELTS.

MONTREAL.

ALEX. McARTHUR & CO.
650 Craig Street, Montreal.

Factory: Harbour and Logan Streets, Montreal.
Paper Mills: Joliette, Que.

MILTON PRESSED BRICK

THE MILTON PRESSED BRICK AND SEWER PIPE CO., Ltd., have one of the best equipped plants in the country, and turn out a brick unequalled anywhere in color and finish. Contracts have already been secured for the season of 1892 of over four million pressed brick.

PLAIN AND ORNAMENTAL BRICK, TERRA COTTA, ETC., ALWAYS IN STOCK.

WORKS AND OFFICE: MILTON, ONT.

TORONTO OFFICES:
4 ADELAIDE ST. EAST AND 1172 YONGE STREET.

MONTREAL AGENT:
W. E. GOWER, M.C.S., C.E.,
Mechanics' Institute Building, St. James Street.

DR. ROBERTSON, PRESIDENT. J. S. McCANNELL, MANAGING-DIRECTOR.

Don Valley Pressed Brick Works

TAYLOR BRTOHERS,
TORONTO.

SPECIALTIES FOR 1892:
RED, TROJAN, CARTHAGINIAN, ROMAN, POMPEIIAN, OBSIDIAN, AND FANCY COLORS.

Our goods are now acknowledged by the leading Canadian and United States Architects to be the highest grade manufactured in America to-day.

OFFICE AND SHOWROOMS:
601 Adelaide Street East, TORONTO.

THE CANADIAN PHOTO-ENGRAVING BUREAU

16 Adelaide Street West, Toronto

Designers - -

—)AND(—

- - Engravers

Illustrations for Magazines, Books, Catalogues and Newspapers made by the

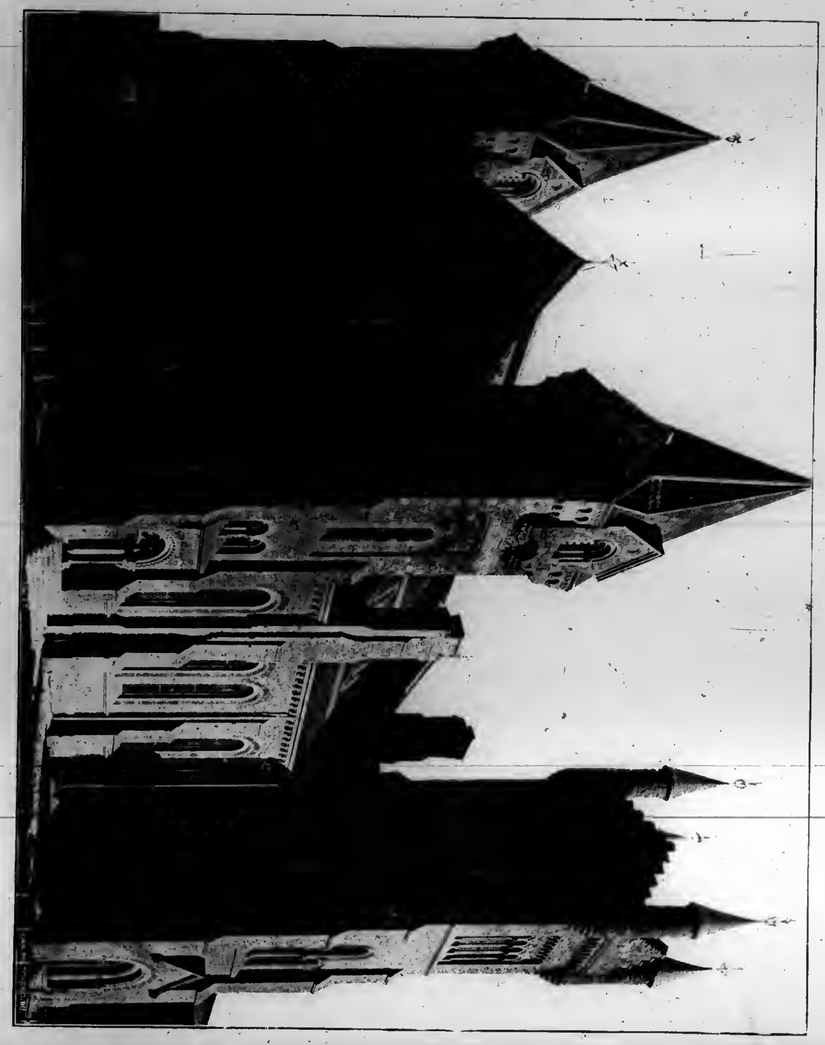
HLAF-TNOE

or line process from photos or drawings. We can reproduce any kind of black or white copy.

SEND FOR ESTIMATES AND SAMPLES.

• • •

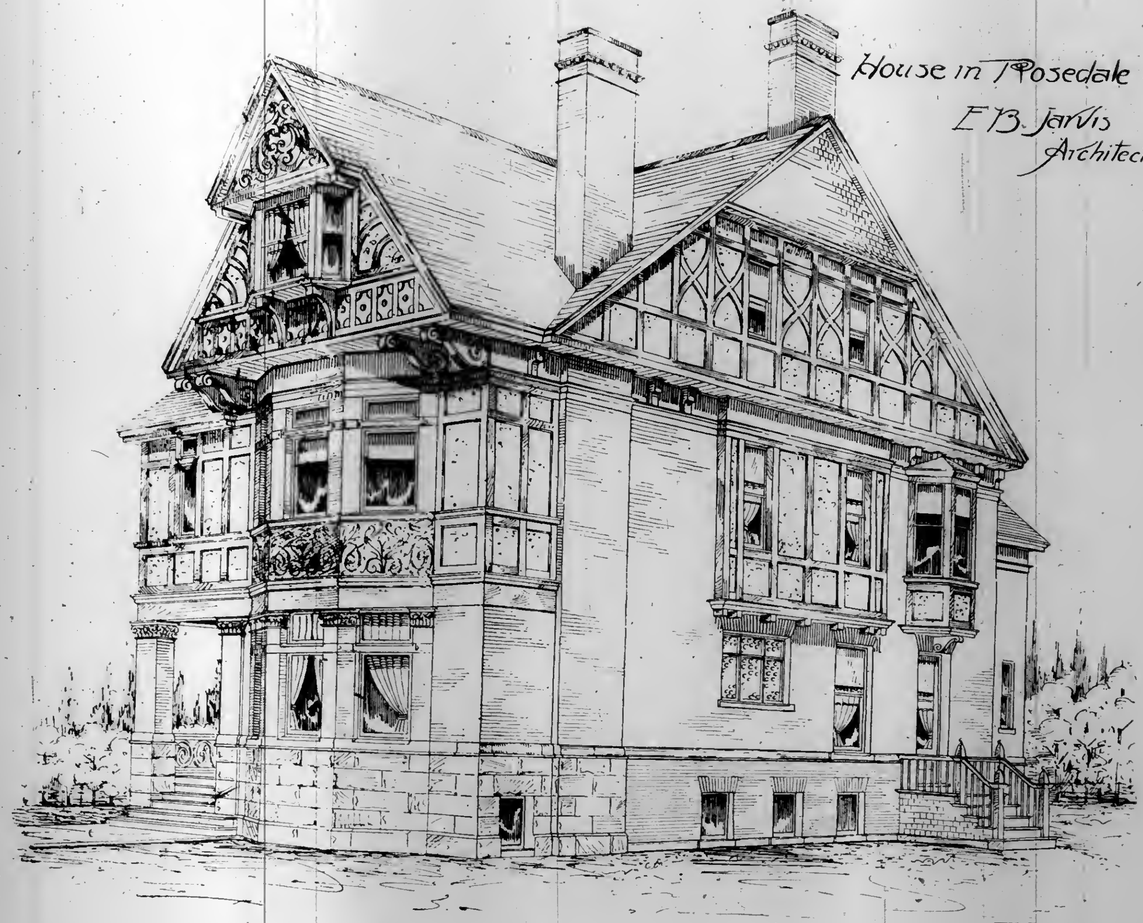
MOORE & ALEXANDER,
Telephone 2158. PROPRIETORS.



ST. ANDREW'S CHURCH, TORONTO.
W. G. STORM, Architect, Toronto

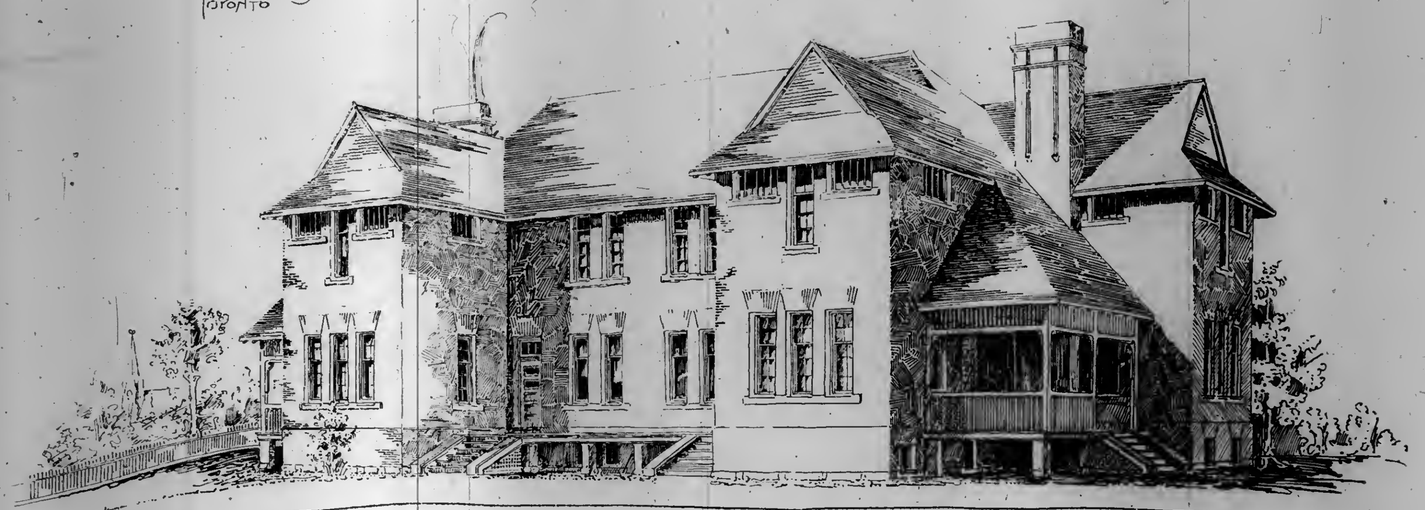
House in Rosedale

E.B. Jarvis
Architect



ALEXANDRA · SCHOOL · FOR GIRLS
at EAST · TORONTO

Henry Simpson Architect
12 Adelaide St. E.
Toronto



THREE RESIDENCES ON DORCHESTER ST. W.
MONTREAL; FOR J. SHEARER; CORNER HOUSE
FOR J. BROWN. WRIGHT & SON, ARCHITECTS, MONTREAL.

CAN PHOTO ENG BUR

CANADIAN ARCHITECT AND BUILDER.

VOL. V.—No. VII. TORONTO AND MONTREAL, CANADA, JUYL, 1892. { PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

14 King Street West, - TORONTO, CANADA.

64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMETS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	S. G. CURRY, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton
TREASURER	D. B. DICK, Toronto.

COUNCIL:

WM. G. STORM	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
JOHN F. PEACHE	Peterborough.
EDMUND BURKE	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Merchants' Bank Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	F. X. BERLINQUET, Quebec.
1ST VICE-PRESIDENT	VICTOR ROY, Montreal.
2ND VICE-PRESIDENT	J. NELSON, A.R.C.A.
SECRETARY	C. CLIFT, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. C. HUTCHISON, R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
ALPH. RAZA	Montreal.
J. F. PEACHY	Quebec.

THE first step towards affording free technical instruction to the artisan classes was taken in Toronto at the beginning of the present year, when the City Council made a grant for the purpose. The results are said to be very satisfactory, and such as to warrant the continuance of the undertaking. The attendance has not been far short of two hundred, and it is gratifying to learn that a large proportion of the students have come from the ranks of workmen connected with the building trades.

IN a letter published in this number an architect asks for information concerning the varieties of Canadian building stones and the names of quarry owners, and expresses surprise that this information is not to be found in our advertising pages. It is obviously to the interest of every manufacturer and dealer in building appliances to keep his materials and his name and address before the notice of the principal consumers. The advertising pages of this journal are undoubtedly the best medium for that purpose.

THE Toronto Builders' Exchange continues to make satisfactory progress. The brick manufacturers have recently connected themselves with the organization, and now constitute one of the sections of the Association, the total membership of which has reached about one hundred and fifty. The new rooms which are being fitted up at the corner of King and Victoria streets for the use of the Exchange, are expected to be ready for occupation in less than a fortnight. Preparations are being made for an enjoyable house warming to mark the removal of the Exchange to its new home.

THE Dominion Parliament has appropriated $10,000 to the purpose of erecting a statue of the late Sir John A. Macdonald. It is said to be the intention to invite competitive designs from Canadian and European artists. A rare opportunity is thus afforded of displaying the worth of native talent. Care should be taken to make the most of it. The result of the efforts put forth by Canadian artists in this competition will have a distinct effect upon the future progress of art in this country. Much will also depend upon the wisdom which the government may display in the selection of competent and impartial persons to judge the designs.

THE *Building Register*, of Washington, makes the suggestion that in office buildings hereafter constructed, provision should be made for the storing of bicycles. It is pointed out that at present person's using these machines must leave them outside, where they obstruct travel or are exposed to thieves, or place them in corridors and halls, where they are equally out of place. The number of users of bicycles is very large, and they are such an indispensable means of locomotion in many branches of business that the number is rapidly increasing. If the increase is as great in proportion in the future as it has been in the past the law-makers will be obliged to take in hand the matter of keeping them off the street.

A DEPUTATION waited on the Minister of Customs and Public Works a few days ago to ask for an increased duty on Portland cement; also that the standard of this material be made as low as is compatible with public safety and that preference be given on all public works to cement manufactured in Canada. Considering that hardly any two persons conducting a test will attain to the same results with a given brand of cement, it seems to be a matter of little importance whether the standard

be a high or low one. Theoretically, however, it would seem to be proper that the government standard should be fixed reasonably high.

THE important position of City Engineer, Toronto, which has been allowed to remain vacant for a year, has finally been filled by the appointment of Mr. E. H. Keating. Mr. Keating was formerly City Engineer of Halifax, and occupies at present a similar position at Duluth, Minn. His reputation would indicate his fitness for his new position. The successful administration of this most important department of the city service will certainly afford scope for ability of the highest order. The amount connected with the appointment as salary was placed at $4,000, but Mr. Keating asks $5,000. The sum is not too great for a first-class man, but the mayor's right to assure Mr. Keating that the extra $1,000 a year would be given him, without having laid the matter before the Council, is open to question.

THE district immediately north of Bloor street has within the last four or five years come to be regarded as one of the most desirable for residence purposes in the city of Toronto. This is due in a measure to its favorable location in proximity to the Queen's Park, the colleges and university, as well as the excellent street car accommodation, but more particularly to the fact that building restrictions are imposed governing the sale of lands, making it impossible for a cheap class of houses to be erected. In view of the precautions thus taken it is very disappointing to find that the result sought to be attained has to a large extent been defeated by the unsatisfactory character, in point of design, of the buildings erected. Unfortunately, much of the land in this locality has fallen into the hands of the speculative builder, who, while obliged to comply with the restrictions as to cost, is under no compulsion to have his designing done by other than a third-class architect. As a result we see a vast amount of good material which might have been made to assume forms of beauty delighting the eye and refining to the taste of the onlooker, wrought into forms of ugliness. Out of the hundreds of houses erected in this beautiful locality within the last five years, the number that can be said to be satisfactory in design might easily be counted on one's fingers.

THE introduction of the trolley electric system for the propulsion of street cars in Toronto was strongly objected to because it would result in adding to the number of overhead wires. When the fact was demonstrated that the trolley was the only successful system which could be adopted, the objectors had no alternative other than to philosophically try to make the best of the situation. There is a strong probability that with the electric street railway will come an improvement in the present arrangement of overhead wires, by which to a large extent their unsightliness and danger will be removed. It is understood that the street railway, electric light and telegraph companies have expressed their willingness to occupy jointly two lines of poles planted on either side of all streets on which cars will run. It is proposed to erect iron poles of sufficient height and strength to carry all the necessary wires. The carrying out of this proposal would allow of the removal of thousands of the large poles carrying electric light and telegraph wires now disfiguring the streets. The advantages would be about equal to those of the underground system, and without the added cost to consumers of electric light which would be certain to follow the construction and maintenance of the conduit system. We hope to see the idea successfully carried out.

WE publish elsewhere a series of "suggestions" issued by the Council of the Royal Institute of British Architects, for the conduct of competitions. The proposal to have the expert appointed to judge the designs advise as to the limit of cost, is designed to place all competitors on an equal footing. It has been the practice in Great Britain to charge competitors ten dollars or so for a copy of the instructions, which sum was returned only in the case of those who furnished a *bona fide* design. As it sometimes happens that a perusal of the instructions is sufficient to cause the architect to decide to have nothing to do with the competition, and as he is not in a position without the instructions to decide whether or not the competition is one which he might desire to enter, the Institute suggests that architects should be entitled to be refunded the sum thus paid, in cases in which they do not desire to compete and in which they return the instructions within the period of thirty days. We are not aware that in Canada competitors have ever been asked to pay for the information necessary to enable them to decide whether or not they should comply with the invitation to compete. It is manifestly unfair that they should. The *Building News*, in discussing the value of these suggestions, admits that they embody many needed reforms, but says: "The main difficulty remains, the difficulty of finding in each case a suitable professional assessor. This has always been in principle, the weak point of the system. A happy accident has so far kept it from being very obviously such, but in course of time its weakness can hardly fail to become conspicuous. It is this difficulty, more than any other, which needs for the future the earnest attention of architects and their representatives." The appointment of three assessors, instead of one, should it be possible to obtain them, would no doubt tend to insure an impartial and satisfactory decision.

IT is said to be the practice of architects in Montreal to include the electric wiring of buildings in the plumber's specification. To entrust this work to the plumber, who, probably in nine cases out of ten has never devoted an hour to the study of electricity, seems like deliberately preparing the way for future difficulty. In this connection we quote as follows from a paper on "Safe Wiring" read by Mr. A. B. Smith, Inspector for the Underwriters' Association, at the recent convention of the Canadian Electrical Association: "While in a few instances much trouble and annoyance is caused by unskilled electric men, who have an idea they possess more knowledge than can be carried by one single brain, still there is a source of trouble to electric light people and the underwriters which is most serious. What I refer to is, the ignorant and clumsy interference with good wiring by plumbers, steam and gas fitters and other pipe men, and our friend the ubiquitous bell hanger. These individuals, with supreme contempt of others' rights, or through ignorance, not realizing the danger of their practices, are constantly making mischief. Nine cases out of ten, where trouble is located in an otherwise perfect piece of work, these pirates are to blame. It is a common occurrence to find gas or water pipes resting upon electric wires, these pipes or other iron work, having been placed in position after the electrical work was completed. Furthermore, there is a certain class of men, especially gas fitters, who really have an idea that they do know something about electricity, and who believe that because wires are sometimes run in pipes, that it is their special vocation to do it. It is true in this as in other matters, that 'A little knowledge is a dangerous thing.' Unfortunately the public have no protection against these half-baked electricians, and it is against this class of work that the insurance companies have to fight their greatest battles. Serious loss has only been averted by constant and skillful supervision, and were it not so, the loss from this source would be vastly greater."

THE wisdom of the large expenditures of the Dominion Government in the construction of canals, as well as in the deepening of those canals sufficiently to admit of the passage of heavily laden vessels from the great inland lakes to the seaboard, is now becoming apparent. As a result of the advantages in the amount of cargo and saving in cost of transhipment offered by the Canadian route over the Erie canal, the exports of grain and flour of the city of New York are steadily decreasing, while those of Montreal are to a proportionate extent increasing. In consequence, the Americans are becoming alarmed, and in the House of Representatives it has been proposed to make an appropriation to cover the cost of a survey to determine the most desirable and practical route for a deep water canal wholly within the territory of the United States, from the great lakes to deep water in the Hudson river. In view of these circumstances, and of the fact that the volume of water transportation as compared with transportation by rail is shown by trade statistics to be on the increase, we are pleased to see the revival of the project to connect Lake Ontario with the Georgian Bay by means of a ship-railway. If this connection were made, either by ship-railway or canal, it would be the means of shortening the route from the grain-producing districts of the northwest to the seaboard by some four hundred miles, and would give Canada an advantage which it would be impossible for her to be deprived of. It would be the means of building up the interests of Toronto and Montreal, of developing our shipping and of promoting trade between this country and Great Britain. The cost of a ship-railway is placed at $12,000,000 to $15,000,000. The cost of the proposed American canal is estimated at $110,000,000. If, as is supposed, the saving in cost of transportation in deep draught ships from the lakes to the ocean, would in a single year amount to sufficient to pay this latter sum, there would not appear to be much risk involved in the Canadian enterprise at so much less cost, and in view of its greater advantages. The benefits to be derived from carrying out the undertaking, will depend to some extent upon its early commencement and speedy completion, in order that the volume of trade, which, as stated, has already begun to flow in this direction, may be encouraged, instead of being allowed to be diverted into other channels.

SCIENTIFIC NOTES.

THE MONIER SYSTEM OF BUILDING CONSTRUCTION.

BY LEWIS ANGELL.

At the meeting of the Science Standing Committee, 4th inst., I called attention to the Monier system of building construction which I have recently had the opportunity of inspecting in actual operation in Berlin. The system consists of a combination of cement or fine concrete with a net-work of wrought-iron wire or small bare forming a core. The system is applicable to a great variety of forms—viz., floors, ceilings, roofs, domes, walls, bridges, retaining walls, waterpipes, circular or oviform sewers, &c., and even the fortifications. Its recommendations are great strength, and economy in materials, space, and time. It is especially fire and damp-proof, and, to a large extent, independent of skilled labor.

The accompanying sketches will generally illustrate the system, which, as above stated, can be applied to various forms of construction.

Fig. 1 is an illustration of a fire-proof floor or arch about 10 feet span and 1¾ inch thickes. Upon an ordinary centre of planks a layer of cement and sand, in the proportions of 1 to 3, is laid one half the intended thickness of the arch. Upon this

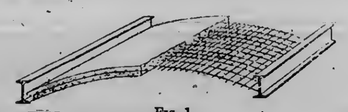


FIG. 1.

are laid longitudinally and transversely wrought-iron wires about ¼ inch diameter, so as to form a net-work with about 3-inch interspaces or mesh, the intersections being secured with fine wire. The net-work is then covered with another equal layer of cement, completing the thickness of the arch, the wrought wire net-work being thus embedded in the cement as a core. The spandrils are filled in with concrete in the proportion of 1 to 8. The thickness of the wire and the cement arch varies with the span and weight to be carried. The Hungarian Government tested a Monier arch, 2 inches thick, of 8 feet span, and 6 inches rise, by a distributed load of 31 tons with safety. Another arch 4 inches thick of 30 feet span carried a distributed load of 42 tons. A bridge has been constructed over the canal at Bremen with a span of 125 feet and 7 feet rise, having a thickness of only 7½ inches on the crown.

It has been proved by tests and expreience that the expansion and contraction of the cement and iron are equal, that cement and iron possess great affinities and become a solid mass, and

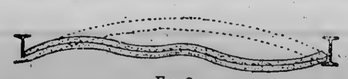


FIG. 2.

that the iron is not oxidized or otherwise affected independently of the cement. This form of construction give a maximum of strength with a minimum of material. It has also been proved by tests of the Hungarian Government that arches constructed on the Monier system will bear five times more weight than a corresponding best concrete arch, and that Monier slabs or landings will bear twelve times more weight than corresponding slabs of concrete. Another valuable quality of the Monier construction is that it will not suddenly break, crash, or collapse as in ordinary construction, but it gradually buckles or sags, retaining the weight above (fig. 2). The chief of the Berlin Fire Brigade has issued an official order that firemen are to enter buildings constructed on the Monier system, as there is no risk of floors and ceilings cracking and falling by reason of either heat or water.

The system has made great way in Germany, Austria, Hungary, and other parts of the continent during the last three years in connection with public buildings, palaces, warehouses, bridges, watefworks, tunnels, drainage, &c.

The foregoing is only a general description of the wonderful results on the continent of this new system invented by Mr. Monier and elaborated by Mr. Wayss, the eminent engineer-architect of Berlin; and capable of such wide application. Its conception in a modified form is not altogether new. There have been proposals to introduce a wire-wove core in various forms, but there has not hitherto been any serious application of the principle to actual construction, nor does there yet appear to be any instance of its adoption in this country. Its first intended application is to be in the deck of the new pier about to be constructed at Brighton, in the form of horizontal slabs or paving, whereby a considerable amount of time and the space it would occupy will be saved. The system is well worthy of the serious consideration of British engineers and architects.

ILLUSTRATIONS.

PHOTOGRAVURE PLATE—PROPOSED NEW UNION STATION, TORONTO.—STRICKLAND & SYMONS, ARCHITECTS.

The main building facing on Front street will be built of red Credit Valley stone for the two lower stories, and pressed brick with red Credit Valley stone dressing for the stories above, the roof being covered with red tile. The main entrance will be built of cut stone, floored in tile and leading into the main hall or rotunda, 40 x 50 ft., finished in oak, with tiled floors, the ceiling being panelled and enriched and the walls arcaded with stone and marble columns. The entrance to the company's offices will be by the tower entrance, which will contain an iron staircase and passenger elevators. Passing through the rotunda where tickets are purchased and baggage checked, the arcade corridor 20 ft. wide leads to the main waiting room. On either side of the corridor the store will be handsomely fitted up in most modern style.

The general waiting room 75 x 80 ft. will be finished in pressed brick and cut stone, with heavy enriched and panelled oak ceiling, with colored glass dome sky-light, light being also obtained from clerestory windows on three sides. The floors of this room and other waiting rooms will be laid with mosaic flooring. The ladies' and gentlemen's waiting rooms will be fitted up in hardwood, with decorated plaster ceilings, and the lavatories in connection with both of these rooms will be fitted up in the very latest and most complete style. Conveniently situated off the main waiting room will be the telegraph and parcel offices and news stand, with their respective fittings specially designed for their various uses. The outer or bridge waiting room will be finished in ash or other hardwood, with plate glass windows and doors. Two passenger elevators each capable of holding 40 persons will connect this room with track level, and also a handsome staircase ten feet wide finished in hardwood.

The new south train shed will be entirely of iron and glass and conform to the latest improvement in train shed construction.

The lighting throughout, and all power for elevators and other machinery, will be by electricity supplied from plant in the basement of main building. Heating throughout will be by steam.

The expenditure for the entire building will approximate $500,000.

POWER HOUSE, HAMILTON ELECTRIC STREET RAILWAY COMPANY, HAMILTON—JAMES BALFOUR, ARCHITECT, HAMILTON.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION FOR A TOWN COTTAGE—DESIGN SUBMITTED BY "VERISOPHT."

DESIGNING A HOUSE.

A writer in the *Magazine of Art* says: In the actual process of designing a house, the plan cannot be separated from the elevation and sections; the architect's mind keeps playing backward and forward from the one to the other, so that the building grows up in his mind as an organic whole. To put it in other terms, while he is at work on the plan he is constantly considering the effect of his plan on his elevation, and vice versa. The results of the work are duly displayed in plan, elevation and erection; and this, no doubt, leads to the false impression in the lay mind that the plan and elevation can be considered apart, and are not in necessary relation to each other. As the plan is embodied in the elevation and sections that is, in the actual walls of the building the two must be considered together in practice. With this provision, there are one or two matters which more particularly concern the plan. The main points to aim at are simplicity and compactness of arrangement and plenty of light. A long, crooked passage with constant changes of level, may be very romantic and admirably adapted to the habits of the "Decameron," but with the hurry of the modern household and the unadroitness of the domestic servant, it means cold dishes and disaster with crockery, and general discomforts and ill-temper. There has been a tendency lately to overdo the queer corner and the curious passages. I have a book before me, sent out by a well-known firm of furnishers, in which there are half a dozen or more designs for inglenooks and bays and recesses which do not result from any necessity of the plan, but are placed at random with no particular object but that of looking queer. The real old ingle is quite delightful, with its great cambered oak-beam across the opening, 14 feet wide or more, and its red-brick floors and the old muzzle loader over the chimney piece, and the little lead-glazed lattice with its dimity curtain; but how far away from this is the affectation of a modern ingle-nook, with its aggressive grate and mechanically stamped paper frieze and fillings of "art-fabrics." If you are going to have an inglenook, at least keep it plain and solid and comfortable, and have a hearth before which you can stretch your legs, and a fire place big enough to burn a reasonable, good oak log. So, too, with the passages: let them be wide enough for two people to pass, and light enough to prevent their falling into each other's arms. In country houses the position of the sitting room is usually determined by the aspect, and in a house of any pretension there is sure to be a good-sized hall and an ample stair case; but the hall is worth a sacrifice, even in smaller houses. The first impression you form of a house is very often the last, and your first impression is formed in the hall.

It is not in the least necessary that it should be two stories high. Some of the most charming little halls in seventeenth century and modern work are long, low rooms, sweet and homely to live in, places never haunted by the ennui of magnificent dreariness. For moderate house the one-story is rather an advantage because it practically gives another sitting room, and in quite small country houses, such as those that are used, say, for summer holidays, why not return to the plan of the yeoman's house of the sixteenth century and earlier, when one great hall was the general living room, and at one end were the kitchen and offices and the servants' rooms, and at the other the solar and the rooms of the master and his family? A house costing less than $5000 could have room enough for a billiard table or a dance, such as would be quite impossible in the stuffy, respectable house up the village built by the squire when he came of age. The reason for such a room would not be mere picturesqueness, but its manifold uses, its essential reasonableness, and the same reasonableness would not be afraid of the plainest work; of showing the rafters or the ceiling joists, or of lining the back of the fire place with honest red brick.

TO PUT ON HARDWARE.

By Owen B. Maginnis.

All working parts of joinery have moveable fixtures to secure them to those parts which are fastened or permanent. So fixings, or as they are better known "hardware," are manufactured for this purpose. By "hardware" is meant the iron and brass hinges, locks, etc., which are placed on doors, windows, and such like, and the purpose of what follows is to show the carpenter how to put it on properly.

Should the doors be of various heights, take two standard distances, say nine from the bottom and six from the top, or if desired, place the hinge just below the bottom edge of the top rail, and above the top edge of the bottom rail. Mark the two ends of the hinge with the point of a penknife, then set a guage to suit the width which will be necessary to let the hinge into the door-edge, which width will be regulated by the width of the hinge itself and the thickness of the door, in order that the screws which are to hold the hinge may be turned solidly into the wood and still leave a ⅛ or ¼ margin. A second guage will require to be set to the thickness of the hinge, allowing a little margin, that when it is let into the beveled edge of the door, it will come about square to the face. It must not, however, be so much sunk as to cause it to hingebound when hung. When the sinkage is made in the edge, the hinge can be inserted, and if it be a loose jointed or loose pin hinge, one piece may be set in and the pin side kept up. Should the hinge be a cast iron or japanned one, the end of the handle of the hammer might be used to knock it into place, but if it be of lacquered, bronzed or buffed brass finish, a neat clean block of soft white pine must be brought into use to avoid injuring the polished surface.

The hinge should not be make to fit too tight, as it may be found necessary to take it out again, and if it fit too closely there is a liability of sprawling the corners in doing so.

Brass screws must always be driven with a firm, square edged screw driver and care must be taken, that the point does not jump out of the slotted head of the screw, so as to mark and scratch the head.

In hardwood finish, brass screws should be well bored for with a German bit, and they should be slightly greased with a little soap or beeswax before being placed in the hole.

It is scarcely wise to hammer brass very much as brass is a soft metal, and the screw is liable to bend under the stroke of the hammer.

When the hinges are screwed on the door edge, place the door in the frame in the rebate, and wedging it up from the bottom so that the top edge will be an easy point, mark the positions of the hinge sinkages, (with a pocket knife) and cut out the wood as before, avoiding sinking it too deep, lest it should be found necessary to block out the hinge again with shaving or paper. It is better to pare out a little than do this, but care must be taken that it is not what carpenters call "hinge bound" which means that the hinges are sunk in too much, and the hinged joint is too close.

The only way to become an expert door hanger is by practice, and care should be exercised while learning in order to put the hinges on without injuring them and make the door work properly.

Single and double action hinges are much more difficult to put on than ordinary single action butts, still the makers give the carpenters great assistance by sending printed directions with sketches in each box showing the lock in position and in parts. This enables him to comprehend the way they should be set, and the directions and sketches ought to be thoroughly studied and understood before making a mark or using a tool. On no account should metal hinges be struck with a hammer as they are liable to fracture. Those of brass will stand a blow, but usually show the effect in bruise or dent.

Ordinary brass-faced mortise locks need nice fitting and require to be set in flush with the door's edge, and not project of the edge is bevelled. Brass door knobs and escutcheons ought, in all cases, to be covered with lawn, to prevent rough, sandy hands from scoring their polished surface. Tie the keys to the knobs, or, if this be risky, put a marked and numbered tag on each, in order that its lock may be readily found.

Patent door springs have printed directions, which must be adhered to to insure satisfactory working. Yale and other special locks need special cutting, and, therefore, a good machanic to put them on right; but the sketch in the box is a wonderful aid to novices. These locks ought never to be taken apart, on account of their intricacy. An error of this kind once cost the writer much expense and delay and a good wetting bringing it to the manufacturer's depot for readjustment.

In regard to sash locks there is little to be said, except that they require to be put on so as to really lock the window namely, bind it close together at the meeting rails, besides preventing the sash from being moved. Fasten on escutcheons perfectly plumb and drawer-pulls level, and the slots of the screws in a line with the work. For instance, in escutcheons, finger-plates, hinges and lock-faces all the slots should be kept plumb, and no drawer-pulls, door-pulls, or any brass, iron or silver work, kept level or horizontal. English ship-joiners never put their screws in any other way but this.

The hardware of sliding-doors run on a track on the floor consists of the sheaves or rollers, the track on which they run, the lock and fittings and the iron door-stop above.

In fitting in the sheaves, the main thing is to get them in the centre of the edge, to bring the two doors fair and to have them project equally. The doors ought, of course, to be fitted till the joint comes, and when the inside wood stop is mortised in and cut the two can be set on the track which, by the way, comes in two lengths and the sheaves regulated till the doors close tightly. Enough should be allowed from the floor for carpet

saddle. The stop is let flush into the door-head and the lock put on in the usual way. No hardwood sliding-doors should ever be made without friction-strips, to save the arrises and faces of the door's surface.

Sliding doors hung from above with sliding door hanger demand an entirely different treatment. The track being of wood and screwed on the partitions necessitates their being put on before the second partition forming the door pocket is put up. It is best to line pockets, for these doors, with matched ceiling to keep the door from being scratched. Concerning the fitting and adjustment of the hangers I would say there are many very excellent makes on the market and each has its own special features and special directions which are sufficiently clear and explanatory for any one of ordinary intelligence to work from.

Fanlight levers, bolts, etc., are comparatively simple in their application and demand little or no direction, but the great thing to watch in putting on all hardware is to make it fit neatly, so that it may look well. All marking, therefore, should be exact to insure the piece fitting in its place and working freely, without sticking.

HOW TO ESTIMATE.

By W. H. Hodson.

Following is the balance of specification and bill of quantities accompanying the drawings of Baptist Church, Walmer Road, Toronto, published in the Canadian Architect and Builder for May:

PLUMBER AND GAS FITTER.

State reduction if gas piping be entirely omitted. Lay on from meter in basement best 1½ in. tested iron piping to ceiling of auditorium and carry from thence to points marked on plans, commencing with 1¼ and diminishing to ½ in. as required. Provide for three separate supplies, one to basement, porch and vestry building, one to the rest of ground floor, and one to the gallery, and place taps in places convenient of access in rear passage; all to be of best tested iron piping laid complete and made ready for fixtures with all necessary bends, junctions, &c., complete, and to be satisfactorily tested on completion. All drop lights to be taken out of side of supplies and in no case from the bottom thoroughly secure to joists or timbers. Lay on water from line of street with ¾ in. lead pipe of 8 lbs. lead to line of fixtures, and from thence ½ in. 6 lbs. to sink, baptistry, W. C's. and basins. Provide brass stop and waste cock immediately inside wall, and pipes to be graded to this point. Provide and set a double tube street washer hydrant where marked. Fit up in basement a cast iron sink 18 ft. long with 1½ in. waste pipe of lead, Dubois trap and trap screw, brass fuller cock. The two water closets to be Malcolm's No. 1 toilet, fitted up with cabinet work and double hinged hardware seats and having all necessary cranks, valves, &c., complete. There will be a 4 in. cast iron extra heavy soil pipe carried from W. C's. to drain. Extend the soil pipes a single pipe up to and 3 ft. above roof with proper open tops to the same. Soil pipe to be coated on both sides with coal tar applied hot, and joints to be carefully caulked with oakum and lead. Provide two brass cleaning screws where directed. Basins to be 12 in. diameter with 1¼ in. counter sunk marble tops and backs 9 in. high, 1½ in. lead waste, Dubois trap, plated plug and chain and plated self closing Hyde cocks. Line baptistry, which will be open, with 14 oz. tinned and planished copper in best manner and provide 2 in. heavy lead waste and overflow properly trapped and carried into drain—plated rose plug and chain. Move and connect present double jacket heater now in school building with 1 in. heavy lead circulating pipes to and from baptistry. Provide brass cock for emptying boiler with waste to baptistry waste. Provide galvanized iron smoke pipe and damper connected into chimney. Put 3 in. lead ventilators to traps of W. C's carried into soil pipe above fixtures and receiving 2 in. and 1¼ in. branches from traps of the other fixtures. All piping and materials to be of weights and description conforming to city by-laws.

PLASTERER.

All brick walls will be finished to show bricks, except in vestry and dressing room building. Plasterers will be required to exercise the most extreme care in order to preserve the pressed brick work from damage in any form. Supply the necessary cotton sheeting to prevent them being splashed with mortar. The inner face of outer brick walls of vestry building to be well parged, making tight and close at frames, etc. Lath with the best sawn pine laths the whole of the ceilings, partitions, soffits of gallery, battened walls in vestry building and other places, prepared for lathing; laths to be not more than 1 in. wide for ceilings and 1½ in. for walls, 5-16 in. apart, well nailed, ends butted, and joints broken every 12th lath. The partitions and ceilings and soffits of gallery and other places prepared for lathing, to be plastered in best three coat work, sand finish. All the corners will be of wood. Walls to be rendered behind all skirtings and sheetings. The mouldings of capitals of the 16 large columns (ground floor and gallery) to be in plaster freely executed. The folited capitals of the 8 columns in gallery to be in plaster modelled in most artistic manner by modeller to be chosen by the architects. The whole of the work to be of the best quality of materials and workmanship, the mortar to be prepared with clean sharp sand, lime and hair in proper proportions, and the work to be left free from cracks, stains, blisters, or other blemishes, and sound and perfect on completion after making good after other trades. Plasterer to leave all dressed woodwork clean and ready for painter. Remove all rubbish and broom clean floors throughout on completion.

PAINTER AND GLAZIER.

A separate tender is required for the lead glazing. Windows of basement to be glazed with —— sheet glass; windows of vestry and dressing rooms to be glazed with 16 oz. glass, the lower panes to be ground. Glass to be well puttied and back puttied, sashes to be primed before glazing. The iron columns to be painted three coats and picked out in bronze. Iron work of principals to be painted three coats of blue and bolt heads gilt. The whole of the external woodwork usually painted, including window and door frames, eaves, &c., to be painted in three coats of best white lead and linseed oil paint of approved tints. Eaves, gutters and down pipes to be painted two coats. The whole of the internal wood work, unless otherwise described, including doors, casings, roof timbers, skirtings, sheetings, &c., &c., to be cleaned, stained to such tints as may be directed and twice varnished with best copal varnish. The risers of gallery plates to receive one coat of stain in oil. Inside frames of windows to be painted three coats. The pulpit front, tracery over baptistry, doors of church and vestibules, vestibule screen, the strings, rails and balusters of staircase, and the gallery front will be of hardwood, to receive a thorough coat of oil, to be well filled with approved fillers, to receive two coats hard oil and rubbed down with pumice stone and sweet oil. Painter to clean sash windows and scrub floors before and after painting and leave glass perfect on completion. The ceilings of church and vestibule, tower and staircase, the walls in church when plastering, and the walls of ceilings of vestry to be calcimined in two coats of tints to be chosen.

LEAD GLAZING.

All the windows except basement and windows of vestry and dressing rooms (which are in painter's specification) will be glazed with leaded glass, also traceried heads of entrance doors and six sets of swing doors; all to be set in strong church lead, securely soldered and cemented and secured with strong copper wire to ½ round iron bars, properly japanned. Lead work to be bedded in frames in thin putty and stops to be closely nailed up to lead. Provide and fix as shown in elevations carefully fitted steel frame ventilators. The windows in loft to be glazed with clear glass in simple quarries. The windows of porch and rear vestibule and third stage of tower to be glazed with rolled cathedral glass of approved tints and in small quarries. The other leaded windows, traceried fanlights and vestibule doors and screen, to be glazed with muffled cathedral glass of delicate tints in varying geometrical forms with roundels and other features to be chosen by the architect. The six sets of swing doors will be glazed with clear glass set in lead made to geometrical forms with occasional roundels.

BILL OF QUANTITIES.

PLUMBER AND GASFITTER.

176 lineal ft. of ⅝ in. lead water pipe, 8 lbs. to the yard
400 lineal ft. of ½ in. lead water pipe, 6 lbs. to the yard
35 lineal ft. of 1½ in. lead waste pipe
18 lineal ft. of 2 in. heavy lead waste pipe trapped
230 lineal ft. of 1¼ in. iron gas piping
300 lineal ft. of 1¼ in. iron gas piping
556 lineal ft. of ½ in. iron gas piping
140 lineal ft. of 4 in. soil pipe (heavy) open traps, caulked with oakum and lead, coated with coal tar
1 brass stop and waste cock
1 double tube street washer hydrant
1 cast iron sink 18 ft. long
1 Dubois trap and screw
1 brass fuller cock
2 Malcolm's No. 1 toilet water closets hinged, hardware seat, cranks, valves, etc., complete
2 brass cleaning screws to soil pipe
2 12 in. dia. basins, 1¼ in. counter sunk marble tops, backs, etc
2 Dubois plated plug and chain
2 plated self closing Hyde cocks
1 plated rose plug and chain
1 brass cock emptying boilers with waste to baptistry waste
1 galvanized iron smoke pipe and damper to chimney.
3 lead ventilating pipes connected to soil pipe with branches from traps
1 rear basement water closet, etc., complete in working order
Lining baptistry with 14 oz. copper
Move and connect present heater with inch pipes to and from baptistry
Traps, bends, junctions, holdfast, etc., to gas pipes, joints lead ed, left ready for fixtures
State deduction if gas piping be entirely omitted

PLASTERING.

2207½ supl. yards of 3 coats work
188⅔ supl. yards of 1 coat and rendering
16 plaster copetals, moulded, etc
8 foliated copetals, gallery
Supply cotton sheeting to prevent damage by splashing
Large inner face of walls as specified, tight and close to frames
Leave wood work clean for painter, remove rubbish, clean floor, etc., on completion.

PAINTING AND GLAZING.

654 supl. yards of 3 coats painting
1655 supl. yards of staining and 2 coats varnishing
70 supl. yards of 3 coats, picked in bronze
13 supl. yards of 3 coats, blue, bolt heads in gilt
28 supl. yards of 1 coat stain in oil
175½ supl. yards of 1 coat, oil filled, 2 coats, rubbed down, etc
213 supl. yards of 2 coats, painting eaves, gutters, etc
2763 supl. yards of calcimining in 2 tints
600 supl. yards of sheet glazing
Glazing vestry and drawing-room windows with 16 oz. glass, lower panes ground

LEAD GLAZING.

953 supl. yards of lead glazing, soldered and cemented, etc
75 supl. yards of clear lead glazing
172 supl. yards clear glazing loft windows
203 supl. yards of rolled cathedral glazing
100 supl. yards of muffeled cathedral glazing
Providing steel frame ventilators as per elevation carefully fitted

CANADIAN BUILDING STONES.

Peterboro, Ont., June 7th, 1892.

Editor Canadian Architect and Builder.

Dear Sir,—Can you inform me as to the address of the proprietors of the Credit Valley stone quarries? I should think that it would be well for them to advertise in your paper.

Some time ago you promised us a report of a test to be conducted at the School of Practical Science of the different kinds of building stone. I have not yet seen the report, but would like to, as I am desirous of getting information as to where the different kinds of stone could be obtained.

I remain, yours respectfully,

E. Bartlett.

A new system of builders' scaffolds is said to have been invented by a Duluth, Minn., man, who claims that his device will save at least 30 per cent. of the cost of laying brick wall by the use of the present system of lumber scaffolding. The new scaffold is made of aluminum and steel, is light, strong and durable, and is moved upward by a set of simple levers as the wall progresses upward, always keeping the bricklayer's material directly in front of him.

THE LATE W. T. THOMAS.

MR. W. T. Thomas, the well known architect, who died at his late residence, 119 Mackay Street, Montreal, on the 26th ult., was the son of the late Wm. Thomas, architect, of Toronto, who came to this country in 1844, settled in Toronto and was one of the leading architects in the west, and a pioneer of Gothic architecture in Canada, and even on this Continent. His brother, the late John Thomas, won wide distinction as a sculptor and architect, having been chosen by Sir Charles Barry, the architect of the Houses of Parliament at Winchester, to execute the statuary about that building.

The subject of this sketch inherited the family ability, and studied under his father the profession of which he proved himself a master. Mr. Thomas went to Montreal about the year 1864, and for a short time practised in partnership with his brother, Mr. C. P. Thomas, now of Chicago, and subsequently in his own name, rising at once to the first rank among his confreres.

St. George's Church in Montreal, and Trinity Church, St. John, N. B., (both won in open competition), are perhaps the best examples of his genius in Church building, but the many churches which he designed elsewhere, also bear evidence of his ability. Mr. Thomas did not, however confine himself entirely to ecclesiastical architecture, as he executed among other buildings in Montreal, the Caverhill block on St. Peter Street, and the houses of the late Thomas Workman, Lord Mount Stephen and Mr. Duncan McIntyre, the Prescott Town Hall and other buildings throughout the country.

The deceased gentleman leaves a widow, the daughter of the late John Hancock, barrister, of Montreal, and two sons who are studying their father's profession. His funeral took place on the 28th ult. the pall bearers being chosen from the members of the profession in Montreal, viz: J. A. Hopkins, R. C. A.; A. C. Fowler; A. F. Dunlop, R. C. A.; J. J. Brown; James. Wright; W. McLea Walbank.

THE LATE W. T. THOMAS, ARCHITECT, MONTREAL.

SUGGESTIONS FOR THE CONDUCT OF ARCHITECTURAL COMPETITIONS.

SANCTIONED BY THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

1. The promoters of an intended competition should, as their first step, appoint one or more professional assessors, architects of established reputation, whose appointment should be published in the original advertisements and instructions, and whose decision should govern the selection of the designs.

All designs sent in should be submitted to the assessors.

2. The duty of assessors should be:

(*a*) To draw up the particulars and conditions as instructions to competitors, and to advise upon the question of cost.

(*b*) To determine which of the designs conform to the instructions, and to exclude all others.

(*c*) To advise the promoters on the relative merits of the designs admitted to the competition, and to make a selection in accordance with the conditions.

3. Every promoter of a competition and every assessor engaged upon it should abstain absolutely from competing and from acting as architect for the proposed work.

4. The number and scale of the required drawings should be distinctly set forth, and they should not be more in number, or to a larger scale, than necessary to clearly explain the designs. If perspective views be required, it should be so stated, and they should be uniform in scale, number, mode of coloring, etc.

5. Competitions should be conducted in one of the following ways:

(A) By advertisement, inviting architects willing to compete for the intended work to send in designs. The promoters, with the advice of the assessor or accessors, should make their selection for such designs. The author of the design awarded the first place should be employed to carry out the work.

(B) By advertisement, inviting architects willing to compete for the intended work to send in their names by a given day, with such other information as the candidate may think likely to advance his claim to be admitted to the competition. From these names the promoters, with the advice of the assessor or assessors, should select: (*a*) an architect to carry out the work; or (*b*) a limited number to compete, and each competitor thus selected should receive a specified sum for the preparation of his design. The author of the design awarded the first place should be employed to carry out the work.

(C) By personal invitation to a limited number of selected architects to join in a competition for the intended work. Each competitor should receive a specified sum for the preparation of his design. The author of the design awarded the first place should be employed to carry out the work.

6. No design shall bear any motto, device or distinguishing mark, but all designs should be numbered by the promoters in order of receipt. Any attempt to influence the decision of the promoters, or of the assessor or assessors, should disqualify a competitor.

7. In every case the amount of premium or remuneration for the competitive designs should be fixed by the promoters, acting under the advice of the assessor or assessors, and should be paid in addition to the usual professional charges for carrying out the work.

8. Where a deposit is required for supplying the instructions, it should be returned on the receipt of a *bona fide* design, or if the applicant declines to compete and returns the said instructions within a month after their receipt.

9. A design should be excluded from a competition:

(*a*) If sent in after the period named (accidents in transit excepted).

(*b*) If it does not substantially give the accommodation asked for.

(*c*) If it exceeds the limits of site, as shown on the plan issued by the promoters, the figured dimensions on which should be adhered to until officially altered.

(*d*) If the assessor or assessors should determine that its probable cost will exceed the outlay stated in the instructions, or the estimate of the competitor, should no outlay be stated; provided always that, should the assessor or assessors not have been consulted in the first instance respecting the cost, as recommended in paragraph *a* of Clause 2, and should he or they be of opinion that the outlay stated in the instructions is inadequate for the proper execution of the proposed works, the assessor or assessors shall not be bound in the selection of a design by the amount named in such instructions, but the question of cost shall, nevertheless, be a material element in the consideration of the award.

(*e*) If any of the other instructions are violated.

10. It is desirable that all designs submitted in a competition, except any excluded under Clause 9, should, with the consent of their authors, be publicly exhibited after the award has been made, which award should be published at the time of exhibition.

11. The architect whose design may be selected as the best should be employed to carry out the work, and he should be paid in accordance with the Schedule of Professional Practice and Charges of Architects sanctioned by the Royal Institute. If no instructions are given to him to proceed within twelve months from the date of the selection, he should receive adequate compensation in addition to the premium (if any) awarded to him. In the event of a part only of his original design being carried out, he should be paid a sum to be agreed upon in respect of the deferred portion, such sum to be merged in the usual professional charge when the completion of the design is proceeded with.

It should be understood that the Royal Institute issues these suggestions as a guide to promoters where a competition has been decided upon, but not as necessarily recommending the principle of competition.

ASTON WEBB, *Hon. Secretary.*
WILLIAM H. WHITE, *Secretary.*

The Royal Institute of British Architects,
9 Conduit Street, Hanover Square, London, W.
Re-issue after revision, 2nd June, 1892.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

At the regular monthly meeting of the Council of the Province of Quebec Association of Architects held on the 11th inst., Mr. A. C. Hutchinson was appointed examiner in place of Mr W. T. Thomas, deceasde.

The Secretary reported that he had several applications for examination to enter upon the study of architecture and one for final examination.

It was resolved that the Council of the Province of Quebec Association of Architects at this their first regular meeting since the demise of the late Mr. W. T. Thomas, take the opportunity to record their sense of the loss sustained by the profession in the decease of their late respected confrere, who during a practice extending over thirty years, designed so many important buildings that contributed so largely to the advancement of architecture. It was also resolved that a copy of this resolution be forwarded to the widow of the deceased, and that copies be sent to the CANADIAN ARCHITECT AND BUILDER and to the city press for publication.

It was also resolved that Mr. J. J. Brown be appointed a member of the Council to frill the vacancy caused by the resignation of Mr. C. Clift, the Secretary, and the acceptance of the same office by Mr. A. C. Hutchison.

PRESBYTERIAN CHURCH COMPETITION.

THE following is the report of the experts appointed to examine the designs submitted in the recent Presbyterian church competition:

TORONTO, May 31st, 1892.

W. A. LANGTON, ESQ., Registrar O. A. A.

DEAR SIR, – In compliance with your notification of May 6th of our appointment as experts, we have examined the competitive designs sent in for Presbyterian churches, and with much regret we beg to say that in our opinion there is not a sufficiently large number of suitable designs among them to warrant the committee in publishing a pamphlet.

The design for "a country church," under the motto "John Nox" is unquestionably the best of those submitted, that for "a village church," under the same motto coming next in merit, and to the author of these we have awarded the first prize.

Although there is considerable talent displayed in several of the sixteen sets received, there being some excellent suggestions in unfinished drawings, there are nevertheless none, with the exception of the two above mentioned, entirely fulfilling the requirments of the competition, which called for plans of peculiar treatment intended specially to meet the wants of Presbyterian congregations, at the same time having sufficient artistic merit to assist in raising the standard of church architecture in this country. This then being the object of the competition, neither those designs partaking largely of the character of existing buildings, nor those lacking study or of questionable architectural merit, can be said to have attained the end in view, and for that reason such have not been placed.

We respectfully suggest that the premiated designs be kept as a nucleus, and another attempt be made next winter to obtain an additional number of creditable plans.

Yours truly,

FRANK DARLING,
JOHN GEMMELL,
A. FRANK WICKSON,
} Com. of Experts.

The members of the Toronto Architectural Sketch Club are engaged to-day in a cricket match with a local team at Norway.

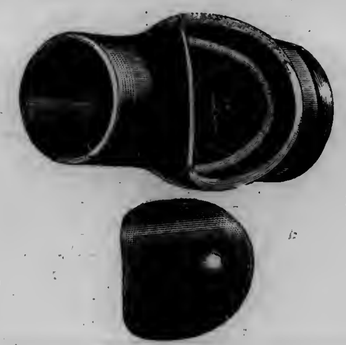
SANITATION AND HEATING

A VALUABLE PLUMBING DEVICE.

Editor CANADIAN ARCHITECT AND BUILDER.

While our plumbing by-law aims at and, perhaps, as nearly approaches sanitary perfection as that of any city, one want has been felt by those who desire to live up to it in the spirit as well as the letter.

When a soil pipe system, including iron drain, has been put in, tested and proved sound, there remains a joint, or rather two of them, and the most difficult of all to make, to connect with the tile drain just outside the building. Though most likely to be defective, there is no chance to test this work, either to see that the inside be clear of cement or the joints gas and water tight. When the tile drain is taken alongside the building to foot of soil pipe, the defects are doubled, and in many hundreds of cases has this been done under our by-law for the want of a simple appliance not in our market, though as a makeshift a T pipe has been used by some plumbers. During my recent travels I was pleased to find an invention, clearly shown by the accompanying cut, known as an "access pipe," and commonly used in England. Having the maker's address, and the price being low, I do not see that we need be longer without it.



In this connection I might also state that in England the practice of laying tile drains corresponds with the national character, ponderous and immovable. A rest is provided under each joint and the whole drain is encased with a solid mass of concrete before covering with earth, preventing any settlement or breaking of joints. The ventilating of traps under fixtures, however, is not common, nor is the plumbing generally equal to ours, though we go to them for fixtures; and I shall be glad when under free or fair trade we may be able to use more of them, as for instance, Shank's porcelain lavatories, as cheap there as the bowl and marble slab, also their enamelled iron baths, more durable than sheet metal and cleaner than wood encased fixtures.

On the continent of Europe good plumbing seems to be unknown, and some of their interesting customs perhaps savor less of decency, according to our standards, than of utility and comfort. In the milder climates, conducive to out-door life, sanitation and house heating, so important with us, can safely be neglected and human energies find occupation in the many fields of art which in this new land remain as yet untilled.

M. B. AYLSWORTH.

VARIATIONS IN PRACTICE*

By H. J. BARRON.

The writer had intended, when starting on this paper, to take some special subject, such as the dimensions of main pipes, or the proportions of risers, but as this is the first meeting at which papers are to be read he decided that glittering generalities might in his case be of more use than solid specialties. The saying that "variety is the spice of life" is not, as it often seems, a flippant remark, but is the most profound philosophy; to differentiate is a necessity of progress and one of the corner-stones

*Paper read before the fourth annual convention of the Master Steam and Hot Water Fitters Association of the United States.

of evolutionary philosophy. In the arts, as in nature, that form best fitted for the environment survives; that which is best absolutely and always no man can say; but that which is worst can be improved by discussion and experiment; the result is knowledge.

Let us commence with estimates: there were eight bidders recently on a Southern post office; A was $9,000, B was $8,500, C was $8,000, D was $7,500, E was $7,000, F was $6,500, G was $6,000, and H, the successful bidder, was $5,500. These are not the exact figures, but those who are conversant with this particular contract will recognize that they are near enough for illustration. As the concerns that bid on this work are familiar with what was required I think if you will add the eight bids together and divide by eight and get the average, you will have a fair bid for the work, which would be $7,275; if you exclude the three highest bidders and strike an average with the five lowest this average bid should be a low bid for the work which would be $6,500; yet the successful bidder is one thousand dollars below this an example of variety with a vengeance.

Recently there was a contract given out in New York in which the bids ranged from $9,000 to $11,000. There were seven bidders. The owner of the building was a business man without preferences—except preferring to get the most for his money. There was to be furnished 6,500 feet of surface in direct radiators, two 75 horse power tubular boilers, with everything that goes into a plant of this character. In this case the lowest bidder also got the work, and the other bidders, who had spent their time advising and negotiating with the owner, got something to think about.

In alluding to this subject I feel like apologizing, as this is such an old, old story, but it is one that a little discussion of may prove interesting. In regard to details one concern makes full working drawings for all work and gives the steam-fitter a specification to work from; others have the foreman lay out work and dispense with drawings, except the use of the architects' plans, perhaps; one concern cuts all its pipe to dimensions in the shop—risers, mains and everything; other concerns cut everything on the job, the largest as well as the smallest pipe; others again pursue a middle course, cutting all pipe above 2½ inches in the shop and all below that size on the job; one concern sets its boilers with a return flue over the top (I am now speaking of the ordinary return tubular boiler); another condemns this practice; one lines the fire-box back of the bridge wall as well as in front of it with fire-brick; the majority only line in front. A & Co. have domes on all their boilers; G & Co. never use them. X uses a straight bridge wall, and H uses a curved one. J feeds through a top feed, and K through the blow off in the back. Then with size of main pipes (I am now speaking of an apparatus with reduced pressure and exhaust combined, say, with 5,000 feet of radiator), B starts the steam main with 4 inches and ends with 2 inches, while C starts with 6 inches and ends with 3 inches. C has a 3-inch return main, and B a 2-inch. X uses a reducing valve the full size of his pipe without a bye pass; C puts in a bye pass and uses a reducing valve half the size of his pipe, while H uses a bye pass half the size of his pipe and reducing valve full size. X uses a pump governor to control the pump returning condensation; C uses a drip tank and lets the engineer control the pump; X puts on a noiseless back pressure valve, and C puts on an ordinary one; one uses a separator on his steam pipe to the engine and a grease extractor on his exhaust pipe to heating system; others leave them off; one uses a continuous main pipe dripped only at the end, while the other has a drip from every riser. Shall we run a steam riser and a return riser and an air line, and how shall we connect our radiators? Shall we run the three risers, and on every floor where we take out a radiator connection run all around to the far end of the radiator, even on the second floor as on the top, to allow for expansion? Shall we use the single or double pipe? Shall we run an air line? Shall connections to radiators be taken above the floor or beneath it or under the ceiling? Chicago takes them above the floor, New York beneath the floor and Buffalo under the ceiling. A curious thing about Buffalo practice is the single pipe system with two valves on the radiators. The two-valve single pipe system, as it is called, this is equalled by a well known concern that puts a single valve with the two-pipe system, a double riser and only one valve on the radiator, and in Philadelphia they put a check valve on the return end of the radiator, using the double pipe.

The writer's creed, as a steam-fitter, is about as follows:

1st. I believe the water tube boiler superior to the fire tube.

2nd. I believe the sectional radiator superior to the solid base radiator.

3rd. I believe the single pipe system superior to the double pipe for all purposes.

4th. I believe every high pressure or reduced pressure apparatus should have a pump governor and also a boiler water level regulator.

5th. I believe in an open feed water heater.

6th. I believe good steam heating is better than good hot water heating, and that there is more skill required for the design and erection for the best steam heating than there is for the best hot water heating.

7th. I believe the hot blast system or, as it is sometimes called, the fan system, is the proper system for public buildings.

8th. I believe every exhaust pipe should have a grease extractor and every engine pipe a separator.

9th. I believe a steam dome on a tubular boiler an absurdity.

10th. I believe it requires an exceedingly clever man to be the lowest bidder and make his business pay and acquire a reputation for good work.

In conclusion let us hope there will be always variety enough to make the life of the thermic engineer interesting.

MANUFACTURES AND MATERIALS

A company is being formed at Waterloo, Ont. for the purpose of constructing asphalt pavements.

Messrs. Fitzgerald & Minhinnick are forming a joint stock company at Hamilton, Ont., with a capital of $50,000, to manufacture ornamental tiles for architectural purposes.

The Trinidad Asphalt Company, of Toronto, limited, has been incorporated with a capital stock of $100,000, divided into one thousand shares of $100 each. Charles Riordan, A. Scott Irving, John Ellis, M. J. Adams, W. M Hall and M. F. Brown compose the company.

The Laprairie Pressed Brick and Terra Cotta Company is being organized, with a capital of $150,000. The promoters are: Messrs. Peter Lyall, of Montreal, Hugh Cameron, of Toronto, Archibald Dunbar Taylor, of Montreal, Thos. Auguste Brisson, of Laprairie, William Johnson, of Montreal, Thomas Henry Rothwell, of Goderich.

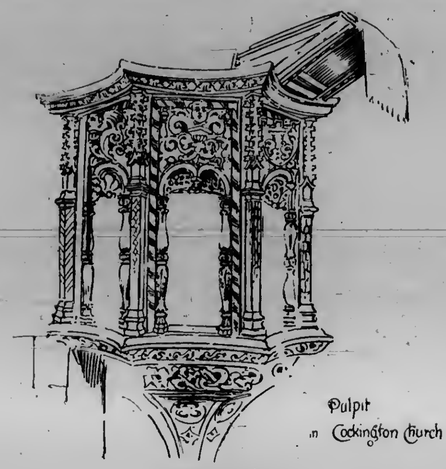
Mr. Cranston A. Stark, of Winnipeg, has recently patented an artificial stone paving tile or block, composed of Portland cement and sand, made plastic with water, and comprising two layers, one layer consisting of equal parts of cement and sand, and the other layer two parts or more of sand to one part of cement, both layers united by pressure in a plastic state in a mould forming the shape of the tile.

Application has been made for letters of incorporation for the Kramer-Irwin-Roach Asphalt and Cement Paving Company (limited), of Hamilton, with a capital stock of $10,000. The proposed incorporators are: Herman Kramer, Buffalo, and Thomas Irwin, John T. Irwin, W. J. Kingdon and J. F. Monck, of Hamilton. The object of the company is to construct pavements of German asphalt, and it has applied for and received permission to lay down a specimen piece of roadway so that citizens may have an opportunity to judge of its merits.

E. B. Butterworth, Ottawa, Ont., has been granted a patent on a warm air furnace, which consists of the combination of a fire pot having angular corrugations, some of which have their edges extended to form flanges, an oblong base, containing grate, ash doors, and draft damper, cylindrical combustion chamber, having a shell consisting of angular corrugations provided with fire door and down flue, a conical top or dome, a deflector suspended from said dome, a down flue attached to the combustion chamber having branch, with damper; a radiator attached to the down flue and partly surrounding the fire pot, branch pipe attached to said radiator and provided with check damper, and the pipe rising from the branch and connected with the branch and the enclosing casing.

As far as research has been able to determine, glass was in use 2000 years before the birth of Christ, and was even then not in its infancy by any manner of means. In the Slade collection of the British museum there is a head of a lion moulded in glass, bearing the name of an Egyptian king of the 11th dynasty. This is the oldest specimen of pure glass bearing anything like a date now known to exist. The invention now known as "bleezing," the mode of varnishing pottery with a thin film of glass is believed to date back to the first Egyptian dynasty. Proof of this is found in the pottery beads, glass glazed, found in the tombs of the age above referred to. Dr. Schliemann found bits of glass in his excavations at Mycenæ, though Homer does not mention it as a substance known in his time. The most eminent Egyptologers place the date of the first use of glass at a period too remote to be given in years.

DECORATION AND FURNITURE



Pulpit in Cockington Church

DECORATION.*

And now, to come to my special subject, I will give some hints as to the best manner of treating a middle class dwelling, and will begin at the entrance hall. Of course there are many ways of dealing with this, as with every other part of the house, so I must give several modes of treatment. It has long been the custom to treat the hall and staircase as unimportant parts of the house, to give them little or no attention, and so they have presented a naked, cold, and uninviting aspect—places to be hurried through as quickly as possible. The ceilings have been left white, and the walls painted one plain unbroken tint of drab or stone color. The visitor obtains his first impression of the house on entering the hall, and it is desirable he should be well impressed. We may first consider the ceiling. It should not be pure white, as garnish whiteness is out of accord with all other coloring—that is, in connection with house decoration; the whiter your shirt-fronts are the better. Well, the ceiling may be painted some shade, such as light vellum or fawn color, or some shade of blue, neutral in tone, such as the shade presented in the duck egg shell. The ceiling tint will be regulated by the coloring of the walls. This toning of the ceiling is good as far as it goes, but there is no limit to the various ways it may be decorated. Stencilled ornament is one of the less expensive modes. And here, in speaking of stencilled ornament, it must not be thought that this is necessarily a "cheap and nasty" mode of ornamentation because we are all familiar with wretchedly designed and executed work of this kind. A stencil is a design cut in firm paper, cardboard, or tinfoil, and the color is stamped through the openings in the manner of printing. Now all printing is not artistic, yet the capital letters in old Italian and German books are full of artistic design yet they are printed, too. So with the stencil plate. It first of all has to be designed, and the highest powers of draftsmanship may be brought to bear in the production of high-class stencil work. The same design may be traced directly by hand, but the stencil plate is used as a quicker method of obtaining like results. The reason why so much work of this kind is inferior is simply because it is difficult to do it well. Preston Town Hall, in England, decorated by Heaton, Butler and Bayne, the eminent glass-stainers and decorators, is nearly all stencilled work, but yet it is one of the best decorated halls in England. I do not recommend stencilled in place of hand-painted work; where money is forthcoming, I prefer to do the latter. But to return to the hall ceiling. It is a simple and inexpensive way of getting a pleasing effect to put a band of well-designed ornament round the ceiling, its breadth being regulated by the size of the vestibule or hall, and there is no reason why the centre of the ceiling should not be covered with a simple geometrical design in quiet colors, and treated flatly, without light or shade. A little gilding introduced in small spots and thin lines defining the leading forms of the diaper or panelling has a very good effect, but there is no limit to the richness and quality of design that may quite fitly be expended here. Besides that, there are many alternative modes of treatment besides painting. There are beautiful paper hangings specially designed for ceilings, besides several embossed or raised materials such as Tynecastle tapestry, Anaglypta, and Japanese leather papers, which when harmoniously colored produce most pleasing effects. The cornice should be colored to connect the ceiling and walls, care being taken to use light shades where the mouldings and enrichments are delicate. The treatment as to the division of the walls will depend on the height of the ceiling, but generally speaking it is good to put a frieze under the cornice, and it is useful to have a dado here, and in the staircase following the rake of the handrail. The dado and wall space should be separated by a wooden moulded rail. The dado should be highly varnished, so as to allow of washing and dusting without the risk of soiling. The color of the walls should be pleasantly warm, such as terra-cotta, or even Pompeian red, the dado in deeper shades of the wall color; soft olive green is also good for staircase walls. Blue, unless it is of the peacock shade, or approaching a grey green, had better be avoided here. The steps of stairs if of wood, should be stained a deep walnut color, or if they be of stone they may be painted a deep shade of the dado color, and varnished to allow of cleaning frequently. The hall and staircase walls may be papered there are special designs made for the purpose that look very well indeed, having friezes and dadoes specially colored to match. The hall is a good place to hang etchings, autotypes, and engravings, in quiet oak or black moulded frames; and when they form a special feature of the decoration, the walls should be painted a quiet shade, as a florid patterned paper detracts from the value of the pictures. The carpets and portières should be in strict harmony with the decorator's work, and should be chosen by him or the architect. I have often seen the whole harmony of coloring in a house destroyed by the unskilful selection of the carpets and hangings. The woodwork should be painted in one or more shades of maroon or other rich brown colors and varnished, all graining should be avoided. I must confine myself to broad principles as I proceed, as I could multiply varieties of treatment without end. The dining-room should be sombre in tone, the ceiling a vellum color in depth to suit the walls. It may be divided by wood mouldings into geometrical panelling, and these panels filled with Tynecastle tapestry or Anaglypta, the effect of this is as if it were executed in low-relief plaster work. The designs manufactured now are very beautiful. If the ceiling is treated in this manner, the walls may also be decorated with the same materials, for there are friezes and wall hangings made of the same stuffs. The painting and gilding on those surfaces can be as simple or as grand as may be demanded, they are capable of many and varied beautiful treatments. Immediately under the frieze should be fixed a moulded picture rail; this is much better than a metal rod, as it goes round the entire room as the cornice does; its distance from the cornice will depend upon the height of the walls. The advantages of lowering the picture rail is that it affords greater ease in hanging the pictures, and prevents the unsightly cords being seen to the same extent as when going to the cornice; by shortening the cords, too, pictures hang steadier and the chances of breakage are lessened. This moulding can be colored to be in harmony with the walls and rendered almost invisible, or it may be gilt solid so as to form a marked boundary to the frieze. The coloring of the walls should have reference to the pictures, and should not be too light in tone; experience has discovered that dark reds or old gold color, not unlike rich brown paper or dull tones of green, either cool and grey, or warm and brown, are the best for showing pictures to advantage. I painted the dining rooms of two of the Royal Academicians in London, J. Pettie's and McWhirter's, and in both cases the color selected was a dark grey-green; both artists found the full value of the coloring of their pictures brought out to the fullest extent on this dark background. The Royal Academy walls are colored a dark Indian red, and so also are the walls of the British National Gallery. As chairs are placed round the walls of the dining room, it is good to put a chair-rail at the height of the chair-backs; this prevents the chairs from breaking the plaster. The dado should be colored in relation to the walls above, and a good many shades darker; the dark dado takes from the bareness of a large room, and gives a coziness and furnished appearance which does not exist when you can see each piece of furniture clearly defined against the walls. The woodwork should be painted good solid colors of Indian red or walnut shades, or black and resembling ebony. I do not recommend decorating the panels with any kind of natural flower designs; thin flat hand-painted ornament in ivory color, resembling, but not imitating, inlaid work, is chaste and beautiful. If the wood is of good quality the panels may be decorated with various stains in full and rich designs as shown in samples here. I have decorated the saloons of many of the great ocean steamships in this manner. It is best to French polish surfaces decorated in this way.

As yet I have dealt with the ceilings and walls as covered with embossed materials, either in low or high relief. The ceilings, where dust cannot settle, may safely have the designs in high relief, but those in low relief are more suited to the walls. The walls themselves may be formed into well proportioned panels, not so small as to interfere with the placing of the furniture or the hanging of the pictures. The panels should be divided by wood mouldings and there should be a style round each treated in flat tints of such a kind as to show the panel colouring to the greatest advantage. The French are partial to the mode of treatment, and I think it a very good one; it gives a rich furnished appearance to the walls. Both ceilings and walls may again be oil-painted and decorated in a hundred ways; I have painted many of the finest houses in Scotland in this way, the ceilings being entirely decorated by hand with figures, wreaths, and ornamental compositions, the walls also being decorated with the like specially designed and hand-painted ornament. This is the most artistic manner, and no two houses are ever painted in the same way. Of course, ordinary wall papers may be applied here as everywhere else in the house, and if chosen by an expert, very fine effects may be obtained in this manner. I don't think there is a wiser way of spending money than in making the home beautiful. Our wives and families spend most of their lives at home, and the enjoyment derived from beautiful surroundings is beyond estimate, besides the refining influence it has on our children. There is no pleasure so constant, so soothing, so lasting and elevating as that afforded by a lovely home; it

*Abstract from a paper read before the Sydney, N. S. W., Architectural Association, by Mr. Andrew Wells.

is the most unselfish pleasure, too, as all our friends may share it. In a room where there is heavy furniture it is good to have a margin of say 30in. round the floor uncarpeted, so as to allow of the carpet being frequently taken up and shaken. This margin may be painted in some dark shade agreeing with the carpet and dado, or if the floors are new they may be stained to a dark oak or walnut color, and in both cases varnished. Wax varnish is most artistic in effect, but is more liable to soil and takes much more labor to keep in good order, and parquet flooring is better than either of the former, but is more expensive.

The drawing-room is the ladies' special room, and should be bright and cheerful. It is difficult to deal with a subject like color to make you realize effects from mere description, and to describe in detail the many ways I could treat a drawing-room would merely confuse you, so I will be general in my remarks. All the materials described for the dining-room treatment would be applicable for the drawing-room. The dado is not so necessary here, as the chairs are not usually placed against the walls, and instead of the sombre hues suited to the dining-room, soft quiet, and light effects are best —say cream or soft duck-egg shell blue or French grey for ceilings, the walls fawn color or a richer French grey or a deeper grey blue, approaching peacock shade. All these are good for showing ladies' complexions and dress to the best advantage, and that is a consideration not to be overlooked. Water-color drawings will also look well on these grounds. The woodwork may be cream-white finished with enamel varnish; this gives a beautiful smooth and fresh effect. I think the judicious application of gilding in this room very advantageous, but the same remark applies to all the public rooms and hall. I think it is better to gild the small enrichment of cornices solid than to break up the ornament of the large enrichments with points of gold what is technically called "hatching" or "picking out." The round, the concave, and small ogee mouldings always look well gilded, as their rounded surfaces catch the light from all points. The wall should be decorated with water-color drawings or etchings tastefully arranged. Choice pieces of Oriental and Doulton pottery are beautiful and very decorative. I have fitted a narrow moulded shelf, supported on neat brackets, all round the walls except where occupied by cabinets about 4 ft. high from the floor; this shelf having a groove on the upper surface for holding plates and photos—this is to prevent them from sliding and is a very pretty arrangement, as between the photos pretty pieces of pottery and statuettes may be placed. Above this shelf should be hung the water-color drawings, etchings, and engravings; or, instead of this narrow shelf, dwarf book-cases rising 3 ft. high may be put round the room, and on the top of those the photos and ornaments may be placed. Books in themselves are very decorative in effect, besides the delight of sitting in rooms supplied with plenty of them. I think there should be many books in the drawing-room; it is the general sitting-room, and no one need ever be weary or suffer *ennui* who loves good books.

The morning-room I will not describe further than to say it should be light and cheerful and cool in tone. French greys and light hues are good. It may be painted entirely and decorated in a simple manner, or any of the wall coverings may be used here quite fitly.

The library is better to be subdued in tone, but not gloomy. The wall should be the background for rare prints and etchings, so should be painted or, if paper, some old rich leather effect is good with a pattern not over conspicuous, the ceiling and cornice colored to match and the woodwork as in the dining-room, dark and decorated with thin lines and ornament. The books should be easily accessible, and low book cases not more than five feet high or lower look very well. I think it is better to have no glass in front of the books, except to protest the rarest of very valuable ones. I have observed that those placed beyond reach of the hand are rarely opened. The floor should be stained or painted all round, say one foot in front of the book cases, so that carpet or rug may be lifted without disturbing the book-cases.

The bed-rooms should be dealt with as to color according to aspect, those getting much sunshine should be cool, and those in the shade warm in tone. I think it good to paint the ceilings and walls of bed-rooms. The walls may be finished with a dull gloss, the paint being partly mixed with varnish; this allows of their being washed down without injury to the paint, and insures that they be always fresh and clean. Walls painted in this manner will last a life-time. The walls and ceilings may be perfectly plain, but there is no reason why the ceilings may not be decorated in a simple way with lines, borders and corner ornaments, or even in a fuller manner. In the children's rooms it is as well to have dadoes that may be fully varnished; of course the walls may be papered without any breach in the fitness of things, and lovely papers are to be had in plenty, and some are made purposely to allow of sponging down. They are called sanitary papers, they are quiet in color and very serviceable. The woodwork should be painted to suit the walls, generally in light tones, and if varnished so much the better; it lasts much longer and all finger marks can be easily wiped from it. I think it is best to oil paint the ceiling in all cases, it lasts for many years and is easily cleaned, and if renewed can be done without causing the dirt and mess that distemper always produces, when washed off. The margins of floors should in all cases be stained or painted and varnished, so that the carpets may be frequently shaken; freshness and cleanness in bed rooms is of the utmost importance. For the same reasons the kitchens and offices should be oil painted, and not distempered; the paint can so easily be washed down by the servants, and it lasts so much longer than distemper, that the difference in the first cost is soon made up. Here the woodwork should be varnished, and the walls for 5 ft. up the same; a simple line should be drawn at the top of the dado.

For the outside of cemented houses there is no treatment that so effectually resists the entry of rain as to paint the walls thoroughly, and when applying the last coat to powder them with fine dry sand. When dry this makes so hard a surface that water cannot penetrate it; it is more costly than ordinary painting, but it is practically imperishable, and so cheaper in the end. As to the best colors for outside painting, I don't feel that any hard and fast rule can be laid down. All tones of stone color, from cream, yellow to terra-cotta and dark chocolate, may be used. I would avoid shades of green and blue on the cement, except they be very neutral in tone; from white through yellow tones to dark red and brown are the most suitable shades. When the walls are painted dark colors, then the window sashes and verandah should be made very light, say, white tinted with yellow, green or blue or even pure white; on the other hand, if the walls are painted in light colors, the window sashes and other outside woodwork may most fitly be painted in dark shades, say olive green, Indian red or dark peacock blue.

The above is a very general survey of the house, but, perhaps, as much as can be profitably introduced into an hour's lecture such as this. It is impossible to do more than treat the subject on the broadest lines. I am embarrassed with too much matter rather than with too little, for practically there is no limit to the modes of treatment for every part of the house. I am far from thinking there is only one good way of painting houses; there are many. For instance, if character is wanted, the house could be treated in purely Greek design—or full of refined designing and affording scope for full harmonious coloring. The Renaissance is founded on the Classic, but treated with abundant freedom and grace by the Italians and other European nations. The various French developments of the Renaissance have their own beauties: Louis Quinze and Louis Seize are full of character, lightness and elegance. But while I have seen much of this high-class work, and executed some, the ever-present regret one feels in the colony is that so little of it is in demand. The country is probably too young, and feels itself bound to be content with humbler things until it can afford better. But of one thing I do complain: it is the system of tendering for every kind of work. Every contractor is assumed to be equally able to do artistic work; cheapness is held to be the criterion of merit and not quality. Things are different in England. A man of merit there is treated with respect, and his worth is acknowledged. I suppose things will improve here as we develop a richer and more leisured class. As this class grows, so the appreciation for Art work of every discription will grow with it—a consummation devoutedly to be wished!

ROOFING AND PAVING MATERIALS

TARRED FELT, 2 and 3 ply,
BUILDING PAPERS,
COAL TAR, PITCH,
DEADENING FELTS.

TRADE A.M. MARK MONTREAL.

ALEX. McARTHUR & CO.
650 Craig Street, Montreal.

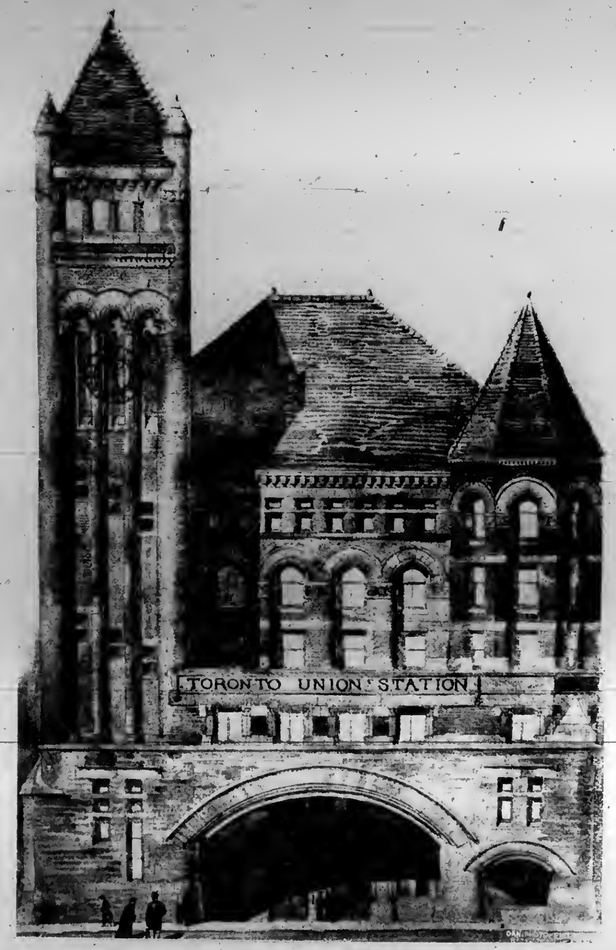
Factory: Harbour and Logan Streets, Montreal.
Paper Mills: Joliette, Que.

The following two cements are of considerable value in caulking hot water pipes: (1) Two parts of ordinary well-dried powdered loam and 1 part of borax are kneaded with sufficient water to a smooth dough, which must at once be applied to the joints. After exposure to heat, the cement adheres even to smooth surfaces so firmly that it can only be removed with a chisel. (2). Mix 430 parts by weight of white lead, 520 of powdered slate, 5 of chopped hemp, and 45 of linseed oil. The two powders and the hemp, cutinto lengths of about ½ in., are mixed intimately, the linseed oil gradually added; and the mass is then kneaded until it has attained its uniform consistency. It is claimed that the preparation keeps better than ordinary red lead cement.

A practical plumber, in a communication to a foreign contemporary, considers that the best working solder for plumbers is made of two parts of pure lead and one part of tin, and to test its quality he would well stir the solder in the pot, and then take a ladleful out and pour it upon a clean dry, level stone, and if the metal has a dull white appearance on both sides, it is too coarse, and needs additional tin; if the metal is closely covered with spots, it is a sign there is too much tin in it; but if the metal has but few spots here and there upon the upper surface, it will be in good condition.

BANK AND OFFICE RAILINGS
IN ALL THE NEW AND Antique.
BRONZE AND OTHER ELECTRO-FINISHES

ARCHITECTURAL WORK OF ALL KINDS IN WROUGHT AND CAST IRON WIRE WORK IN ALL ITS BRANCHES
R. DENNIS. LONDON. ONT.
SEND FOR CATALOGUE

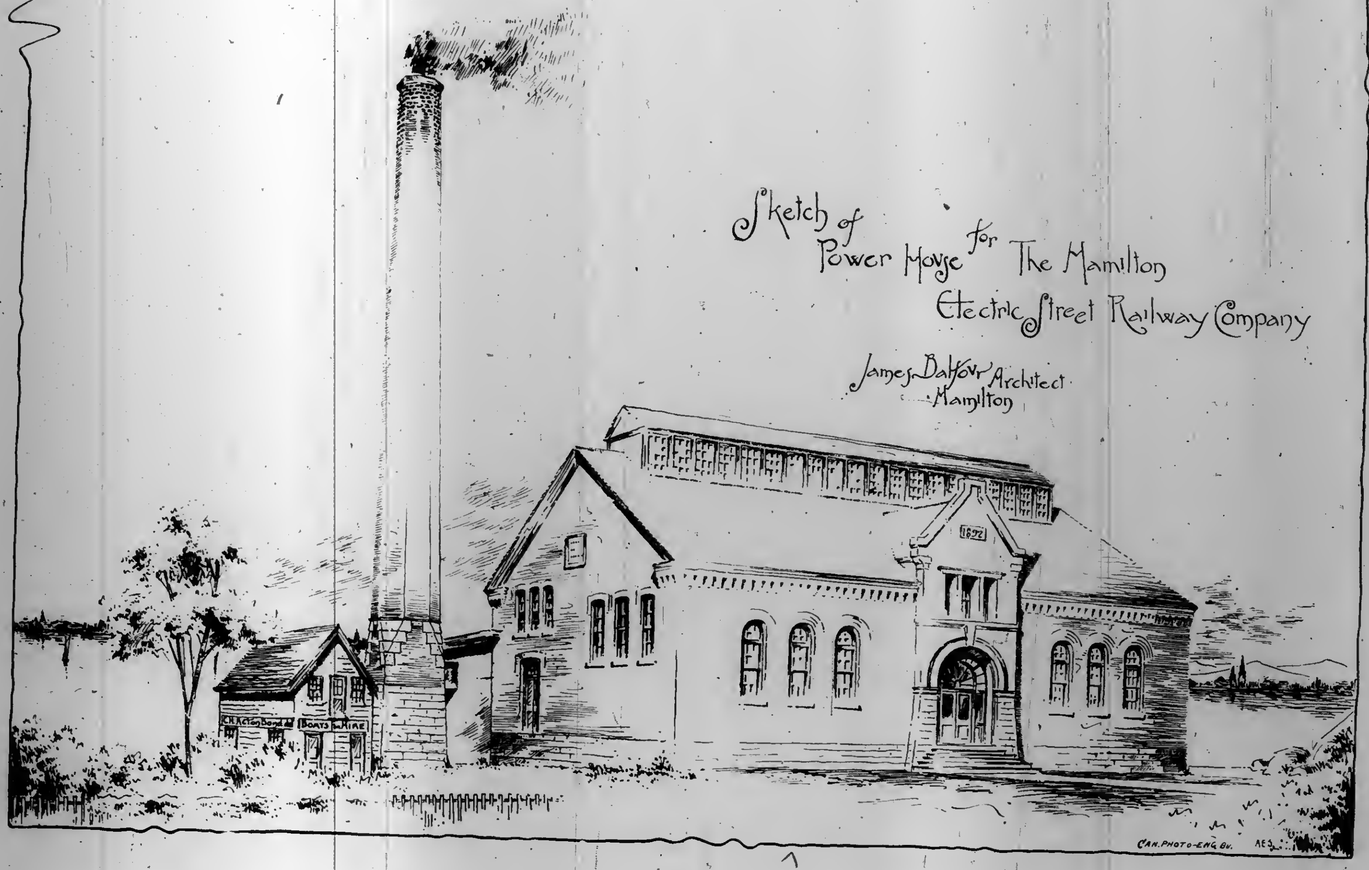


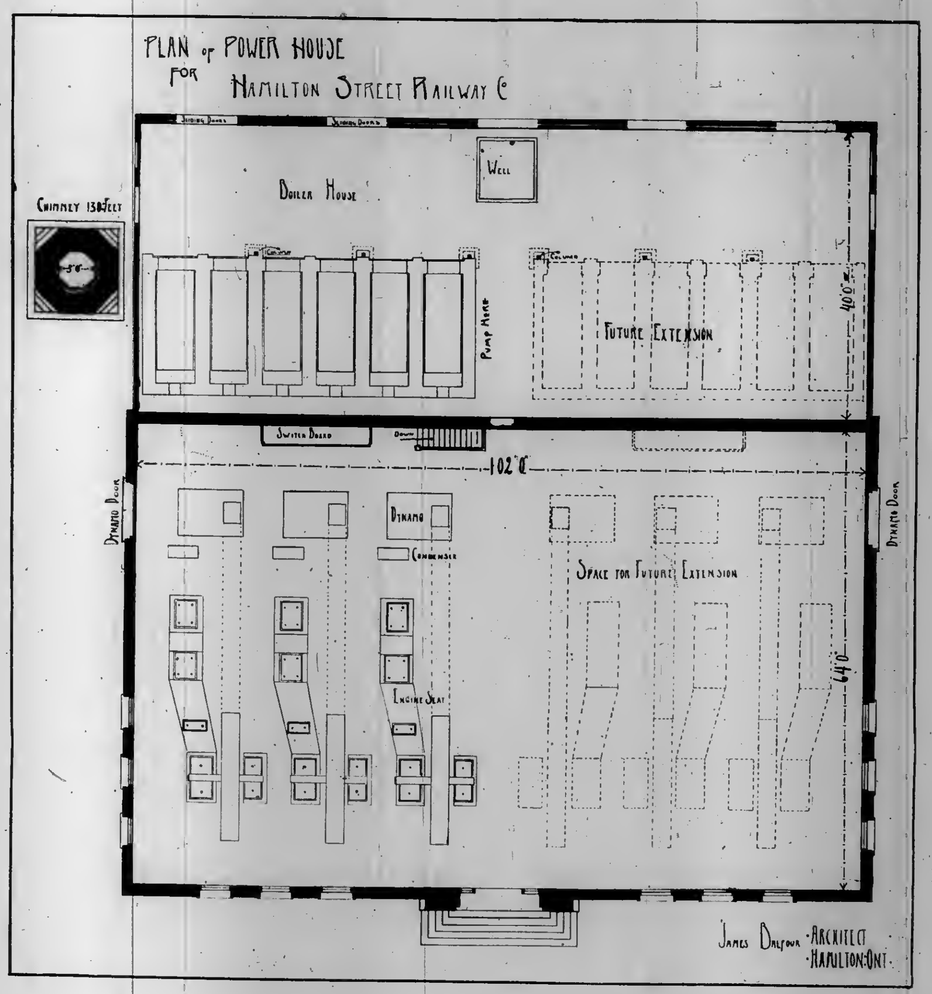
PROPOSED UNION STATION, TORONTO—PRINCIPAL ELEVATION.

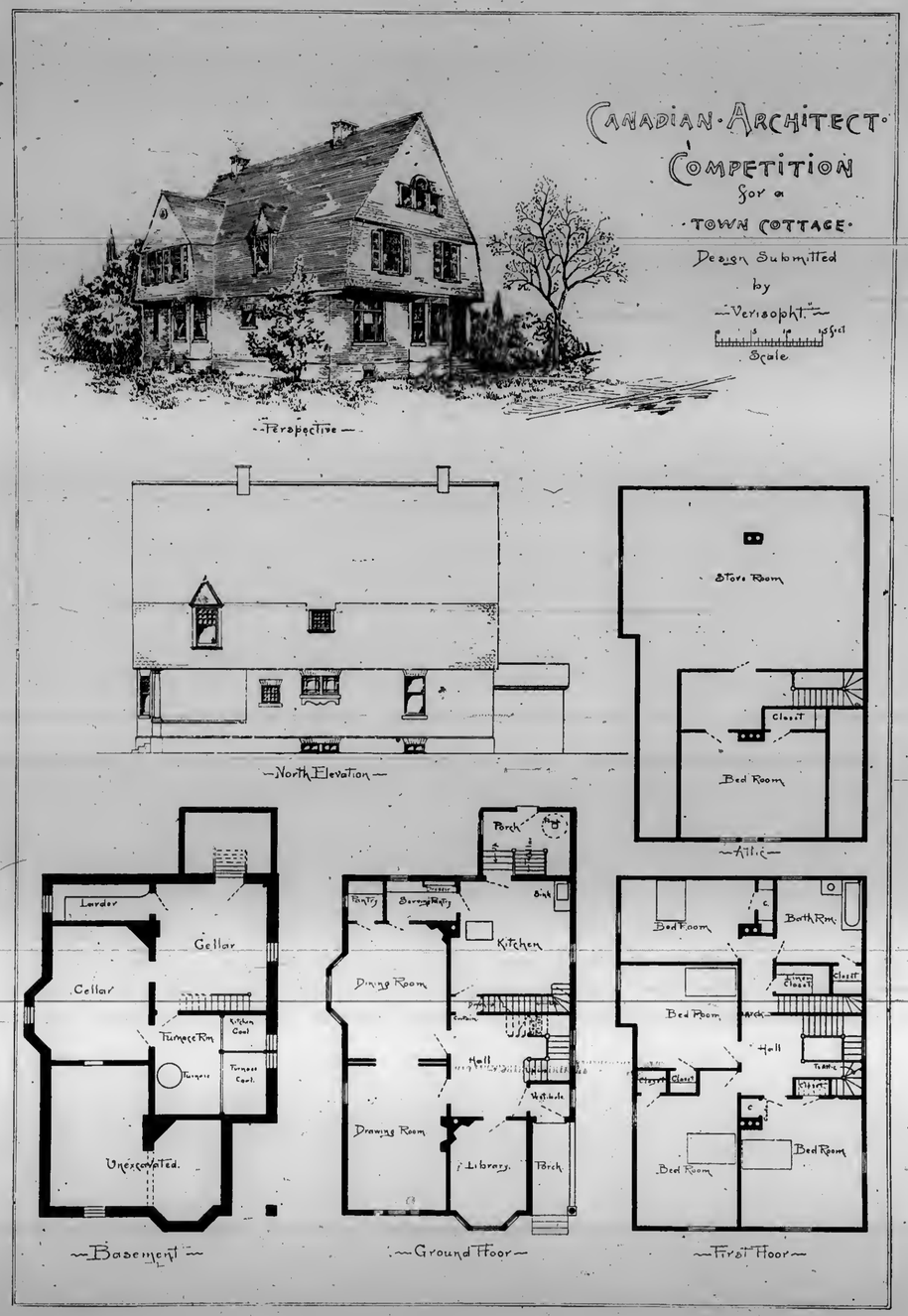
STRICKLAND & SYMONS, ARCHITECTS.

Sketch of Power House for The Hamilton Electric Street Railway Company

James Balfour Architect Hamilton






Canadian Architect
Competition
for a
Town Cottage.
Design Submitted
by
"Verisopht."
Scale
Perspective
North Elevation
Attic
Store Room
Closet
Bed Room
Basement
Larder
Cellar
Gellar
Furnace Rm.
Kitchen Coal
Furnace
Furnace Coal
Unexcavated.
Ground Floor
Porch
Mug
Pantry
Serving Pantry
Sink
Kitchen
Dining Room
Hall
Vestibule
Drawing Room
Library.
Porch
First Floor
Bed Room
Bath Rm.
Linen Closet
Bed Room
Arch.
Hall
Closet
Bed Room
Bed Room

CANADIAN ARCHITECT AND BUILDER.

VOL. V.—No. VIII. TORONTO AND MONTREAL, CANADA, AUGUST, 1892. PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
14 King Street West, - TORONTO, CANADA.
64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should always give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	S. G. CURRY, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton
TREASURER	D. B. DICK, Toronto.

COUNCIL:

WM. G. STORM	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
JOHN E. BELCHER	Peterborough.
EDMUND BURKE	Toronto.

REGISTRAR AND LIBRARIAN:
W. A. LANGTON — Merchants' Bank Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	F. N. BERLINQUET, Quebec.
1ST VICE-PRESIDENT	VICTOR ROY, Montreal.
2ND VICE-PRESIDENT	J. NELSON, A.R.C.A.
SECRETARY	C. CLIFT, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. C. HUTCHISON, R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
ALPH. RAZA	Montreal.
J. F. PEACHY	Quebec.

NOTICE OF REMOVAL.

On or about the 20th of September, the publication offices of the CANADIAN ARCHITECT AND BUILDER will be removed to the new Confederation Life Association Building, corner of Yonge and Richmond Streets, Toronto.

IN connection with the publication of the competition design for a suburban house in our last issue, we omitted to print the name of the author, Mr. W. Ford Howland, Toronto.

THE project for connecting Prince Edward Island with the mainland by a sub-marine tunnel is assuming practical shape. At the last session of Parliament, $12,000 was appropriated to cover the cost of making preliminary surveys. Borings for the approaches on the island have already been made, and the character of the rock is reported to be favorable for tunnelling.

PUBLIC recognition of architectural ability is of rare occurrence. An instance of such recognition, however, is at present seen in the determination of the trustees to place in the library of Cornell University a portrait in oil of the architect of the building, Mr. W. H. Miller. The painting of the portrait has been entrusted to a Canadian artist, Mr. J. C. Forbes.

THE members of the Chicago Architectural Sketch Club have been invited to submit designs in a competition for a permanent memorial monument to the late J. W. Root. The memorial is to cost $15,000, and is proposed to be erected in Jackson Park. In view of Mr. Root's ability as an architect, and his popularity, especially with the younger members of the profession, this competition should awaken much enthusiasm, and call forth the best efforts of which the members of the Club are capable.

A SYNDICATE, in which some Toronto persons are interested, has been formed to manufacture steel by what is known as the Hastings process. The surprising claim is made that by means of this process structural and cast steel adaptable for all purposes can be manufactured from pig iron at a cost of a few cents per ton. Such a discovery might be expected to give an impetus to iron production in Canada and greatly cheapen the cost of the construction of large buildings in which iron and steel are so largely employed.

REFERRING to the death of the late W. T. Thomas, of Montreal, the *American Architect* states that he was "still in the prime of his usefulness, being only sixty-four years old at the time of his death," and adds, "but our harrassing and poorly-paid profession does not favor longevity in those who practice it, and we can perhaps hardly say that he was too soon released from his anxieties." Without disputing the fact that the practice of architecture is usually attended with many vexations and much mental anxiety, it nevertheless appears to us anomalous that our contemporary should have selected as an example of the effect of these influences one who had almost attained to the allotted three score years and ten. It should be borne in mind that the men who live beyond sixty years, are largely in the minority.

THE Toronto City Council has foolishly allowed the opportunity to pass of securing, at a moderate cost, the enlargement of the space for traffic at the corner of King and Yonge streets. The owner of the old building on the north-east corner has recently replaced it by a new structure, which, although not of an

expensive character, will add perhaps $15,000 to the cost of the site. Since the erection of this building, which is five or six stories in height, the lack of space at this point has become more than ever noticeable, and an idea can easily be formed of the condition of affairs which will exist when a similarly tall building shall have taken the place of the low one at present occupying the north-west corner. There is no wiser step that the Council could take on behalf of the city's future than to still endeavor to provide for the carrying out of this improvement, even at the extra cost which the erection of the new building to which we have referred would entail.

THE architects of Australia are to be congratulated upon the announcement recently made that the law compelling registration, for the passage of which the leading men in the profession have been laboring for some time past, will be introduced as a Government measure on the opening of parliament. Under these circumstances its passage in some form may be considered assured. On the other hand we regret to observe that the bill providing for the registration of architects in the state of New York, after having passed the legislature, has been disallowed by the Executive, in compliance with the petition of five New York architects, none of whom are members of the American Institute of Architects, or have attained to distinction in their profession. It is not a matter of wonder that the decision of the Executive has awakened a feeling of indignation on the part of the professional press and of those who have put forth unremitting efforts on behalf of the measure.

THE principal business thoroughfares of Toronto are being torn up to permit of the laying of companion water mains and permanent pavements, and the putting down of tracks for the electric street railway. The excavation, close beside the fashionable promenade on King street, let loose into the atmosphere noxious gases and foul odors to such an extent as to cause pedestrians as far as possible to avoid the locality. The underground conditions thus revealed are not pleasant to contemplate. The earth appears to be completely saturated with illuminating gas and other substances which are continually being discharged from defective mains. These substances, so deleterious to health must find their way into the atmosphere of the streets, and into cellars, where the results are still more harmful. Another thing which a glance into these excavations suggests, is the liability of frequent accidents to the network of pipes buried beneath the surface of the streets. It seems almost too much to hope that the permanent pavements which are about to be constructed will remain long undisturbed.

UNUSUAL dullness prevails in the building trade in Toronto, the result to a large extent of operations having been carried on for several years past on much too large a scale. Hundreds if not thousands of houses were erected by speculative builders in advance of the demand. Many of the houses so erected in the expectation of a speedy sale, were put up in a most unsubstantial manner, and by the time the population shall have increased sufficiently to create a demand for new buildings, will have become scarcely habitable. The work under way and in prospect is principally of a commercial character. Many of the large structures, such as the Confederation Life Association building, the new University buildings, Victoria College, Ontario Legislative buildings, etc., which employed much labor and material, are nearing completion. It is to be hoped that the services of the workmen on these structures will be in demand for the proposed union railway station, the new city buildings, drill shed, etc. It is also to be hoped that the proposal to erect a first-class hotel will soon assume tangible form. The city is much in need of such an hotel, and whoever may carry out the undertaking will no doubt receive ample return from the capital invested.

THE architects of Germany have appointed a committee to arrange an architectural exhibit for the World's Fair. About two hundred of the most meritorious buildings in all classes erected during the last decade have been selected by a competent jury, and special invitations sent to the architects of the same to forward the necessary drawings. The Government will defray all charges for transportation, insurance, etc. December has been fixed as the time when all drawings for the exhibit must be ready. The attention of Canadian architects was recently called to the importance of taking immediate action to insure a creditable exhibit of Canadian work. Our German friends, who, are generally supposed to move more deliberately than the people of this continent, are at least far ahead of us in this matter. The influence of their example should cause us to awake from our seeming lethargy and act promptly in a matter of such importance. Why should not committees be at once appointed by the Associations of Ontario and Quebec to deal with this matter? Since the above was written we have received from the Secretary of the Committee on Congress of Architects a request for the names of members of the Canadian Associations of Architects. It is intimated that the names of architects throughout the world are being collected preparatory to issuing a call for an Architectural Congress to meet during the Columbian Exposition. The practical objects of the congress are stated to be to bring the leading architects of the world into fraternal relations for mutual acquaintance and the promotion of their mutual interests, to review the progress of architecture in different countries and by a comparison of results attained promote the general advancement of the profession of architecture throughout the world; and to consider the principles of architectural art and the relations of architecture to the other arts, sciences and industries.

THE destruction a second time of the city of St. John's, Newfoundland, will, it is to be hoped, lead to the erection of buildings of more substantial character, capable of resisting to some extent the action of fire. The greater part of the city having been built of wood, it was impossible for the few substantial buildings to withstand the intensity of the flames on every side. We are informed that the fire protective service was sadly inefficient, but the most perfect system could be of little value when once fire had got possession of a street of wooden structures. St. John's being the only city in the colony was the site of a number of costly public buildings, most of which were destroyed. Among these were the Government House, erected at a cost of a quarter of a million dollars, legislative buildings, custom houses, hospital and market buildings, court-house, chamber of commerce, commercial bank, Temple Club house, Masonic Temple, Athenæum Buildings, Methodist college, St. Andrew's church, and the two great cathedrals, Roman Catholic and Episcopalian, which are said to have cost in the neighborhood of $1,000,000. From the *Building News* we learn that the latter of these cathedrals had been some five and forty years in course of erection in sections. The original designs were prepared in 1847 by Sir Gilbert Scott, and the nave was then erected. In 1880 the next step was taken, when the choir and transept were built by masons sent out from England, under the direction of Mr. Gilbert Scott, to whom was entrusted the completion of his father's designs. The whole of the freestone was exported from Scotland. At the time of the fire the cathedral consisted of a nave with aisles of six bays, lighted by a single lancet headed window in each bay of the aisle and clerestory, and a western narthex; projecting transepts and a square-ended choir of four bays, this eastern work being of fully developed Decorated character, and provision was made for a future central tower, 35 feet square with broach spire. The styles were purely worked out, the whole effect being simple and bold. The Bishop of the diocese is soliciting funds in Canada and Great Britain to aid in the reconstruction of the edifice. A similar appeal is being made for funds to rebuild the Methodist college. The total insurance on property destroyed is understood to amount to about $6,000,000. Some of our architects and builders who are not at present overburdened with work might find in St. John's a profitable field for their energies.

THE crowds of busy citizens who throng our business streets suspect but little, if they think of them at all, the dangers that are near them through the insecurity of many old buildings, arising from careless and cheap construction in the first place, weakened by the hand of time. And generally it is not until some alterations to existing premises, such as tearing out of shop fronts for the purpose of putting in larger windows, are taken in hand, that the real truth concerning these structures, is exposed to view. But every now and then we are startled by the exposure, and we wonder where our building inspectors are,

that they do not warn off the foot passengers and insist on a protecting hoarding. There is this to be said against a hoarding, namely, that it would not be of very much use if the buildings in question chose to come down with a run. A short time ago on King street opposite the cathedral, Toronto, the cornice and freize of an old shop front was removed, and behind it was discovered, not the usual horizontal beam, but a laminated beam cambered to a foot or fifteen inches and tied in with a tie rod at the feet. Whether any test was applied or not to the tie rod, which was in place for a number of years, we do not know, but we are inclined to think not. In a couple of weeks, a two-story brick wall was built on the top of the "beam." Every one knows that the rust gets at iron, even under paint, and we are inclined to question very much whether, if the houses on either side of the one in question were removed, the cambered beam would be held in by the rod. We should expect to see it "kick," and the whole construction descend. At the time of writing there is an exposure of even more alarming character, because absolutely unaided in its ability by neighboring buildings, this is where a shop front has been removed on the north side of King street between Toronto and Yonge streets. Here we see a 12″ × 12″ beam of about 18 ft. long, with one end resting not more than 2″ in a brick wall, and that not on a plate or cushion, but upon a single brick; the other end of the beam is not seen. Two 4″ iron columns support the beam at say 5 ft. or 6 ft. intervals, and on the top of the beam is some of the roughest brickwork, laid anyhow, some bulging out to the street, some canted, and all apparently loose, which description answers also to the pier into which the end of the beam is supposed to be "built." Over this miserable brickwork rises two stories of better brickwork, but although the danger is so excessive and so apparent, nothing is done day after day to prevent what may perhaps be a serious calamity. There is a tie rod running at right angles from the end of the beam through about eight joists set parallel with the beam, which appears to have its end in a trimmer arch, but there can be no great help expected from this tie rod, as it is passed through the joists on a curve and is not by any means tight. No doubt now that the discovery of this weakness has been made, its defects will be remedied, but how about those buildings concerning which no alterations are contemplated? Surely these exposures should warrant our inspectors making an examination of all our old buildings, which, so far as we can see, is the only way to avoid some serious accident. The need of a vigilant system of inspection has been further emphasized since the above was written by the falling in of the roofs of a row of five houses on Florence st., Toronto, on July 30th. Only three of the houses were occupied, and fortunately the inmates escaped with but slight injuries.

PROVINCE OF QUEBEC A. O. A.

The annual meeting of the Province of Quebec Association of Architects will take place in Montreal on Thursday, the 29th of September.

The following are the names of the successful candidates in the recent examinations of the above Association: L. Lemieux; Fred. Loomis; M. W. Hogle; D. MacFarlane.

TEMPERING STEEL TOOLS FOR STONE WORK.

The matter of tempering drills and other tools for stone work is one of so much interest to quarrymen, that we may be pardoned for giving at length the very able paper on the subject presented by the *Northwestern Mechanic*. We add to it only this advice, "Stick to a single brand of steel," and let your blacksmith get thoroughly acquainted with its properties. There may be several brands of equally good steel, but they must be worked separately, and with a full knowledge of their peculiarities. That failures occur are more often due to the peculiarities of the steel than to the ignorance of the blacksmith, and if the blacksmith is ignorant in a specific case, it is because he cannot know the properties in every brand of steel. However the article contains its own comment:

In sharpening drills for stone work, the first thing to guard against is not to heat the steel too hot. All the books treating upon this subject say, "never heat above a cherry heat." This is certainly a safe rule to work to, but it does not apply to all varieties of steel. Some kinds will bear heating to a bright red heat, and still others will bear a yellow color without detriment to the metal. In all cases the steel should be worked as hot as it will bear, notwithstanding the old advice "to forge at as low a heat as possible." The forging should be done at as high a heat as the steel will bear, but the finishing should be done at a very low heat, and it is better to hammer the drill until the heat is out of sight and the metal becomes black. For such hammering the blows should be light, and very little drawing of the metal should take place. Heavy blows upon a cold or nearly cold piece of steel will cause the particles of the metal to move over each other, ending in disintegration of the metal.

Cracks often develop after steel has been hammered too cold, or rather after it has been hammered too much while nearly cold.

Suppose that a common ¼-inch drill is to be made for use in making holes for plug wedges. Select a piece of ¼-inch octagon steel; cut off a piece 24 inches long, which is just enough to make two good drills. Heat one end of the piece for about six inches in length, drawing it down to ⅝ of an inch; then hammer it octagon, and still further reduce to a little over one half inch. A swage should next be placed upon the anvil, the drill placed therein and operated upon by a top swage and sledge hammer. Draw down to a little more than ½ inch. Take care to make a fine taper at the point where the octagon shape merges into the round part of the drill. This taper should be about two inches long. Take care that the round part of the drill is exactly central with the large part; an overcast at this point will result in making a poor tool. All instruments to be used by percussion must be perfectly straight from one end to the other, otherwise they will spring when struck by a hammer, and a large portion of the force of the blow will be lost, to say nothing of jarring the fingers of the operator and the damage to his temper.

The drills should now be about 18 inches long, 6 or 7 inches of one end being octagon, 2½ ins. taper and 9 or 10 ins. ½ in. in diameter, and round. After finishing as many drills in this manner as it is desired to make, allow them to cool slowly; under no pretence whatever quench them in water or let them lie upon an iron surface while cooling. It is best to throw them upon the coal and dust on top of the forge, or, if it is desired, stick them into dry dirt and ashes in any convenient place.

To sharpen the drill, hammer one inch on one end of the drill to a square section; then flatten out to a flat point, so that the bevel will be about 1½ inches long. Hammer the edges frequently, so that the drill will not spread in width. Upset the end of the drill occasionally so that it asumes and retains a slight diamond shape when drawn down to 1 16 of an inch in thickness at the extreme point; the corners of the drill will be about 1/12 of an inch in thickness. Revolve the drill upon the anvil so that one side of the diamond-shaped end lies true with the outer face of the anvil. With light, true blows thin this side of the diamond point down to 1/16 of an inch, allowing the drill to spread sidewise at the same time. Treat the other side of the drill in the same manner, and after a little truing up of the edges of the drill, it has assumed a correct shape and is ready for hardening.

Heat about two inches of the drill to a dull red; for some steel the cherry red will be sufficient, but other varieties require a little more heat. Heat slowly so that the heat is uniform and the color alike all over the heated portion. Lower the drill slowly into a pail of cold water, the point first, and do not hold the drill still for an instant while it is in water. If two inches of the end have been heated, lower the drill into the water about one inch, passing it down slowly and steadily as stated; the end of the drill will then be as hard as "fire and water can make it."

Remove from the water immediately after it has reached the desired depth and polish by rubbing upon a piece of board, on top of which a little sand or dirt has been sprinkled. The polishing process is merely to allow the color to be seen as the temper runs down from the heated portion of the drill. During the drawing process, skill and judgement are the only guides to obtaining a drill that is just hard enough to do the work, and not hard enough to break. The color necessarily varies with different qualities of steel. The steel that will not bear heating harder than a cherry red must have a temper drawn to a purple or blue color. Steel that stands a higher working temperature will stand a straw color for temper and perhaps even lighter.

The instant that the red color is noted the drill must again be plunged into the water.

ILLUSTRATIONS.

PORTRAIT OF THE LATE W. G. STORM, R. C. A.

BANK OF MONTREAL, WEST END BRANCH, MONTREAL. TAYLOR & GORDON, ARCHITECTS, MONTREAL.

PROPOSED HOUSE, VANCOUVER, B. C., FOR MR. O. G. EVAN THOMAS, ESQ.— FRIPP AND WILLS, ARCHITECTS, VANCOUVER.

This picturesque country house is to be a frame-built structure, covered with shingles, and to have leaded light windows in large square. The roof timbers will be stained dark to match teak; the mantelpieces, and internal finish generally, to be made of teak, imported from the east and made there. The cost will be about six thousand dollars; but as houses are usually finished in Vancouver, the cost would, perhaps, be only some five thousand dollars, which seems very cheap for a house of this size.

This is one of the cases in which the plan arrangement is very much due to the client, the particular arrangement here shown having been laid out by Mr. Thomas's own suggestion in every particular. The large galleried hall, with its encircling gallery and lookout recess over the porch, will be a very pleasant feature if in bad weather it is kept warm and free from draught.

The description and illustration are reproduced from a recent number of the *British Architect*.

PRESBYTERIAN CHURCH COMPETITION—DESIGN BY "JOHN KNOX." (MR. A. E. WELLS), TORONTO, AWARDED FIRST POSITION.

The instructions to competitors for the class in which this design was submitted called for a country church to seat from 150 to 200 persons, with one room to be used as vestry and library; and the building to be heated with stoves.

This is a design for a wooden building with a stone base to the height of the window sills. Externally the walls and roof are intended to be covered with shingles and left to be stained by rain and weather. Internally it is purposed to treat the roof entirely in wood and the walls to the height of the window sills with a moulded wood dado; the remainder of the wall space to be plastered, the brown plaster to be straightened and the walls finished without the usual white coat. All internal woodwork not exposed to handling is intended to be oiled merely, and left to turn richer in color with age. It is estimated that this design would cost in execution from $2,500 to $3,000.

TORONTO BUILDERS' EXCHANGE.

On July 27th, the members of the Exchange, together with their friends, about 325 in all, took a trip to Olcott, N. Y., on the "Carmona," leaving Geddes' wharf at 8 a. m., and returning at 9:30 p. m. The weather was all that could be wished for. The excursionists, for the most part, appeared to better appreciate quiet discussion in the shady park, than amusement requiring much exertion, as the temperature was "away up." The return passage was made very pleasant by the cool breezes of the lake and by a musical entertainment under the able direction of Mr. J. Lester Nicholls.

The excursion is the first venture of the kind since the Exchange was organized, and the success of the experiment will probably induce the members to make it an annual "institution."

PERSONAL.

F. M. Rattenbury, architect, has opened an office in Vancouver.

Mr. Copping, Building Inspector, Toronto, recently received serious injury by falling from a street car.

Mr. Louis Coste has received the appointment of Chief Engineer of the Public Works Department of Canada.

The Toronto Plate Glass Importing Co., their employees and friends, enjoyed their annual excursion and picnic on the 6th inst. Their objective point this year was Galt, Ont.

Mr. Arthur E. Wells, Secretary of the Toronto Architectural Sketch Club, a young man of marked ability, is about to leave Toronto to take up his residence and pursue the study of his profession in New York. The best wishes of many friends for a prosperous future will accompany him.

A PLEA FOR PERFECTION IN BRICKWORK.

The perfect in building construction may be said to be reached when there is obtained a maximum of strength and durability at a minimum cost. To design a roof, a floor or a wall that shall be strong enough to carry the load to be placed upon it, and strong enough to resist the thrusts that may be put upon it, is simple enough; the problem is to design in such a way that the portion of the structure is exactly strong enough and no stronger than is required; in other words, that there is no waste.

Having these facts in mind, it is easy to understand why there is so great a difference between carpentry in the United States and in England, and some parts of Europe. In this country timber is cheap and labor comparatively dear, while in England the reverse is true, and labor is cheap and timber comparatively dear. Adding the expense of freight to American timber used there, the cost will be somewhat more, while labor costs in round figures only about one half of what it does here. These facts affect and regulate construction to a very great extent, and what would at first appear to an English carpenter faulty and wasteful construction, is simply the result of a desire to save time; in other words, material is sacrificed for saving of labor.

These facts are equally true as far as brick construction is concerned, and it it is doubtless due simply and only to the desire to save time that the imperfect, faulty, and altogether wasteful method of laying bricks in "running" or "American bond" has come into general practice. It has been suggested in these columns that the fact of face bricks being of a different size to those on the interior of the wall is responsible for the use of the bond, but the writer thinks that this does not by any means explain it all, although it may to some extent. There is no reason in the world why the back of a wall, whatever the sizes of faces and back may be, should be laid in running bond.

Now, in the construction of buildings as in other things, it is often profitable to closely and critically examine the methods followed elsewhere to ascertain whether they may not be adopted with advantage here. It is certain that no part of a building deserves perfection in construction, so to speak, so well as does brickwork, and this for the simple reason that no portion is less liable to decay. The best bricks, and this litterally means bricks of the highest quality, are exceeded in durability by no known material used in the construction of buildings. Iron rusts; timber decays; stone perishes, and if it be limestone is destroyed quicker than timber; but good brick resists the action of atmosphere, fire and water, and lasts for ages. The very strength and durability of brick have been the cause of poor brickwork, paradoxical though it may seem.

To construct a brick wall that shall be as strong as possible from the material at hand would appear to be eminently desirable, but a wall erected in running bond falls short of this.

This is not difficult to understand. The system of construction violates the most important principle of bonding which is, that no two vertical joints shall come over one another. Suppose that there were no consideration of appearance, why not pile the bricks up one upon the other irrespective of bonding? "Oh," the bricklayers will tell you, "we must get bond,"—he must interlap the bricks to get bond,—to get strength on the face of the wall. Why not get bond through the breadth of the wall as well? That there is a necessity for it will not be denied, for the whole weight of the building rests on the inside portion of the wall, and it is of the utmost importance to distribute this weight through the thickness.

That which comes nearest to a perfect wall is that system of construction knows as "English bond," in which the bricks are all laid headers, excepting at the face, in alternate courses, when they are laid stretchers. This system of construction produces a wall in which the fundamental principle of bond is closely adhered to, and it will be found that, when it is faithfully carried out, no two mortar joints, in any part, come over one another. Flemish bond, although less perfect from a constructional point of view, is very considerably stronger than running or American bond, while its appearance is generally acknowledged to be very much superior.

Now, while the strength of a wall erected in English bond is very considerably stronger than one built in running bond, it is a fact to which due regard must be paid that the latter effects a saving of time. But while it is true that running bond can be built somewhat quicker than English, the writer claims that the advantage gained in this respect is so small as to be altogether inadequate to compensate for the great decrease in strength. It may be added, that, when he has urged architects to specify English and Flemish bond, he has been told that builders would refuse to construct them without an exorbitant increase of cost, being actually bound by the journeymen bricklayers to lay only the system of bonding they have been used to. This idea is doubtless exaggerated because no small porportion of working bricklayers are foreigners and are well acquainted with the correct methods of laying English and Flemish bonds.

But whatever bond is used in the construction of walls, there are certain other points of importance that are only too frequently overlooked. The first of these that may be mentioned is "damp courses." In Europe the use of damp courses is rendered compulsory by the building laws in most large cities. A damp course, if constructed of proper materials, is absolutely effectual in preventing the rising of moisture by capillary attraction from the earth and the consequent dampness of the walls.

"How to cure damp walls," is a question that is propounded to the architects' and builders' journals very frequently by house owners and others who are suffering from this trouble, and who not infrequently state that they have tried the application of various kinds of paint to the surface of the walls with the only result of driving the moisture higher up the wall. In such cases an effectual remedy may be found in inserting damp courses throughout the wall, underpinning it as may be necessary, although, of course, the damp course should have been inserted when the wall was built.

A good damp course may be constructed of three layers of common roofing slates, laid in cement with the joints lapping, the edges of the slates projecting to about an inch or so beyond the side of the wall. The damp-course, of whatever kind it is, should be put in just above the ground line. A layer of Portland cement (that is, cement mixed with water without the addition of sand) spread over the surface of the wall, to the thickness of three fourths of an inch, makes a very effective damp course, as does also a layer of bituminous asphalt laid in the same way. Sheet lead is also used and possesses the advantage of yielding somewhat to the inequalities of the brick or stone, and by that means distributing the weight more equally over the area. Damp courses may be constructed of other materials: in fact anything that is absolutely impervious to moisture and may be applied to the thickness of the walls is suitable.

While the fact that damp courses are very little used can but occasion surprise to those who have had an opportunity of having seen them in constant use, the fact that hollow or cavity walls are so used is even more surprising. Brick buildings, when standing in isolated positions may always be erected with advantage with a cavity wall, because any moisture passing through the outer casing cannot find its way into the interior of the building. Cavity walls are constructed of what are practically two walls, built side by side parallel and at a distance apart of about two inches, the two casings being closely tied together either by brick or by iron ties specially made for the purpose inserted in every fourth course at a distance apart of about two feet six inches. The wall, from the foundation up to the ground line, is built solid, and on the top is formed a damp course upon which two cavities are built. The portion between the cavities thus forms a gutter and is constructed with a fall so as to allow any water that may find its way in to run down the drains with which the cavity is connected. Sheet lead or sheet zinc is inserted over all door and window openings. In case of brick-and-a-half walls, which consists of one brick wall and a half brick wall, connected as described, it will be a subject of consideration as to whether a thicker or thinner casing should go on the outside. As a rule a thicker is preferred on the exterior, as it offers the greater resistance to the moisture finding its way in; but in any case it is well to observe that the floor and roofing timbers should always rest on the thicker casing.

One of the most important advantages of hollow cavity walls is the important influence it has on the temperature of the house. The two inch space of air in the centre of the wall acts as a sort of a non-conductor, and the variations in the atmosphere are felt to anything like so great a degree as they are when the walls are built solid. In other words, houses built with these walls are warmer in winter and cooler in summer.

Another point of construction that may be referred to is the hoop iron bond; this costs so little and adds so much to the strength of the brickwork that it is a difficult to understand why its use has not become general. Hoop iron used for this purpose is about an eighth of an inch thick, and one and a half inches broad. It is laid in every fourth course right along the wall, one row of hoop iron being inserted for each half brick in the wall's thickness; the hoop iron is riveted at the angles. In order to prevent the iron from rusting, it is covered with tar of zinc. The edges are generally jagged with the object of getting a better grip of the mortar, and the hoop iron holds the wall together and assists in distributing weight and is in every way desirable. Its cost is little, and the work it does great.

The writer, in preparing the above, has only referred to one or two of the more important directions in which it would appear that an improvement might be made in the construction of brickwork. Architects and builders have now better facilities for producing perfect brickwork than they ever had in the history of the world; and they should make it a matter of pride to see that the most perfect building material approaches as nearly as possible to perfection in construction.—Arthur Seymour Jennings in *The Brick Builder*.

THE ARCHITECT AND THE CONTRACTOR.

By Edward Hurst Brown.

"O wad some power the giftie gie us,
Tae see oorsel's as ithers see us."

It may be very well for the poet to write that way, but how many of us, I wonder, would feel highly flattered if we really knew what other folks think of us, down deep in their hearts. I have read with interest the reports of the various conventions of master painters as they have occurred from time to time, and while I have seen recorded there many words of self glorification and self satisfaction, as is perfectly natural—unfortunately most of the members seem so carried away with enthusiasm of the moment, that they forget there may be others who do not always look upon the performances of painters and decorators in general through the same rose tinted spectacles that these estimable gentlemen do themselves. Now I hope, my dear readers, if you have not become restive and sought some other article, before reading thus far, that you will bear with me patiently, even if I do say some few unpleasant things. Remember, it is not you I am talking about—it is the other fellow, that poor slouch who never read the *Painter's Magazine*, or the old timer who is so set in his old fogy notions that he never can believe that there is any other way to do a job than the way he learned some thirty or forty years ago. Of course you are too progressive not to fall in at once with an architect's notions, so you won't feel offended at what I may have to say. I have not failed to notice that you are all fond of having a little fling at the architects, not only in your conventions but in the columns of the magazines. Sly digs now and then or perhaps letters complaining of the manner in which these autocrats of the T square dictate to you, and insist that you shall do things as they want, and not as you would perhaps do otherwise. Now, is it not fair play that I, as an architect, may say a few words from the architect's point of view? Don't forget that this much abused personage occupies a very peculiar and delicate position in the erection of the building. The owner goes to him and regards him as a professional adviser, much the same as he consults a lawyer or a doctor. In this capacity he prepares the plans for the work in hand and writes the specifications for it. Here his advisory capacity ends and he becomes the agent of the owner, and, as such, proceeds to make contracts on behalf of the owner and see that they are properly carried out. But, as agent he has no authority whatever to alter in one jot or tittle the drawings or the specifications which he has prepared as the professional adviser. Moreover, he is legally responsible to the owner, in as great a degree as the contractor, for any deviations made by the mechanics employed upon the work. Although in his professional capacity he is responsible for any errors he may make in plans or specifications involving either questions of stability or adaptability to the purposes intended by the owner, as set forth in the instructions given to the architect, still, as agent he has neither power nor authority to modify these plans or specifications in the slightest degree, nor to allow any variation from them without the consent of the owner. When the building is

completed it is the architect who has to bear the blame and shoulder the responsibility for all defects in either workmanship, material, or faulty or inartistic designing. The contractor, more especially the sub-contractor, is rarely thought of by the owner. He is supposed in his work merely to carry out the instructions given to him by the architect.

I have entered into this rather full account of the relations existing between the owner and the architect because I think, as a rule, they are very little understood. Most mechanics regard the architect, in his capacity as supervisor of the work, as having absolute authority to order or permit changes or extra work at his own sweet will without regard to the owner, who stands back of the architect and is the real party to the contract. Hence, they feel little or no compunction about changing the methods or materials designated by the specifications if, in their opinion a better job may be obtained, or one which they believe would be more creditable to them or more workmanlike, relying on the good nature of the architect to permit such changes, if detected by him. As a rule, he is not consulted beforehand. Now, this may be, and frequently is, done with the most honest intentions in the world. The work substituted for that specified may be just as strong, just as durable, and perhaps may be even better, and may cost the contractor more money. But (and this "but" is a very strong one), the contract is not carried out, and though the work may be better, though both architect and contractor may be able to prove it so, the owner can, if he wishes (and sometimes he does wish to do it) bring suit against the architect and recover heavy damages, sometimes many times in excess of the fee charged for professional services. As a case in point I know of a firm of architects who were compelled to spend three times the fee they received on a certain building in order to pay their lawyer for defending them in a suit brought by an owner under circumstances precisely similar. Fortunately, they were enabled to prove to the satisfaction of the jury that the work did not differ materially from that specified, or they would have been mulcted in heavy damages as well. Hence, the architect's position is by no means a bed of roses, and it seems to me to be a little unfair in the mechanic who is called upon to do the work in accordance with certain definite specifications, to set himself up as superior to the contract, to feel that the architect is not treating him fairly in setting forth in definite terms the manner of doing the work, and to complain because the architect particularly calls for certain specified materials. You may say that you, having devoted your lives to a certain trade, ought to know more about it than an architect who has never handled a brush or mixed a pot of paint in his life. Undoubtedly you do about the practical application of the principles which govern your work, though you may not know as much of those principles as the architect whose knowledge of the subject you are trying to treat with contempt.

Doubtless you may come across foolish or carelessly drawn specifications. There are careless, young, or inexperienced architects, just as there are careless, young and inexperienced lawyers or doctors. But remember it is the architect who is responsible for the carelessly drawn specifications, not you. If you are afraid that doing a job in the manner specified will injure your reputation as a painter, you are privileged to refuse to estimate upon the work; or, having done so, you need not sign a contract for it if, in your judgment, the specification calls upon you to do a poor, unworkmanlike job. It is your privilege before entering into a contract to object to any of its terms, and to insist or request, as the case may be, that it be modified before you sign it; but having once signed a contract to do work under certain specifications, whether this contract be a direct one with the owner, or an indirect one through a builder, you are bound both morally and legally to fulfill that contract to the letter, and any variation therefrom without the consent of the other party is dishonest, even though your variation may make what you deem to be an improvement in the manner of executing the work. Now, these are plain words, but when you come to look upon a contract in its full legal aspect, and to view it from every side of the question, you cannot fail to see I am right.

You may think an architect should not specify any particular material to be used, but I say an architect is bound to use his professional knowledge to discover what he believes to be the best material and mode of executing the work to suit the particular case on hand, and to further the interests of his client; not necessarily to make the best possible job in every case, but to make the job best adapted to that special piece of work. If the architect considers his client's interests are best served by the use of a certain kind of varnish, or a certain make of ready mixed paint, he is bound, in duty to his employer, to specify accordingly, and the painter who accepts the contract under those particular conditions is equally bound to see that these materials are used upon the job. I know of one case where, owing to certain personal and business relations existing between the owner of several houses and a certain firm manufacturing a special brand of ready mixed paints, the architect received definite instructions to specify that particular brand. The painter, knowing nothing of the circumstances, and not having much confidence in the paint in question, mixed his own colors, to match in shade the numbers specified by the architect. The consequence was that the architect, having failed to require the compliance with the contract, was held responsible by the owner, though fortunately a law suit was avoided, but the paint manufacturers withdrew a very important business relationship from the owner of the houses. Can any possible process of reasoning justify that painter for having departed from the strict letter of the specifications?

Then again the architect is looked to for the artistic effect of the building, and may specify that the work shall be done in a particular manner, in order to obtain a result which he knows will please him, and his client as well, although it may look rough and unfinished to the mechanic who has been trained up to do the work in a different manner. I know in one case I wished to obtain a certain effect on oak wood, and specified that the work was to have a light coat of paint, which was to be wiped off with a cloth, then followed by two coats of varnish rubbed to a dull gloss. When the work was finished I expected to see the texture of the wood plainly. Judge of my horror when I found that the painter, thinking I had made a mistake in myspecification, and had neglected to specify any filler, without consulting me in any way, filled the oak with paste filler before applying the paint. The whole scheme of the work was changed, and the effect I was trying to obtain was lost. Moreover, a special hanging, which was being made to harmonize with the rough woodwork, seemed strangely out of place with the smooth surfaced wood. At another time I had occasion to paint a certain studio wall, and mixing some Indian red and raw sienna to get just the tint I wanted, gave a light wash of water color over the paper, in such a manner that the brownish gray background showed through the color. I instructed the painter that this was the effect I wanted on the wall, which was to be done in water color. When I next visited the room I was horrified to find a solid coat of color on the walls; the shade was matched, it was true, but the effect was totally different from my instructions. Fortunately, in this case, I could set the men to work with sponges to wash off the superfluous color, and get very near the effect originally intended.

Now don't for a moment think that all mistakes and all disregard to the terms of the specifications are confined to the painters. Other mechanics are just as apt to err, or to set themselves up as superior to the architect. But I do want you to bear in mind that the architect is the responsible head, and that it is better in most cases to follow his instructions than to think your way is best. Don't think that every time he specifies a particular brand of varnish or color, or calls for a special make of white lead, that he is actuated by underhand bribes from the manufacturer. I can tell you, and I know well what I am talking about, that not one reputable architect in a hundred will accept a bribe or an illicit commission as an inducement to specify particular makes of goods, and the manufacturers who attempt to offer such commission usually get sadly left. I do not speak of the self-styled builder architects of small country towns. I don't know what they may do, though I hope they are honest; but I refer to the educated, conscientious, painstaking members of the profession whose practice is in the great cities, and who make up the membership of the American Institute of Architects. If you wish to bring them into sympathy with you, don't sulk in corners, call names, and say you won't play, like silly boys, but get them interested in your associations and your conventions, and you will soon bring about a better relationship between your trade and the architects of the country.—*Painters' Magazine.*

THE LATE W. G. STORM, R. C. A.

THE removal by death on the 1st inst. of the subject of this sketch, has taken from our midst one who has filled a very important place in the architectural work of not only this city of Toronto, but of the province of Ontario, during the last forty years.

He was of English lineage, born at Burton-upon-Strathar, Lincolnshire, England, October 29th, 1826, and came to Canada with his parents in 1830. They left Hull, England, in a sailing vessel on the 29th May, landing in Little York, (now Toronto), in August of the same year. He has therefore spent 62 years of his life in Toronto.

As a youth he was apprenticed for five years to his father, who carried on an extensive business as a builder and contractor, and he early developed a taste for architecture. When 18 years old he was articled to the late Mr. William Thomas, an architect of great taste and skill in Toronto, in whose office he continued for some years.

In 1848 he became associated with the late F. W. Cumberland, Esq., as assistant. In 1849 old St. James cathedral was burned, which was the second destroyed by fire on the same site. Plans for a new church were advertised for, premiums offered, and the first prize was awarded to the plans prepared, it is said, by Mr. Storm, in Mr. Cumberland's office. About the close of 1850 a partnership was formed between Messrs. Cumberland and Storm, and soon they became the leading firm in both city and province. St. James cathedral, the Normal School and the Mechanics Institute buildings were among their earlier work in this city, and among the counties of the province they had to do with many municipal buildings. The erection of the new University buildings in Queen's Park from an important era in the architecture of the city, and with them Mr. Storm was associated from the first in the development of the plans and details and the construction and completion of the buildings. Thoroughness was an important feature in Mr. Storm's work, and owing to this and his practical knowledge gained by him in the workshops of his youth, the Toronto University buildings presented about as perfect a piece of building as could be found on the continent.

The centre building of Osgoode Hall followed close on the completion of the University, and with this Messrs. Cumberland & Storm had to do. Opened in 1860 by the Prince of Wales, it was referred to as the finest law library building in the world. St. James' Cemetery Chapel, St. Andrew's Church, corner of King and Simcoe streets, among others, were his work, and finally the handsome and commodious pile which his eyes just failed to see completed in Queen's Park, the Victoria Methodist College buildings.

At the organization of the Ontario Association of Architects in March, 1889, Mr. Storm was chosen President, which position he held until the second annual convention of the Association which took place in February of the present year. This position was one of peculiar pride to him; as well as to his associates to have him there. He was indeed an ornament to his profession.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS' EXAMINATIONS.

The following are the examination papers used in the recent examinations of the above Association:

Arithmetic.

1. Add 52 multiplied by 321 to 87 multiplied by 139, divide by 12 multiplied by 7, and subtract 13 multiplied by 8.
2. Divide 19 multiplied by 158 by 44 multiplied by 7.
3. The following deposits are made in a bank:
   $10.00 at 4% for 1 year.
   $16.00 at 5% for 3 years.
   $26.00 at 6% for 8 months.
   What is the amount of interest on deposit?
4. Bricks cost at the yard $7.00 per M and $1.00 for cartage. What will be the cost of 142,700 bricks at the building.
5. Find the number of rolls of paper required to paper the walls of a room 21 feet square and 10.6 high from top of skirting to ceiling, a roll of paper being 8 yards long by 18 inches wide.

Algebra.

1. Reduce to their simplest forms:
   (*a*). $(a-x)-(2x-a)-(2-2a)+(3-2x)-(1-x)$.
   (*b*). $a^2-(b^2-c^2)-\frac{1}{2}b^2-(c^2-a^2)\frac{1}{2}+\frac{1}{4}c^2-(b^2-a)\frac{1}{2}+3(b^2-c^2)$.
   (*c*). $1-\frac{1}{2}\,1-(1-4x)\frac{1}{2}+2x-(3-5x)\frac{1}{2}-\frac{1}{2}\,2-(-4+5x)\frac{1}{2}$
2. Multiply
   $x^2+2xy+2y^2$ by $x^2-2xy+y^2$.
   $x-1$ by $x+1$ and x^2+1.
   $a+b+c+d$ by $b+c-d-a$.
3. Simplify $\dfrac{2(x^2-\frac{1}{4})+\frac{1}{2}}{2x+1}$.
4. Reduce $\dfrac{x^3+3x^2-4}{x^3-1}$ to its lowest terms.
5. Solve the equations:
   (1). $2x-\frac{1}{3}=75\,(3-2x)+\frac{1}{2}x$.
   (2). $2.7x+\frac{1}{6}\,(x-1)=x-4$.
   (3). $\frac{1}{6}x-1\frac{2}{3}=83\,5+2(3\,5+2(3\,5x-1)-(x+8)$.

Mensuration.

1. A trapezoidal field has two parallel sides whose length are 8200 yds. and 6190 yds. respectively. The perpendicular distance between the sides is 220 yds. The rental of the field is $750.00 per annum, what is the rent per acre of 4840 square yards?
2. The height of a precipice standing 20 feet back from the side of a river is 112 feet and a line 200 feet long will reach from the top of it to the opposite bank, find the width of the river.
3. A building 210 feet long, 64 feet wide has a slate pitched roof 32 feet high measured perpendicularly hipped at a similar angle to sides, at both ends. How many squares of slating of 100 sup. ft. will there be in the roof?
4. A boundary wall is 940 feet long, 10 feet 6 inches high and 2 feet 4 inches thick, how many cube yards of stone will the wall contain?
5. A gallon of water contains 277.2 cub. inches and weighs 10 lbs. avoirdupois, find the weight of 3 cubic feet of water in ounces.

Euclid.

1. Any two sides of a triangle are together greater than the third side.
2. If a straight line falling on two other straight lines make the alternate angles equal to one another, the two straight lines shall be parallel to one another.
3. Parallelograms upon equal bases and between the same parallels, are equal to one another.
4. Divide a given straight line into 2 parts so that the rectangle contained by the whole and one of the parts may be equal to the square of the other part.
5. If a straight line be divided into any two parts, the rectangle contained by the whole and one of the parts is equal to the rectangle contained by the two parts together with the square on the aforesaid part.

Besides the foregoing there was a composition on a subject given by the examiners. Also freehand and linear drawing from copy.

A curious suit has been entered by the Queen of England in the New York courts to recover a cargo of asphalt recently brought from the island of Trinidad, and sold to the Standard Asphalt Company of New York. It seems that the island of Trinidad is the property of the British Crown. The principal source of asphalt in the island is the celebrated Pitch Lake, which is practically a mass of asphalt, or rather, bituman. This is collected by a simple process of driving carts upon the surface of the lake, which is solid enough to support them, and shovelling the material into them; and the price, on the island, of the asphalt so collected is about a dollar and a half a ton. The lake is entirely Crown property, but there are secondary deposits of asphalt in other parts of the island, which are least, or otherwise conceded, to private parties. According to the claim of the council for the Crown, the deposits of asphalt under private control are nearly or quite exhausted, and their proprietors have taken to replenishing their supplies of the material by poaching on the Queen's property. It seems that this reprehensible practice has become so general of late that the Crown officers detain, where they can, all vessels leaving the island with cargoes of asphalt until it is ascertained whether any of the asphalt was stolen from the Queen or not; but it is alleged that, in the present case, the vessel succeeded in escaping without being searched. On the other hand, the respondents assert that, as the Crown imposes an export duty of a dollar and a half a ton on all asphalt taken from the island, the Queen has already received the full value of the cargo, and that they believe the suit to be merely a contrivance to annoy them, devised by a rival asphalt company, which has made an agreement with the Crown officers, not to take asphalt from Crown lands.—*American Architect.*

completed it is the architect who has to bear the blame and shoulder the responsibility for all defects in either workmanship, material, or faulty or inartistic designing. The contractor, more especially the sub-contractor, is rarely thought of by the owner. He is supposed in his work merely to carry out the instructions given to him by the architect.

I have entered into this rather full account of the relations existing between the owner and the architect because I think, as a rule, they are very little understood. Most mechanics regard the architect, in his capacity as supervisor of the work, as having absolute authority to order or permit changes or extra work at his own sweet will without regard to the owner, who stands back of the architect and is the real party to the contract. Hence, they feel little or no compunction about changing the methods or materials designated by the specifications if, in their opinion a better job may be obtained, or one which they believe would be more creditable to them or more workmanlike, relying on the good nature of the architect to permit such changes, if detected by him. As a rule, he is not consulted beforehand. Now, this may be, and frequently is, done with the most honest intentions in the world. The work substituted for that specified may be just as strong, just as durable, and perhaps may be even better, and may cost the contractor more money. But (and this "but" is a very strong one), the contract is not carried out, and though the work may be better, though both architect and contractor may be able to prove it so, the owner can, if he wishes (and sometimes he does wish to do it) bring suit against the architect and recover heavy damages, sometimes many times in excess of the fee charged for professional services. As a case in point I know of a firm of architects who were compelled to spend three times the fee they received on a certain building in order to pay their lawyer for defending them in a suit brought by an owner under circumstances precisely similar. Fortunately, they were enabled to prove to the satisfaction of the jury that the work did not differ materially from that specified, or they would have been mulcted in heavy damages as well. Hence, the architect's position is by no means a bed of roses, and it seems to me to be a little unfair in the mechanic who is called upon to do the work in accordance with certain definite specifications, to set himself up as superior to the contract, to feel that the architect is not treating him fairly in setting forth in definite terms the manner of doing the work, and to complain because the architect particularly calls for certain specified materials. You may say that you, having devoted your lives to a certain trade, ought to know more about it than an architect who has never handled a brush or mixed a pot of paint in his life. Undoubtedly you do about the practical application of the principles which govern your work, though you may not know as much of those principles as the architect whose knowledge of the subject you are trying to treat with contempt.

Doubtless you may come across foolish or carelessly drawn specifications. There are careless, young, or inexperienced architects, just as there are careless, young and inexperienced lawyers or doctors. But remember it is the architect who is responsible for the carelessly drawn specifications, not you. If you are afraid that doing a job in the manner specified will injure your reputation as a painter, you are privileged to refuse to estimate upon the work; or, having done so, you need not sign a contract for it if, in your judgment, the specification calls upon you to do a poor, unworkmanlike job. It is your privilege before entering into a contract to object to any of its terms, and to insist or request, as the case may be, that it be modified before you sign it; but having once signed a contract to do work under certain specifications, whether this contract be a direct one with the owner, or an indirect one through a builder, you are bound both morally and legally to fulfill that contract to the letter, and any variation therefrom without the consent of the other party is dishonest, even though your variation may make what you deem to be an improvement in the manner of executing the work. Now, these are plain words, but when you come to look upon a contract in its full legal aspect, and to view it from every side of the question, you cannot fail to see I am right.

You may think an architect should not specify any particular material to be used, but I say an architect is bound to use his professional knowledge to discover what he believes to be the best material and mode of executing the work to suit the particular case on hand, and to further the interests of his client; not necessarily to make the best possible job in every case, but to make the job best adapted to that special piece of work. If the architect considers his client's interests are best served by the use of a certain kind of varnish, or a certain make of ready mixed paint, he is bound, in duty to his employer, to specify accordingly, and the painter who accepts the contract under those particular conditions is equally bound to see that these materials are used upon the job. I know of one case where, owing to certain personal and business relations existing between the owner of several houses and a certain firm manufacturing a special brand of ready mixed paints, the architect received definite instructions to specify that particular brand. The painter, knowing nothing of the circumstances, and not having much confidence in the paint in question, mixed his own colors, to match in shade the numbers specified by the architect. The consequence was that the architect, having failed to require the compliance with the contract, was held responsible by the owner, though fortunately a law suit was avoided, but the paint manufacturers withdrew a very important business relationship from the owner of the houses. Can any possible process of reasoning justify that painter for having departed from the strict letter of the specifications?

Then again the architect is looked to for the artistic effect of the building, and may specify that the work shall be done in a particular manner, in order to obtain a result which he knows will please him, and his client as well, although it may look rough and unfinished to the mechanic who has been trained up to do the work in a different manner. I know in one case I wished to obtain a certain effect on oak wood, and specified that the work was to have a light coat of paint, which was to be wiped off with a cloth, then followed by two coats of varnish rubbed to a dull gloss. When the work was finished I expected to see the texture of the wood plainly. Judge of my horror when I found that the painter, thinking I had made a mistake in myspecification, and had neglected to specify any filler, without consulting me in any way, filled the oak with paste filler before applying the paint. The whole scheme of the work was changed, and the effect I was trying to obtain was lost. Moreover, a special hanging, which was being made to harmonize with the rough woodwork, seemed strangely out of place with the smooth surfaced wood. At another time I had occasion to paint a certain studio wall, and mixing some Indian red and raw sienna to get just the tint I wanted, gave a light wash of water color over the paper, in such a manner that the brownish gray background showed through the color. I instructed the painter that this was the effect I wanted on the wall, which was to be done in water color. When I next visited the room I was horrified to find a solid coat of color on the walls; the shade was matched, it was true, but the effect was totally different from my instructions. Fortunately, in this case, I could set the men to work with sponges to wash off the superfluous color, and get very near the effect originally intended.

Now don't for a moment think that all mistakes and all disregard to the terms of the specifications are confined to the painters. Other mechanics are just as apt to err, or to set themselves up as superior to the architect. But I do want you to bear in mind that the architect is the responsible head, and that it is better in most cases to follow his instructions than to think your way is best. Don't think that every time he specifies a particular brand of varnish or color, or calls for a special make of white lead, that he is actuated by underhand bribes from the manufacturer. I can tell you, and I know well what I am talking about, that not one reputable architect in a hundred will accept a bribe or an illicit commission as an inducement to specify particular makes of goods, and the manufacturers who attempt to offer such commission usually get sadly left. I do not speak of the self-styled builder architects of small country towns. I don't know what they may do, though I hope they are honest; but I refer to the educated, conscientious, painstaking members of the profession whose practice is in the great cities, and who make up the membership of the American Institute of Architects. If you wish to bring them into sympathy with you, don't sulk in corners, call names, and say you won't play, like silly boys, but get them interested in your associations and your conventions, and you will soon bring about a better relationship between your trade and the architects of the country.—*Painters' Magazine.*

THE LATE W. G. STORM, R. C. A.

THE removal by death on the 1st inst. of the subject of this sketch, has taken from our midst one who has filled a very important place in the architectural work of not only this city of Toronto, but of the province of Ontario, during the last forty years.

He was of English lineage, born at Burton-upon-Strathar, Lincolnshire, England, October 29th, 1826, and came to Canada with his parents in 1830. They left Hull, England, in a sailing vessel on the 29th May, landing in Little York, (now Toronto), in August of the same year. He has therefore spent 62 years of his life in Toronto.

As a youth he was apprenticed for five years to his father, who carried on an extensive business as a builder and contractor, and he early developed a taste for architecture. When 18 years old he was articled to the late Mr. William Thomas, an architect of great taste and skill in Toronto, in whose office he continued for some years.

In 1848 he became associated with the late F. W. Cumberland, Esq., as assistant. In 1849 old St. James cathedral was burned, which was the second destroyed by fire on the same site. Plans for a new church were advertised for, premiums offered, and the first prize was awarded to the plans prepared, it is said, by Mr. Storm, in Mr. Cumberland's office. About the close of 1850 a partnership was formed between Messrs. Cumberland and Storm, and soon they became the leading firm in both city and province. St. James cathedral, the Normal School and the Mechanics Institute buildings were among their earlier work in this city, and among the counties of the province they had to do with many municipal buildings. The erection of the new University buildings in Queen's Park from an important era in the architecture of the city, and with them Mr. Storm was associated from the first in the development of the plans and details and the construction and completion of the buildings. Thoroughness was an important feature in Mr. Storm's work, and owing to this and his practical knowledge gained by him in the workshops of his youth, the Toronto University buildings presented about as perfect a piece of building as could be found on the continent.

The centre building of Osgoode Hall followed close on the completion of the University, and with this Messrs. Cumberland & Storm had to do. Opened in 1860 by the Prince of Wales, it was referred to as the finest law library building in the world. St. James' Cemetery Chapel, St. Andrew's Church, corner of King and Simcoe streets, among others, were his work, and finally the handsome and commodious pile which his eyes just failed to see completed in Queen's Park, the Victoria Methodist College buildings.

At the organization of the Ontario Association of Architects in March, 1889, Mr. Storm was chosen President, which position he held until the second annual convention of the Association which took place in February of the present year. This position was one of peculiar pride to him; as well as to his associates to have him there. He was indeed an ornament to his profession.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS' EXAMINATIONS.

The following are the examination papers used in the recent examinations of the above Association:

Arithmetic.

1. Add 52 multiplied by 321 to 87 multiplied by 139, divide by 12 multiplied by 7, and subtract 13 multiplied by 8.
2. Divide 19 multiplied by 158 by 44 multiplied by 7.
3. The following deposits are made in a bank:
   $10.00 at 4% for 1 year.
   $16.00 at 5% for 3 years.
   $26.00 at 6% for 8 months.
   What is the amount of interest on deposit?
4. Bricks cost at the yard $7.00 per M and $1.00 for cartage. What will be the cost of 142,700 bricks at the building.
5. Find the number of rolls of paper required to paper the walls of a room 21 feet square and 10.6 high from top of skirting to ceiling, a roll of paper being 8 yards long by 18 inches wide.

Algebra.

1. Reduce to their simplest forms:
   (*a*). $(a-x)-(2x-a)-(2-2a)+(3-2x)-(1-x)$.
   (*b*). $a^2-(b^2-c^2)-\frac{1}{2}b^2-(c^2-a^2)\frac{1}{2}+\frac{1}{3}c^2-(b^2-a^2)\frac{1}{3}+3(b^2-c^2)$.
   (*c*). $1-\frac{1}{2}\,1-(1-4x)\frac{1}{2}+2x-(3-5x)\frac{1}{2}-\frac{1}{2}\,2-(-4+5x)\frac{1}{2}$.
2. Multiply
   $x^2+2xy+2y^2$ by $x^2-2xy+y^2$.
   $x-1$ by $x+1$ and x^2+1.
   $a+b+c+d$ by $b+c-d-a$.
3. Simplify $\dfrac{2(x^2-\frac{1}{4})+\frac{1}{2}}{2x+1}$
4. Reduce $\dfrac{x^3+3x^2-4}{x^3-1}$ to its lowest terms.
5. Solve the equations:
   (1). $2x-\frac{1}{4}=75\ (3-2x)+\frac{1}{2}x$.
   (2). $2.7x+\frac{1}{6}\ (x-1)=x-4$.
   (3). $\frac{1}{6}x-1\frac{2}{3}=83\frac{1}{3}+2(3.5+2(3.5x-1)-(x+8)$.

Mensuration.

1. A trapezoidal field has two parallel sides whose length are 8200 yds. and 6190 yds. respectively. The perpendicular distance between the sides is 220 yds. The rental of the field is $750.00 per annum, what is the rent per acre of 4840 square yards?
2. The height of a precipice standing 20 feet back from the side of a river is 112 feet and a line 200 feet long will reach from the top of it to the opposite bank, find the width of the river.
3. A building 210 feet long, 64 feet wide has a slate pitched roof 32 feet high measured perpendicularly hipped at a similar angle to sides, at both ends. How many squares of slating of 100 sup. ft. will there be in the roof?
4. A boundary wall is 940 feet long, 10 feet 6 inches high and 2 feet 4 inches thick, how many cube yards of stone will the wall contain?
5. A gallon of water contains 277.2 cub. inches and weighs 10 lbs. avoirdupois, find the weight of 3 cubic feet of water in ounces.

Euclid.

1. Any two sides of a triangle are together greater than the third side.
2. If a straight line falling on two other straight lines make the alternate angles equal to one another, the two straight lines shall be parallel to one another.
3. Parallelograms upon equal bases and between the same parallels, are equal to one another.
4. Divide a given straight line into 2 parts so that the rectangle contained by the whole and one of the parts may be equal to the square of the other part.
5. If a straight line be divided into any two parts, the rectangle contained by the whole and one of the parts is equal to the rectangle contained by the two parts together with the square on the aforesaid part.

Besides the foregoing there was a composition on a subject given by the examiners. Also freehand and linear drawing from copy.

A curious suit has been entered by the Queen of England in the New York courts to recover a cargo of asphalt recently brought from the island of Trinidad, and sold to the Standard Asphalt Company of New York. It seems that the island of Trinidad is the property of the British Crown. The principal source of asphalt in the island is the celebrated Pitch Lake, which is practically a mass of asphalt, or rather, bituman. This is collected by a simple process of driving carts upon the surface of the lake, which is solid enough to support them, and shovelling the material into them; and the price, on the island, of the asphalt so collected is about a dollar and a half a ton. The lake is entirely Crown property, but there are secondary deposits of asphalt in other parts of the island, which are least, or otherwise conceded, to private parties. According to the claim of the council for the Crown, the deposits of asphalt under private control are nearly or quite exhausted, and their proprietors have taken to replenishing their supplies of the material by poaching on the Queen's property. It seems that this reprehensible practice has become so general of late that the Crown officers detain, where they can, all vessels leaving the island with cargoes of asphalt until it is ascertained whether any of the asphalt was stolen from the Queen or not; but it is alleged that, in the present case, the vessel succeeded in escaping without being searched. On the other hand, the respondents assert that, as the Crown imposes an export duty of a dollar and a half a ton on all asphalt taken from the island, the Queen has already received the full value of the cargo, and that they believe the suit to be merely a contrivance to annoy them, devised by a rival asphalt company, which has made an agreement with the Crown officers, not to take asphalt from Crown lands.—*American Architect.*

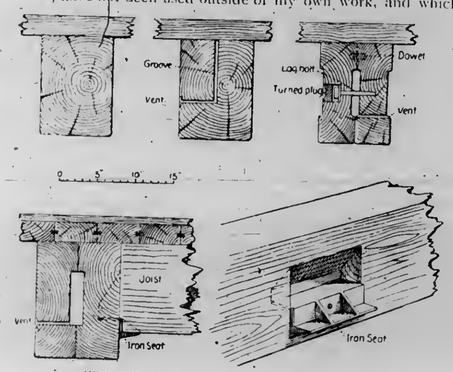
NEW METHODS IN HEAVY TIMBERING.

The following article on this subject from Mr. Frederic G. Corser, architect, Minneapolis, Minn., appears in a recent number of the *Engineering News*:

The great success of the building now much in vogue for warehouses and factories, known as the "mill construction," and the probable extension of some features of this system to other classes of buildings than those mentioned, has been productive of more or less study of the subject of timbering. If we except the efforts made within a comparatively short time to reform the timbering customary in these factories and storehouses, we must look in vain for recent examples of even tolerable timber-work. All the traditions to be acquired by the present generation of builders lie in the direction of rough, cheap work, intended to be concealed from view. No builder of this day thinks that the timbering of the ordinary building is a thing to be proud of under any circumstances. The carpenters of the day will look over the old works on the subject with rather more pity for the simplicity of the old builder, which led him to waste his time on the splendid framing shown, than of admiration for that framing.

Another factor in the decline of timber-work is the cheapness of sawing and dressing lumber in our time, which has increased the tendency to hide the actual construction by boxing or casing it in. When to this we add that the properties of timber used transversely are not generally well understood, we find sufficient causes for a decidedly low state of the art of timbering. However, with an amount of ingenuity and technical skill unknown to former times, seeking employment in every field, it were indeed a pity if the art of timbering were overlooked; and now that there are such good economical reasons for the use of heavy timbering, left in full view, we may look to see the objectionable features overcome.

The accompanying cuts give some things which, as far as I know, have not been used outside of my own work, and which



NEW METHODS IN HEAVY TIMBERING.

are submitted as in the right direction. The drying of large timbers being a slow process, proceeding from the outer and newer tree growth which shrinks most, to the inner and older wood which is more stable, we get under the ordinary conditions several unsightly cracks, due to the strains set up by this unequal drying. Aside from their unsightliness, these cracks are often of considerable damage to the timber from the standpoint of strength. The boring of posts from end to end has long been done, and when the holes thus made are of considerable size, and vented by transverse holes at top and bottom, the trouble is overcome to some extent: Were it practicable to bore the floor timbers in this way, the benefits would be even greater than to the posts, because in the timbers used transversely we could bore out a relatively large part of the centre without weakening them. However, boring requires special machinery, not to be found around saw-mills or planing-mills, and there are limitations to the length of the timbers that one can get bored. After trying for some years to get manufacturers of lumber to put in the necessary machinery for boring, I gave it up.

A deep groove may be worked in from the upper edge, a circular saw being specially set for the purpose. This method is open to the objection of destroying a few of the fibers opposed to the compressive strains, but it is even more efficient in reducing the tendency to crack than is the boring. The preservation from season-cracks would doubtless in some cases prevent a loss of strength that would offset the amount taken away by the grooves.

An old way of reducing the tendency to season-cracking consists in splitting the timber through the center with the saw, turning the outer sides inward, and bolting. This was a favorite prescription by Viollet le Duc. It puts the older and more permanent part of the tree-growth outward, and as this is less liable to shrink than the sappy newer growth, it not only relieves these seasoning strains by so much as would naturally follow from dividing the timber, but it also exposes the part of the timber which cracks least.

There are also other advantages in thus making up the timber in two parts, among which is the opportunity given to inspect the heart of the tree; this portion being, as is well known, subject to decay which does not manifest itself at the surface. Another advantage of using the timber of two parts is the fact that in the operations of the modern sawmill, larger timbers can in this way be sawn from a given diameter of logs. Still another gain to the building is to be found in the greater progress of the seasoning process in the interval between the cutting of the lumber and its final assembling in place in the building.

Not long since it occurred to me that possibly broad grooves or panels might be worked in the sides of the pieces thus proposed to be bolted together, the operation being done at the planing-mill at the times of dressing of lumber. Upon enquiry, I find that the planers in use at these mills for doing the bulk of their work may be easily modified to work these channels, and I have had estimates for doing it at a very low figure.

As grooves or panels of about the proportion shown in the cuts may be made without taking from the strength of the pieces when subjected to transverse strain, this form becomes desirable for several reasons. The seasoning of the timber prepared in this way would be accomplished in a fraction of the time required by a solid timber; the panelling would so reduce the pieces at the center as to remove the tendency to season-cracks; considerable weight would be saved in freighting and handling on the building; the interior could be dried while the under side of the timber, being practically solid, would resist fire well, and if the outer sides were also panelled, it would do much toward relieving the appearance of the timbers, by introducing lines that would in a measure take the attention from the unsightly features of common lumber. In fact, this treatment of timbers will go far toward making open timber-work desirable in other classes of buildings than factories and warehouses. Floors built on this principle are much to be desired in schools, for instance, where by their substitution for the common thin joist and concealed construction, and by the use of open-timber roofs of suitable detail, a practically fire-proof building may be obtained at less cost than one of the kindling-wood structures so nearly universal.

I am indebted to Mr. C. J. H. Woodbury for the suggestion that the small vent-holes be placed at a low enough level to drain the inside of any water that might get into the centre during or after building. For bolting the halves of the timber together, lag-screws are used as shown, because they would not become so loosened by the shrinkage of the wood as would the common bolts running clear through. A few dowels might be inserted with profit in the upper part of the girder liable to unequal loading, as the planking, being parallel with it, would not be of assistance in distributing the load over the two halves. The dowels, replacing fibres subject to compressive strains only, would not take from the strength of the beam.

The iron stirrup, so commonly used for the support of timbers meeting at right angles, as when heavy joints are carried at one or both ends by girders, is far from an ideal way of accomplishing the desired result. It is clumsy in appearance, if not actually so in manufacture; it usually gives a rather poor bearing for the joists, while the shrinkage of the joist eventually leaves the top of it considerably below the top of the girder. The iron seat shown in the cut is designed to overcome these faults in a degree.

As we approach the neutral axis of the timber in which the mortise is cut, we find the fibers less and less strained under a load, so that we may remove a part of the timber without weakening it, provided we have enough wood at this point to bear the small strains that the timber will be called on to withstand at the level of the mortise. If in this mortise we place a casting of the form shown, and tenon the joist to fit, we shall get a bearing of the joist much better than that given by the stirrup; the arrangement will be much less unsightly, and nearly all the old trouble of shrinking away from the common level at the top, which gives so much trouble where stirrups are used, will be overcome.

DECORATION AND FURNITURE

OLD CANDLESTICK.

DEVELOPMENTS IN DECORATION.

A well-known writer says: "Art moves in cycles of styles. At one time a separate style in blended form is resurrected; at other times we witness blended styles. New combinations of old styles may create a novelty with nothing new in principle—new only in arrangement, and with no great variety in details. We have few decorative forms that do not retain some element of a preceding period." To this, says *Furniture and Decoration*, we cannot dissent. Those of us who have given any attention to the origin and composition of style in decorative art will readily agree that in the present era there is little or no purity; although we may be compelled to call such by, or adopt, some classical name for our purpose, the intent is not to deceive, but the designer merely wishes to convey the idea that the scheme was not to faithfully decorate in exact reproduction of some period or era of time, but simply to avail himself of the advantages of that peculiar style, with such adaptations, in form and color, discarding here, appending there, modifying this, strengthening that, and reserving the right to make such changes as will best accord with the surroundings, improvements, temperament and culture of to-day.

We endeavour to be as classical as our knowledge and resources of material will permit. We all know that to consistently decorate in say the "Louis XV.," or "Japanese" style, if we at all succeed in obtaining the genuine article, we do so at a great outlay, and then we may venture the opinion that our stained glass, mantel, and fire-place will be very modern, and the exterior architecture will be composite "Romanesque."

Although we are utilizing all styles in our present decorations, the predominating ones have been adapted from the French period of the "Rococo," the different kings, Louis XIV., XV., XVI., and the Empire. The revival of these style shas chiefly been confined to interiors, while the "Cinque Cento," "Italian Renaissance," "Romanesque," "Early English," and "Elizabethan," in composite form with "Celtic" and "Byzantine," as well as the "Adams," are extensively employed both for interiors and exteriors. Modern inventiveness joins hands with ancient picturesqueness, and produces varying and unique results. This we see constantly exemplified in the interior as well as on the exterior of our buildings.

A gratifying change is being made by our architects. Formerly, when the dwelling was constructed by the builders, they considered their work done, and their interest ceased upon its completion.

The coloring used in decorating a modern dwelling is always, consciously or unconsciously, controlled and dictated by the prevailing fashion. To gratify its whims, new shades and tints must constantly be created. These colors will appear in the latest textile fabric, and necessarily are introduced in the surroundings. The painter must become acquainted with these and introduce them in his scheme of coloring. In the selection and arrangement of his colors his degree of taste, refinement, and art will be seen. He may possess all necessary scientific and technical knowledge of his calling, his treatment with the brush be skilful, his judgment of design and proportion of same be perfect, but the entire effect may be destroyed, or at least marred, if the coloring does not receive the proper attention.

The successfully-decorated room receives its maximum amount of work, not in labor or material, but in thought and study. A certain shade in one place will appear entirely different when exposed and contrasted to different lights and surroundings. "Seeing is believing"; this trite saying aptly applies to a decorator studying a color effect.

The covering of walls with silk, tapestry and cretonne is on the increase for finer wall hangings. As a rule the effects are very beautiful, the good coloring and softer nature of the material easily according them with their surroundings; but its perishability, the ravages of moths and dust, the fading of the aniline dyes, will prevent the adoption of this material for permanent decoration.

Truly there is a soul in our art, or at least a finer feeling, not gifted to all, which must be disciplined and cultivated, for to be able to discern those subtler tones, to appreciate those minute differences in tints and shades, to feel the effect of warm and cool, or to distinguish between chaste and vulgar colors, there is something more than the technique of a craft required to be thus affected.

The more we are surrounded by beautiful and harmonious forms the more exacting becomes our natures, the greater our requirements, the higher our ideal. It is our education, our intelligence, our culture, that creates this natural demand for a higher art. We know there is no finality in art, but we must endeavour, on all occasions, in return for our labors, to attain the greatest amount of permanent beauty, and to strive, constantly strive, to reach the highest excellence, the position occupied by our old masters of the Fifteenth and Sixteenth Centuries.

The use of copper in decorative metal work is largely on the increase, by reason of the ease with which it can be used in various electroplating processes. The electrotyping of metal has been carried so far that entire shop fronts are constructed by this process. One of the ceilings of the Equitable building is made of electroplated copper on wood, which exhibits the capabilites of this beautiful method of interior decoration.

A good frieze for the wall was produced recently by a firm of decorators in the following way: A frieze was marked out on the wall by bands of narrow moulding two-and-a-half feet apart, thus preserving the depth of frieze. The paper of the frieze was the same as the paper on the rest of the wall, and along this frieze were arranged, at distances of one-and-a-half yards apart, and located at points about three inches below the top moulding of the frieze, small brass lions' heads, and from these heads was draped a chintz festooning all round the room.

The Ontario Department of Public Works has removed to the new Legislative buildings in Queen's Park, Toronto.

To measure plumber's work, says Lockwood's "Builders' Price Book," take the lead as cut and laid, by the superficial foot; the quantity of feet multiplied by the weight of the lead per foot, and divided by 112, will give the required weight.

In the case of a mortgagor who moved a house from the mortgaged premises to another piece of land owned by him but not covered by a morgage, the Supreme Court of N. Carolina held that the mortgagee's lien on building was not affected, and decreed a sale of the house on its new *situs* with leave of the purchaser to remove the building, there being no question as to the ownership apart from the claim of the mortgagor.

The famous "Leaning Tower" of Pisa, Italy, so celebrated in the annals of the world as one of the greatest of its many wonders, was begun in the year 1152, but was not finished until after two centuries had come and gone. It was erected as a sort of triumphal tower to celebrate the victory of the Pisans and the Normans over the Saracens, the two former having allied to drive the latter out of Italy. The fact that this old relic is now in the market and offered for sale to the highest bidder makes this item timely and appropriate. The old tower is circular in shape, 100 feet in diameter, 179 feet high, and is of pure white marble. It is divided into eight stories and has galleries at each story which extend entirely around it. As above mentioned, the entire structure is of massive marble slabs, the weight of which gives it a decided over-toppling look, the top hanging out, as it does, sixteen feet over the foundation.

SANITARY AND HEATING

HOUSE DRAINS.

We can remember, says the *Contract Journal*, when it was customary for architects to specify nothing less than 9 in. for the internal diameter of the main drain to an ordinary house, and sometimes a 12 in. pipe was thought necessary for a large mansion or warehouse. We are glad to think that smaller pipes are more generally adopted now. Yet we occasionally meet with architects who still cling to the prejudice in favor of large pipes, and some two years ago we knew a vestry surveyor who insisted upon a 9 in. main drain being laid to a common lodging-house containing some half-a-dozen water-closets, all discharging into a single 6 in. trough. To those who reflect upon the rapidity with which water finds its level, the danger of deposits being left in a 9 in. pipe is obvious. A 9 in. circular pipe, half filled with water, holds one gallon in every 4 in. of length, so that the orthodox two gallon flush from a single closet soon distributes itself in such a shallow stream as is totally insufficient to carry away the soil. A 6 in. pipe, half full, carries a gallon of water in 1 ft. 8 in. of length and a 3 in. pipe, half full, carries the same quantity in 3ft. 4 in. Of course it is advantageous for the soil to flow in narrow, deep channel. This is a reason in favor of pipes of an egg-shaped section, though the care required in setting the axis of the oval section vertical increases the cost of laying the pipes. The danger of small pipes becoming choked through an excessive flow of soil has been exaggerated. Prof. Corfield has found that even in large country mansions, with large areas and outbuildings, no main soil drain need ever be more than 6 in in diameter; and in Gwilt's "Encyclopæa of Architecture." (1888) there is instanced the case of a 10-roomed villa where a 3 in. main drain was used without inconvenience for many years.

The choking of a drain is caused not so much by an excessive flow of soil through the pipe, as by an insufficient or badly regulated flow, which causes deposits to accumulate. It has been observed that when a water-closet is situated low down, near the head of the drain, the latter is liable to become choked. This occurs through the gradual accumulation of solid matter. It certainly is preferable when the water-closet is situated at some height above the head of the drain. The advantage of this consists less in the velocity acquired by the soil in travelling down the soil-pipe, than in the breaking of the soil matter into small fragments, which are held suspended in the water. The velocity is useful to carry the soil through the trap, and after that a slight fall suffices to ensure a sufficiently rapid flow.

An insufficient fall to a drain allows time for solid matter to settle, because the water does not flow rapidly enough. On the other hand, it has been found that if the fall is too great the water runs away, leaving deposits of soil. According to Hurst, a velocity of 2ft. per second is the smallest that will keep a drain clear, but 3 ft. per second is required for a house drain. It has been calculated that this velocity can be obtained in a 4 in. pipe half full, with a fall of 1 in 100; in a 6 in. pipe, with a fall of 1 in 150; and in a 9 in. pipe, with a fall of 1 in 225. But there is great divergence of practice in arranging the falls of drains. Some architects favor falls of 1 in 60, some 1 in 40, and others 1 in 30. The regulations made by vestries exhibit differences of opinion on this subject. One London vestry states the minimum fall for drains at 1 in 60, another at 1 in 48, and a third at 1 in 40. We rarely find measures taken to guard against an excessive fall. We know one London vestry that requires the fall to be not less than 1 in 40, and provides that the whole of the available fall is to be made use of. The maximum fall may, therefore, be anything, and it may easily be such as to allow the water to flow away, leaving deposits of solid matter in the sides of the pipes. A plentiful flow of water is far more effective in cleansing a drain than a rapid fall, and the two-gallon flush, to which we are limited by law for each water-closet, ought to be supplemented by a further supply. A rain-water drain may advantageously be turned to account in flushing soil drain, especially if connected near the head of the latter.

A report obtained currency two or three weeks since that an association of manufacturers of plumbing supplies was to be formed to restrict credit, and in other ways to place the trade on a more satisfactory basis. Enquiries of leading manufacturers elicited the reply that they know nothing about such a movement.

MANUFACTURES AND MATERIALS

EFFECT OF TIME ON STRENGTH OF CEMENTS.

Baron de Roehmont, engineer of the Port of Havre, gives figures to show that the strongest briquettes, at two days, having a breaking strain of 147 pounds to the square inch, had a breaking strain of 318 pounds per square inch, after a period of 30 days. Other cements which had breaking strains of 157 pounds at two days increase to 661 pounds in thirty days. The weight or tensil strength of cements diminish when they have been kept in stock for some time. In the case of 15 cargoes of cement which came under his notice the weights, on delivery, were between 111 and 121 pounds per bushel, and the breaking strains were from 75 to 160 pounds per square inch in two days, 160 to 289 pounds in five days, and 339 to 460 pounds in thirty days. After being six months in store their weights were from 101 to 108 pounds, and their breaking strains from 38 to 114 pounds in two days, 112 to 195 pounds in five days, and 234 to 340 pounds in thirty days. The fall in weight and strength when the cement has been kept in store for a year is still greater. One cargo weighed on delivery 111 pounds per bushel, and its breaking strains at two, five and thirty days were 96, 230 and 271 pounds respectively. After the cement had been in store six months its weight was 106 pounds per bushel, and the briquettes made from it had breaking strains at two, five and thirty days of 109, 178 and 332 pounds respectively. After being in store a year the cement weighed 106 pounds per bushel, and the briquettes made from it had breaking strains at five and thirty days of 73 and 250 pounds respectively.

NOTE ON THE COMPRESSIVE RESISTANCE OF BRICK.

The writer has previously called attention to the fact that the flatness of the pressed surfaces greatly affect the crushing strength of cubes of brick or stone. The present note is written to present the results of some experiments made to determine the effects of different methods of preparing the pressed surfaces to the test specimens.

In testing some paving brick, the writer made some preliminary experiments by preparing the surfaces in five ways, viz.: 1, grinding as nearly flat as possible upon the convex side of an emery stone, and crushing between self adjusting, parallel, cast iron plates; , removing the irregularities of the surface, and crushing between blotting paper; 3, removing the irregularities of the surface, and crushing between straw boards; 4, removing the irregularities of the surface, coating with plaster-of-paris and placing under slight pressure until set (12 to 24 hours), and then crushing; 5, coating with plaster-of-paris which was afterwards ground down on a sand-paper disk, to the surface of the brick, so as to leave a minimum thickness with a perfectly flat surface, and then crushing.

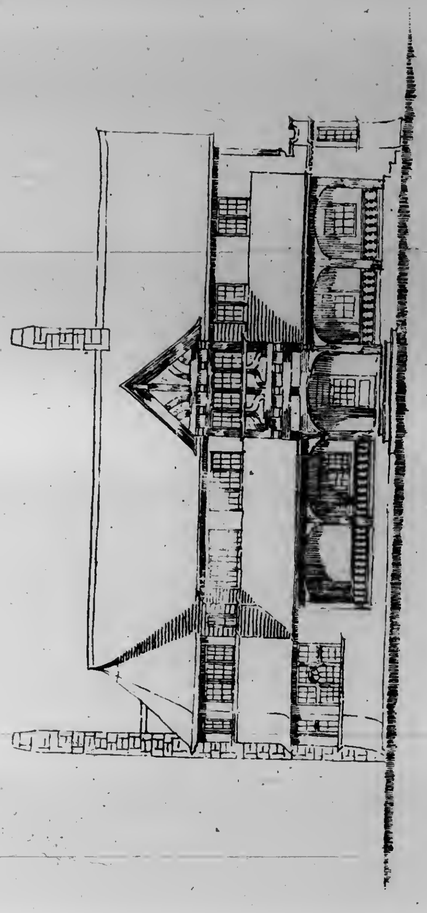
After a considerable number of experiments, it was decided that there was no great difference between the first three methods, while the difficulties in applying the last two were so great as to render them worthless. With a grade of brick which was quite uniform in quality, the first three methods gave 7,000 to 9,000 pounds per square inch as the crushing strength of cubes. The fairly close agreement of the results was considered satisfactory evidence that the method employed secured the full strength of the brick. Subsequently the writer decided to determine the strength of cubes when pressed surfaces were prepared with the greatest care. The samples were prepared on a rubbing bed at a marble dressing establishment, by the ordinary workmen, with instructions to secure perfectly flat surfaces. The brick were of the same grade as those referred to above, and many of the samples were the second halves of the brick used in the first experiments. The strength of the carefully prepared cubes ranged from 16,000 to 21,000 pounds per square inch, and averaged a trifle over 18,000.

The conclusion derived from the two series of experiments is that an almost imperceptible difference in the flatness of the test specimens makes a very great difference in the strength. Obviously this difference is greater the harder and more brittle the brick or stone. It is perhaps well to repeat that tests of compressive resistance of blocks of stone or brick are useful only in comparing different samples, and gives no idea of the strength of masonry constructed of these materials.

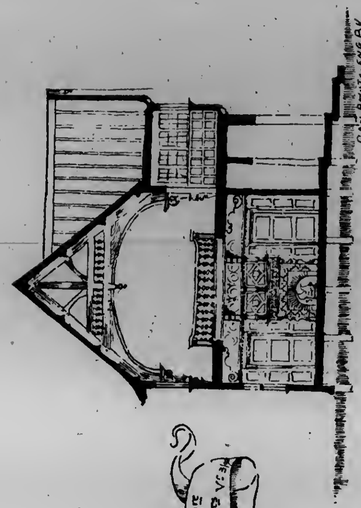
It is interesting to note that Rankine and Trautwine, standard British and American authorities, in editions of their engineers' manual published a few years ago, give the crushing strength of the best brick at 1,100 and 4,000 pounds per square inch respectively, while there has recently been tested in the university testing laboratory three lots of brick which averaged from 15,000 to 18,500 per square inch. The difference is probably due mainly to improvements in the manufacture of brick. The crushing strength of granite, when tested under similar conditions, is from 12,000 to 20,000.—IRA O. BAKER, Professor of Civil Engineering, University of Illinois, in the *Technography*.

The Central Bridge Works, of Peterborough, has been succeeded by the Central Bridge and Engineering Co., incorporated, with a capital stock of $200,000. The company will manufacture steel and iron bridges and structural iron and steel for all purposes.

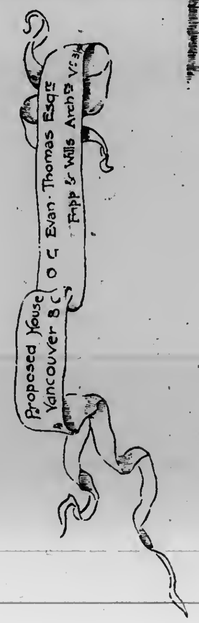
Messrs. Merchant & Co. are calling the attention of their customers to the fact that they have ceased to handle "Gilbertson's old method" brand of roofing plates, the quality of which, in the opinion of many of their customers, has deteriorated of late. They are now offering a heavier and better plate manufactured in their own works in Philadelphia.

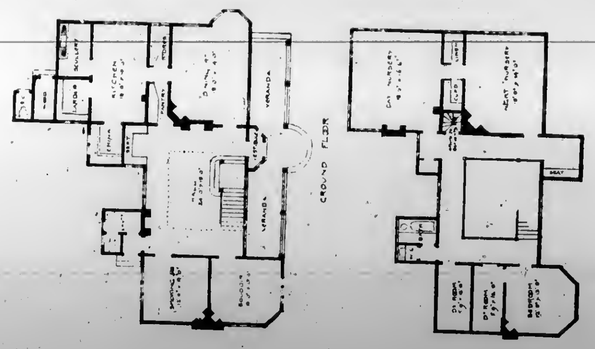


FRONT ELEVATION

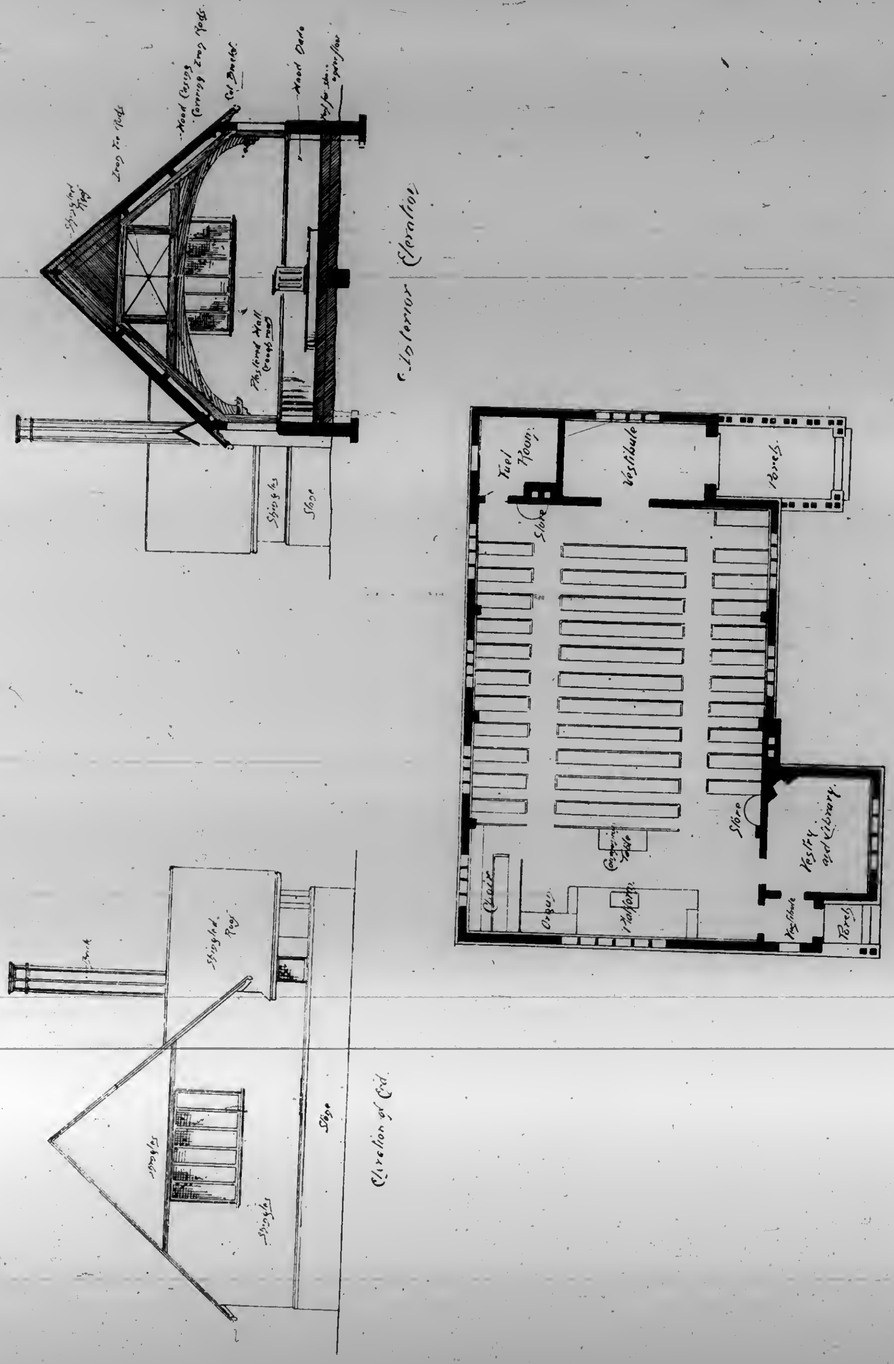


SECTION ACROSS HALL





GROUND FLOOR



Presbyterian Church Competition.

Design Submitted by "John Knox." (Arthur E. Wells) Toronto.

CANADIAN ARCHITECT AND BUILDER.

VOL. V.—NO. IX TORONTO AND MONTREAL, CANADA, SEPTEMBER, 1892. PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
14 King Street West, - TORONTO, CANADA.
64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	S. G. CURRY, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton
TREASURER	D. B. DICK, Toronto.

COUNCIL:

WM. G. STORM	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
JOHN E. BELCHER	Peterborough.
EDMUND BURKE	Toronto.

REGISTRAR AND LIBRARIAN:
W. A. LANGTON - Merchants' Bank Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	F. X. BERLINQUET, Quebec.
1ST VICE-PRESIDENT	VICTOR ROY, Montreal.
2ND VICE-PRESIDENT	J. NELSON, A.R.C.A.
SECRETARY	C. CLIFT, Montreal.
TREASURER	W. E. DORAN, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. C. HUTCHISON, R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
ALPH. RAZA	Montreal.
J. F. PEACHY	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. J. HILL, President.	JOHN ALDRIDGE.
GEO. MOIR, 1st Vice-President.	BENJAMIN BRICK.
GEO. OAKLEY, 2nd Vice-President.	WM. PARK.
JOHN L. PHILLIPS, Secretary.	JAS. CRANG.
DAVID WILLIAMS, Treasurer.	M. MURPHY.
	J. LISTER NICHOLS.
	WM. PEARS.

THE introduction of iron and steel skeletons for the support of large buildings is said to have lessened to a very large extent the demand for brick.

REFERRING to the illustration of the proposed new union station at Toronto, published in this journal, the *Architectural Era* says: "We had the pleasure of seeing the original drawing in Toronto recently, and it seemed to us to be one of the most pleasing compositions yet produced in the Province."

A New Hampshire granite manufacturer states that it will take ten years for the industry to regain the position which it occupied prior to the recent strike of granite cutters. It would be interesting to know what advantage the strikers expect to derive as the result of the injury which they have been the means of inflicting upon this important industry.

THE next number of the ARCHITECT AND BUILDER will be issued from new publication offices, Rooms 106, 107 and 108 Confederation Life Association Building, Richmond and Yonge streets. We shall there enjoy better facilities for the carrying on of our work, and shall be pleased to see as many of our friends as can make it convenient to visit us.

The opinion of the citizens of St. John's, Nfld., was that the cathedral destroyed in the recent conflagration, was fire proof. Consequently when the fire broke out, the building was made the storehouse for furniture and other combustible materials. A burning ember blown through the open door set fire to these materials, and belief in the ability of the structure to withstand fire was quickly dissipated.

SEVERAL accidents, some of a fatal character have lately resulted from the breaking down of derricks while under strain. There appears to be need for more careful examination of such apparatus, to give every possible assurance that it possesses the requisite strength. Equal care is required on the part of those who may be entrusted with its operation, in order that the lives of workmen may not be carelessly sacrificed.

The time has almost arrived when the Toronto Architectural Sketch Club should resume its regular meetings. It is to be regretted that owing to the prevailing dullness in building operations and other causes, several of the leading spirits of the organization have recently removed from the city. While the loss of these members will be severely felt, others should be found ready to take their places, and display like activity on behalf of the progress of the Club.

WHILE congratulating Messrs. Strickland & Symons upon having received the commission to prepare the plans and superintend the erection of the new union railway depot at Toronto, and the railway companies and the city upon the fact that the work has been entrusted to such capable hands, we may nevertheless point out that an opportunity existed for a most interesting competition. The subject is one which might well have engaged the thought of all the leading architects of the country. The palace hotel which it is said to be the intention of the C. P. R. to erect opposite to the new depot, might also form the subject of such a competition

A DECIDED impetus has been given to the movement for the reduction of the hours of labor, by the signing by the President of the United States of an act recently passed by the Senate enacting that eight hours shall constitute a day's work on all public works, except in cases of extraordinary emergency. Any government agent or contractor who shall violate this law, will be liable to a fine not exceeding $1,000, or to a fine and imprisonment, at the discretion of the court.

The Toronto Builders' Exchange, a list of whose officers may be found in this and future numbers of the ARCHITECT AND BUILDER, is still adding to its membersship and in other respects proving a success. The exchange has delayed taking possession of its new and handsome suite of rooms, pending the paving of the southern portion of Victoria Street. This part of the street having now been asphalted, no time will be lost in making the change of premises, and in a short time the members of the Exchange and their friends will be asked to take part in a formal celebration of the event.

LERNARD HEUKLE, a resident of Rochester, gravely announces his purpose to erect "the largest building on earth," in the shape of a power house at Niagara Falls. The building, which is to cost about $35,000,000 is expected to pay six per cent. on an investment of $256,000,000. It is a fortunate thing for the management of the World's Fair that several years will be required for carrying out Mr. Heukle's plans. Otherwise visitors might be expected to give the Fair the go-by in favor of the greater exhibition at the Falls. The architectural world will anxiously wait for the publication of the plans of this structure which is to dwarf the pyramids.

YOUNG architects who have not been practicing long and whose clientele is not large, often find it profitable in more than one sense to do some work outside of architecture, for instance, designing of various kinds. Wall papers, bindings for books, title pages, photo engraving and even furniture, all offer a field for a clever designer in which to add to his income while it does not detract in the least from a proper professional dignity. Young architects whose means are small too frequently "go in" for the publication of works cootaining "designs for the million" to the great disadvantage of themselves and of their profession. By inquiry they might find many fields more profitable and less *infra dig.*

It would, no doubt, lead to the avoiding of defective construction, such as that referred to in our last issue, if there was an enactmeot in force in Ontario, similar to that which exists in Great Britain and the Province of Quebec. In Quebec, the law holds the architect and the contractor jointly responsible for the safe construction of buildings, for a period of ten years after their completion. An instance has come to our notice wherein a Montreal architect was compelled to pay between three and four thousand dollars, in consequence of the collapse of a building erected under his supervision some five years ago. Unfortunately for the architect in this case, the contractor had placed all his property in the name of his wife, and it was not possible to compel him to contribute his share of the amount.

IN another column will be found an article descriptive of experiments in the use of electricity for heating purposes, which have recently been in progress at Ottawa, Ont., together with illustrations of the devices employed. So successful have these experiments been, that the new method of heating is soon to be put to a practical test on an extensive scale. The result will be watched with much interest, more especially in view of the advancing price of coal. A vast waste of money and labor is involved in our present methods of heating. It may be regarded as certain that there will be substituted for them in the near future a method not less efficient and more cleanly and economical. It is by no means unlikely that electricity will be the chief agent in the reform.

A CANADIAN gentleman who lately inspected the buildings in course of construction for the Columbian Exposition, became firmly impressed with the idea that there was great danger of their being destroyed by fire during the progress of the Fair. To the frame-work of the buildings is nailed diagonally rough boards, which in turn are covered with a material called "staff." Our informant states that should a spark find its way inside this hollow wall of highly inflammable material, it would be almost impossible to check its progress. The vast extent of the buildings, besides increasing the probability of fire, would greatly add to the difficulty of subduing it. The extensive precautions being taken against the possibility of fire, serve to indicate that the management are not unaware of the dangerous conditions above referred to.

A CONTRIBUTOR to an English professional journal recommended the use of a solution of common salt to prevent the accumulation of the unsightly efflorescence that so frequently appears on the surface of brickwork. The usual remedy, if such it can be called, is to apply a solution of muriatic acid, but it is by no means absolutely effective. This trouble has bothered architects and builders for years, and so far no remedy has been found. An explanation of the efflorescence is simple enough. When a clay from which a brick is made contains magnesian lime, the trouble will occur. A brick being absorbent, the water soaks in, and dissolving the magnesia, effloresces on the surface of the brick. Why should not architects specify that no brick is to be used that will effloresce. The result would simply be that brickmakers would cease to use clay that contained magnesian limestone.

ARRANGEMENTS are being made for the annual meeting of the Province of Quebec Association of Architects, which will take place in Montreal on the 29th inst. We hope that every effort will be made to ensure the success of this meeting. A feature which has been absent from former meetings, has been the reading of papers on architectural subjects; such papers, when read at the meetings of the Ontario Association, have awakened profitable discussion, and have been of lasting benefit to the members. We have no doubt that similar results would follow the reading of papers at the meetings of the sister Association of Quebec, and we are pleased to see that a departure is to be made in this direction at the approaching meeting. It will be remembered that the Ontario Association, at its last convention, had the pleasure of a visit from Messrs. Hutchison and Clift of Montreal, representing the Quebec Association, and it is to be hoped that the desire for a better acquaintance thus manifested by the Quebec Association will be reciprocated by the architects of Ontario. The Ontario Association should appoint some of its members a delegation to Montreal on the 29th inst., and these delegates should go prepared to offer such advice and encouragement to the younger Association as will tend to awaken the enthusiasm of the members for the carrying out of the objects which the Association was formed to accomplish.

IT is surprising that concrete is not used to a greater extent than it is. There is so much material, such as slag from the iron works, available for the purpose that the cost of concrete should be quite low. Although pebbles are employed for ballast in making concrete, with the addition of sand and cement or lime, any hard material answers equally as well; in fact concrete gives ample opportunity for the utilization of the waste products of many industries. Of course a hydraulic cement such as Portland is the proper thing to use in making concrete. It not infrequently happens, however, that the expense is too great, and lime is used instead. It is of great importance to remember that pure lime —that is one that will not set in the presence of water— is practically useless for this purpose. Pure lime, called also rich lime because of its rich or fatty appearance when slaked and mixed, is only suitable for interior work such as plastering. The proper limes to use for concrete and mortar are those of the hydraulic class, called also "poor" limes. These have proportions of material other than lime in their composition, such as iron, silica, etc., which gives them the property of setting under water. A "pure" lime can readily be distinguished from a "poor" lime by the fact, that while the former gives out a good deal of heat and steam in slacking, the latter does not. Limes used for building purposes too frequently lack the hydraulic qualities.

THE new building ordinance which has recently gone into operation in Boston, and which is regarded as a model of its class, provides that no buildings, excepting wharf sheds and grain elevators, shall hereafter be put up a height of more than 70 feet or an area greater than 10,000 square feet, unless strictly of incombustible materials; that no building, to be used above the first floor for mercantile, manufacturing or storage purposes, can be put up having a height of more than 45 feet unless constructed wholly of incombustible material or with floors of grooved planks at least two inches thick; that no building of any kind or material will hereafter be allowed exceeding a height of 125 feet, and brick, stone, or iron buildings must have party or bearing walls of brick carried at least one foot above the roof. These must be plastered directly upon either solid masonry or metal lathing. All columns or beams bearing weight must be protected by brick, terra cotta or other incombustible material. Doorways in partition walls cannot exceed two upon each floor, and these must be protected by double, tin-covered doors hung to iron frames. Buildings, except offices and dwellings within 30 feet of an exposed opening, must have fire-proof shutters, and all elevators must be of solid brick, or other incombustible material, and the openings furnished with metal-covered doors.

Now that the agreement between the city of Toronto and the Railway Companies has been signed and the works put in hand it is time to consider what may be done to improve the appearance of the water front. No one who has seen Toronto from the water, will say that there is not plenty of room for improvement, and we are inclined to think that it is not generally known as it might be that the proposed water front park is not part of the programme now. The new street which is to begin at the waterworks and run east along the whole front of the city, behind the wharfs and docks, at present promises no better an appearance than exists with the esplanade. After a few years, probably, warhousces and such buildings will be erected upon it, and these, though no doubt very necessary, are not likely to be noted for architectural beauty. We can see no very great reason why that large area, which was to have been the site of a C. P. R. station—south of the tracks and west of the present steamer landings and sheds—should not be made into a public garden or park, with an "embankment," on the principal of the Thames embankment, London, with a handsome water wall. This park would be reached by York street and the bridge which is to be constructed to give access to the water over the tracks, so that there would be no risk to the public in having to get to the south side of the tracks. It is all very well to urge that the Island Park is being made into a resort which gives great delight and immense advantages to the citizens, but it costs ten cents to get there and back every time, while here is a fine space, which, if made into a park would be a boon to a great many and would be a decided improvement to the appearance of the city We may mention in passing, that it is a pity some rather less commonplace name could not have been found for the new street; "Lake Street" is not only commonplace but senseless, as it has nothing whatever to do with the lake. "Bay Street' would have been more *appropriate* perhaps, but there is already a street of that name, and perhaps such a name would have been equally poor. We leave it to others to choose a name, but register our objections to "Lake Street." A park here would be a great advantage to travellers, who while waiting for trains could rest in the gardens in preference to the waiting-rooms of the station. Toronto water-front needs some redeeming feature; it can never be like Montreal's quay or even that at Kingston, and at present it is only one degree better than Hamilton. Toronto is an entirely different class of city to Montreal, and a garden front at the point where all incomers arrive, whether by boat or train, would be decidedly in keeping with the character of the city.

ILLUSTRATIONS.

CLUB HOUSE FOR THE TORONTO ATHLETIC CLUB.—E. J. LENNOX, ARCHITECT, TORONTO.

CHURCH OF ST. JOSEPH, ST. MARYS, ONT. POST & HOLMES, ARCHITECTS, TORONTO.

MANTEL IN PROVOSTS ROOM, GLASGOW MUNICIPAL BUILDINGS.

COTTAGE AT SCARBORO', ONT.—E. B. JARVIS, ARCHITECT.

The whole of the exterior is shingled from roof to the ground. The shingles are stained as follows: roof, red.; gables, raw sienna; and ground floor a grey tint. The wall and ceilings inside are stucco finish, tinted. The hall is sheeted up to the frieze, then stucco frieze and ceiling.

THE TORONTO COURT HOUSE DIFFICULTY.

THE Toronto Court House has been at home of almost unceasing interest from one cause or another ever since its inception. In the face of the many stories in circulation, and the difficulty of getting at the actual facts, we have up to the present refrained from commenting upon the case. The crisis having at last been reached by the entry by force of the architect upon the premises and the exclusion of the contractor, we need hesitate no longer. What the result of the trial of the case which is to take place on the 26th inst., may be, we of course cannot foretell, but it is certainly time that such a grave scandal as the matter had become should be ended. There is more than one question at issue. The works are two years behind time, and the contractor, whether rightly or wrongly we cannot pretend to say, has refused to remove certain stones, built into the wall, which the architect has condemned, giving as his reason that they were passed by the architect as sound before being placed in position. We regret the stand made by some of the aldermen, who cannot from the nature of their calling be expected to be versed in such matters, but who would nevertheless try to settle the difficulty by ways totally unsuitable and contrary to the strictly business principle that should and must be adhered to. Contracts exist between the city and architect, and between the city and the contractor, and the terms of these documents, ought to be sufficient to meet the difficulties which have arisen, and no doubt they are. Advice has been obtained by the city and also by the architect, as to the legality of the proceedings they contemplated taking. Little can be said pending the trial of the suit brought by the contractor, but for the honor of all parties concerned, it is to be hoped that the matter may speedily be settled, and the work proceeded with, as thus far the court house has been fruitful of little else than trouble. One thing is certain, viz., that the stone is unfit for the position in which it has been placed. One of the questions which the courts will be called upon to decide, will be, who is to blame for the stone being built into the wall and left there for several months, and then found to be in a state of decay. Stone that will decay in so short a period could never, we should suppose, have been passed by an intelligent architect or clerk of works, or be used for face work by a competent builder. The matter may hinge upon the quality of the stone selected. It is understood that samples of stone were submitted by all the contractors who tendered for the work; it becomes a question whether or not a sufficient quantity of the stone chosen, of a quality similar to the sample, can be procured. This important information should certainly have been obtained before the contract was let. We understand that it is the contention of the architect, that there is sufficient stone of good quality to be had from the quarry from which the condemned stone was taken. The evidence on both sides of the dispute, will be looked for with much interest, and it is much to be desired that a final and satisfactory settlement of the difficulty will be the outcome.

The well-known architectural firm of Langley & Burke, Toronto, has been dissolved. Mr. Langley will continue the business of the firm, while Mr. Burke has assumed the business of the late W. G. Storm.

The Superintendent of Water Works, Toronto, recommends that in the future water be supplied free to builders. It having been found impossible to collect more than about fifty per cent. of the water rates charged against builders, it is deemed unfair to honest builders to continue the system.

In our August number was published the results of recent examinations of the Province of Quebec Association of Architects, together with copies of the examination papers. In this connection the fact should have been explained that these examinations were not to qualify persons for registration but simply to admit students to study. There were no candidates for registration.

It is in the perfection of the details of sanitary work, in the careful observance of every essential requisite that will promote cleanliness and exclude all health destroying elements, that the competent master plumber reveals his skill, and it is just in these very points that we look for the difference between good and bad plumbing.

ODDS AND ENDS.

IN building brick houses in positions where they are not protected by surrounding property do not forget that hollow walls will add greatly to the convenience of the occupiers. They will render the house cooler in summer and warmer in the winter, and will assist in materially in keeping the house dry. The cost of hollow walls is only very little higher than that of walls built solid.

* * *

During the hot weather that has prevailed of late it is of great importance in erecting buildings in stone or brick to thoroughly wet every stone or brick before it is laid. The water not only removes any dust that may have accumulated and would prevent the mortar adhering, but it causes a much better adherence between the bricks or stones and the mortar than would otherwise be the case, because of the tendency to suck up moisure in dry and hot weather. This may seem at first sight an item of little importance, but there is more in it than may appear.

* * *

What is the best paint for general iron work used in the construction of a building? Many prefer metallic paint, but experience has shown that for practical purposes nothing is better than red lead. The first cost is somewhat greater, but the increased durability renders it cheaper in the end. It should be added that the red lead should be applied directly to surface of the clean iron, not on top of a coat of oil or of metallic paint as is sometimes done.

* * *

A method of finishing doors and other woodwork that appears to be coming into favor is the following: The doors are of hardwood and are filled with a very dark filler; they are then polished in wax, when they present a semi-dull appearance that is somewhat pleasing. Ornamental headed nails made of white metal are then driven in the doors at regular intervals but in a way to form a somewhat elaborate design of scrolls. Each of the doors leading into the same hall are finished in different designs as far as the nails are concerned, but the prevailing color is the same throughout. The effect is very good.

* * *

A paragraph that went the rounds of the architectual press about a year or so ago was to the effect that in Norway the custom is, in building in winter, to use mortar while it is hot, after slaking, with the object of preventing the mortar from freezing before it has time to set hard. The item is plausible enough, but the usefulness of the information is destroyed by the fact that lime that evolves much heat is entirely unsuitable for the use of making good mortar.

* * *

Painting is perhaps less understood by builders and architects than other branches of the building trade. For instance in finishing in the natural wood specifications frequently call for shellac and two coats of varnish in jobs where such a finish is not required. Shellac is probably the best first coat for hard pine that there is, but is not too expensive for ordinary work. "Liquid filler" or surfacer is largely used as a substitute in the United States and gives general satisfaction while saving at least one third of the cost, because the liquid filler is practically a varnish although it contains silex, starch or other substance that fills up the pores of the wood and stops suction. A little point that is not generally known even among amoong painters is this: To produce the best results use liquid filler for the first coat and add about one third of the filler to the second coat. A third coat of varnish just as it comes from the cans will make a very good job. The writer recently saw a church the walls and ceiling of which were finished in pine that had been treated in the way described with very satisfactory results.

FIRE ESCAPES FOR PUBLIC BUILDINGS.

QUEBEC, AUGUST 19th, 1892.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—New York's and more recently Boston's new building law, as noticed and commented on in late issues of the New York *Engineering Record*, contain many pertinent provisions as to the safety of buildings against accidents by fire, or due to faulty construction; but I have not yet seen anything in in them or in those of any other city, which thoroughly provides for escape in case of fire, from the upper tiers or galleries of theaters, assembly and lecture halls, academies of music and the like, or from the upper floors or stories of factories, colleges, convents, asylums, hotels and boarding or even tenanted houses, nor, in a word, from any building where there are large assemblages of human beings and especially when the old and infirm have to be dealt with, as well as the helpless infant.

Regarding such buildings, a provision of the "Boston Act" is that they shall have from each apartment (which, of course, also means from each floor or story) two independent ways of egress, one of which shall be enclosed in brick walls and shall have no interior openings other than the doors of the apartments from which it is an exit.

Now there is certainly no absolute safety in this proviso of doors opening from the inside into said stairway; for even though the enclosure be of brick and the stairs of iron, stone or other incombustible material, and that flames from below could therefore not run up through such a stairway and endanger the floors above, still the fact of any communication at all between the stairway and the inside of the building would allow all of the heated air and gases from the burning portions of the building to pass upward through such a well or shaft, and thus effectually cut off retreat in that direction.

On the contrary, any direct communication between the interior and the stair-case should be studiously avoided. The stairs should only be reached by passing out from the apartment on to an outer unenclosed landing, or open to the sky, and thence to the stairway; and as I proposed some years ago in a paper read before Section III of the Royal Society, I am still of the opinion and maintain that there is no other solution possible in the case of escape from a single or double series of rooms in a hotel or boarding school, etc., opening on a corridor with stairways at each end thereof, allowing the heated air and smoke from below to ascend and fill the passages, thus cutting off escape in the direction of their length, than by egress from each and every rear window of each and every floor above the first or ground floor, by stepping over the sill on to a continuous iron balcony (narrow and with lattice floor not to obstruct light to the window below) communicating with the stair-way—one or more according to the extent—the occupants of the front rooms having only to cross the corridor and escape through the window of the rear room opposite their own.

These stair-ways when in the rear and leading down to an interior court enclosed on all sides, should communicate with the open, the front of the building of street, by a fire-proof passage-way leading from rear to front, and as such passage-ways need not necessarily be more than of mezanine height, the exterior could be reached and the street level attained by a short flight of iron steps, without in any way cutting off communication between any of the ground floor rooms or corridors.

The only argument I have heard adduced against these continuous balconies all around the interior courts of a hotel, is on the score of want of privacy in case of a person from any one of the rooms prying into a neighboring apartment; but as there is not supposed to be any attraction towards the rear, the difficulty might easily be got over by posting in each room among other rules and regulations to be followed by the guests, "No access to rear galleries allowed except in case of fire" with the addition of curtains or frosting to the lower half of sash to render peeping in a profitless endeavour.

Where, as in a theater or concert hall, escape must be looked for in the opposite direction or towards the street or exterior, the same continuous balconies or verandahs can be made an ornamental feature of the several facades, or of one or more of them on the level of each and every tier of inside gallaries or boxes, as lately done (I do not say in obedience to my suggestion, though sometime after I made it public) in a theater at Antwerp in Flanders, where each of the five tiers of inner galleries communicates by some 25 doors or openings radiating from the auditorium with a corresponding series of outer balconies reaching first tier level by fixed iron stair-ways, and thence the street by folding stairs immediately detachable on the mere pressure of a foot spring, or where the first tier level may easily be jumped from without danger to life or limb; the non-existence of fixed stairs from street level being of course a preventive against access to the building excepting through the ingress door where tickets of admission are collected.

Such a system of fire escape galleries and stairs and passages I have combuted not in any case to necessarily exceed from 3 to 5 per cent. of the total cost of any building it might be applied to.

CHAS. BAILLAIRGE, Architect, etc.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER).

Following is the Program of the annual meeting of the Province of Quebec Association of Architects to be held on the 28th and 29th of Sept., in the rooms of the Association, 186 St. James St.:—

Thursday, 28th.—Forenoon—Annual meeting at 10.00 a.m.—reading minutes, report, &c.; President's address; election of officers; other business. Afternoon—2.30—Reading of papers by members. Evening 8.00—Annual dinner at the City Club, St. James Street.

Friday, 29th, 10.00 a.m.—Meet at rooms of the Association and drive to Victoria Hospital, new buildings of McGill College, and new High School. Afternoon—Visiting art collections, buildings, &c., at discretion of members.

THE VERANDAH IN AUSTRALIAN DOMESTIC ARCHITECTURE.*

WHAT feature has more importance and prominence in the designs of our houses, or is a more useful adjunct to the necessary living and sleeping-rooms of the plan than the varandah? Such has been the effect of its constant use on the public mind that no matter how good a design is or how masterly its details, if the verandah is omitted or even in an unconspicuous position, the public object and say, "What a bare-looking building!" or "It looks more like a State school than a house." In treating of the subject one naturally divides it into two parts—first, the practical uses and position of the verandah with reference to the plan; secondly, its treatment as an architectural feature.

The position of the verandah in respect to aspect is one of the chief points for consideration under the first head. The protection of the northern and western walls and windows from the hot summer sun usually decides its position, although for a summer evening lounge the western aspect is absolutely useless. In the cooler weather it might be so used, especially if the prospect is good, although the northern aspect will always be found more serviceable. Besides affording a protection to a building from the heat of the summer sun the verandah also serves to shield the walls from driving rain, such as we had experience of last July, which seems capable of penetrating almost any exposed wall of ordinary thickness. In the use of verandahs for winter exposures it must be always borne in mind that every room in the house should, where possible, receive the sun's direct rays into it during some period of the day, and that the more the southern and eastern walls of a house are exposed to the light of day the healthier will the house be. I think that even the rooms facing north and west should be designed so as not to be too closely sheltered from direct light, and that some means of introducing light above the level of the verandah roof or by glass skylights in the roof (opposite the windows of the rooms) ought to be made use of on the darker sides of the house if covered by verandah or balcony. By such means, and the use of movable blinds or shutters, the lighting and cheerfulness of a room could be completely under control, and many rooms cold and dark in winter brightened and made more habitable, whilst features might be made of the lighting in such a way as to improve the design. An illustration of a house was published some time ago in a professional journal in which this plan was adopted. So far, I have only been taking into consideration the lean-to shade so generally adopted here which does duty both for a protection to the house, an open-air living room, and as often as not simply a source of pride to its owner, especially, I am sorry to say, if showing a lavish display of cast-iron vegetation. It is to our American cousins that we are indebted for the most thoughtful arrangement of the verandah as regards both practical use and appearance. In many cases it can hardly be called a verandah; "piazza" is the name they give it, and it forms what really is an open-air living-room of rectangular plan and independent roof. It is open on three sides, but can easily be enclosed at pleasure by means of blinds or shades. It is usually on a secluded side of the house and facing the garden, approached from a side-door or garden entrance, and has the advantage over our usual narrow form of being wide enough to allow all to sit face to face. For the summer weather nothing seems more adapted to this climate, and yet it has come very little into use, people preferring the long narrow strip of floor to the roomier plan. As to the balcony, although most of the foregoing applies to both verandah and balcony, it is of course not so much used as an open-air resort, being on the bedroom floor and in a more private position. It therefore may be of smaller area and accessible both from rooms and from some public thoroughfare. Its prospect, of course, will influence its position, but the protection it affords will be its chief use.

Having thus far only dealt with the verandah as a convenience, I will next turn to its treatment as an architectural feature, but before doing so would like to draw your attention to its appearance and use in the styles which are the basis of the architecture of the present day. It is not necessary to go further back than the Greek temples, the colonnades of which are familiar to you as their chief embellishment, as well as being a convenient shelter from sun or shower. The same, of course, are found in the Roman examples, sometimes in the form of a portico, and sometimes in the complete peripteral arrangement. In the houses we find the prototype of the Gothic cloisters in the peristylum, a central open court with a fountain in the centre and a covered colonnade all round, where sun or shade might be enjoyed at pleasure. This feature became the cloisters of the Gothic, in which the ecclesiastics took their exercise, and on which the Gothic architect displayed his most elegant taste, if not his highest genius. These are found connected with nearly all religious establishments of the Middle Ages, surrounding as they did in old Roman houses a central square or garden. These cloisters, or rather the arcades dividing the cloisters from the open squares, exhibit some of the finest examples of Romanesque, with their richly carved shafts and arches. The Moors, too, loaded this feature with a lavishness of ornament, brilliance of color and gracefulness of form that have been the admiration of us ever since. The private courtyard, with its surrounding cloister or arcades, remained in extensive use in Italy and Spain right throughout the Renaissance, as many of the palaces testify, whilst the external colonnade is also to be found, as for example in the Gothic palace of the Doges at Venice, and the later Renaissance of the library in the same square. Beyond its introduction in the porticoes of the Renaissance, the external use of this feature did not find much favor in England. Sunlight was too highly valued, and obstructions to it were avoided. There is, however, one very curious instance of its use to be found in Chester, where the first floor walls right along the streets are recessed some 8 or 9 feet back, making a covered walk which is continuous along the top of the ground-floor shops. The storeys above, which are supported on heavy wooden posts, keep the line of the ground floor and form a roof over the first floor balcony. This peculiar feature of Chester struck me as very curious when I first saw it, and as far as I know it is unique. It would be interesting to hear what was its origin if any present can explain it. It is in the East, in India, China, and Japan, however, that we have the most extensive use of the outside verandah. There its necessary application to the smaller buildings and houses brought it into use in simpler and lighter forms than we find in Europe. The materials, too, being less massive, tended to alter its appearance to a less imposing structure, and although the large temples and palaces were surrounded by ponderous pillars and elaborately-covered approaches the houses, especially in Japan and China, were of very light construction, little more than open-air verandahs or living-rooms separated and enclosed by screens and mats. From the architecture of these nations a good deal could be learnt as regards the design of picturesque and effective verandahs, which in their hands are always artistic and usefully simple.

As external features the verandah and balcony have great importance, many domestic buildings here carrying all their architecture on their verandahs, while their prominence and the strong effects of light and shade which they afford often make them the governing features of the design. In many of our larger mansions they form arcades or colonnades surrounding the building, with columns and orders of the same material as the main block and after the manner of the Italian Renaissance, and if of good design give an imposing and substantial appearance. They are seldom, however, treated with much picturesqueness in this style, and so have a formal and somewhat depressing effect (especially if carried out in stucco), which suggests a similarly formal interior. The less stiff intermixture of Classic detail and Gothic grouping which we find so picturesquely blended in the later Elizabethan architecture of such buildings as Holland House,

* From a paper by Mr. W. M. Campbell, read at a meeting of the Victorian Institute of Architects, and published in the *Australasian Builder*.

where the arcaded verandah is extensively used, should afford some useful hints as to how to treat our large houses with piquancy as well as dignity. The most objectionable form that this most useful adjunct to a house has taken, and one peculiarly Australian, is that in which ornamental cast-iron is such an important factor. Every portion of these erections is as a rule a jar of the artistic nerve. When one comes across such examples as I have sometimes had the fortune to meet with in my walks, as, for instance, brackets composed of a few ragged cast-iron leaves, painted a brilliant green and forming a perch for a cast-iron cockatoo in natural colors; or, what is more common still, a verandah front representing a sort of nightmare of Ferntree Gully, one begins to look apprehensively at the gardens in fear of alighting on a crop of cast-iron shrubs. I do not wish you to understand that I think that cast-iron is a material which cannot be treated artistically, though as a matter of fact it very seldom is, and never when any attempt is made to copy the delicate and flexible forms of nature. The necessary slenderness of the supports, and the wide spacing of the posts, make a design in this material structurally unpleasant to the trained eye. From the consideration of this class of design, which will doubtless hold its own in this city for a long time to come, one can turn with relief to the simpler and less pretentious forms which are now beginning to show themselves in our suburbs. Of these developments one of the principal is that of the bungalow form, in which the sloping roof of the house is continued to cover the verandah also. With these designs the posts require to be simpler and heavy with simple cut brackets in keeping with the style. In this style, too, I should prefer to see a change in slope of the roof at the junction of the verandah and house roofs, to accentuate the position of the house walls and to take the apparent weight of the roof off the verandah posts. Glancing at some of the designs published in the American journals we find great variety of treatment, from the heavy roof supported on rough stone piers to the elegant Classic wooden columns and orders developed from the early colonial architecture of the country, and all having a substantial and well-designed appearance, so often wanting in the work here. In some cases the treatment of the verandah seems too fussy and the striving after the picturesque too obvious to be altogether pleasing, but there is great originality and careful thought shown in a great number of designs. It is noticeable that the continuous balcony is not a common feature, with the result that the main building stands up boldly, and is an object for architectural treatment of the boldest kind, whilst the verandah roofs coming lower down give greater protection and allow of better proportions than when the balcony is introduced. In the American work there is much more unity in design between house and verandah than is usually to be found in the work, resulting to a great extent from the substantial manner in which the former is carried out.

INCANDESCENT WIRING.

By C. W. Swoope.

THE proper installation of wires for carrying electric currents is a subject which has engaged considerable attention ever since electric lighting first became practical. Since this time it is of course natural that there have been progression and improvements in the methods of electrical distribution, as well as the manner of insulating the conductors. Insulation is the vital principle of the subject, and all efforts, which indeed have been many, interesting, and expensive, have been tending towards a perfect bridling of the "subtle fluid." For ordinary currents and voltages the present methods come very close to the object, but the subject is still fresh and unsolved in the minds of those experimenting with alternating currents of high potentials. The question is still asked by property owners, architects and builders, "Can electric lights be satisfactorily installed with safety from fire," and the answer comes without hesitation, "yes, if the underwriters, requirements are strictly fulfilled and the installation is put in by competent parties using the most modern appliances and material." Verily "competition has been the life of the electrical trade" in its true branches, especially in the manufacture of appliances and construction work, the former producing many forms and grades of apparatus to answer a single purpose, and the latter various modes of installation. Nearly all the difficulties and troubles in electric lighting stations or consumers' houses have been caused by defective wiring, and upon this part of the system more than upon any other depends the success of the service. It is all well enough to require bids for this house or that, from the various contractors for the purpose of reducing the cost of wiring, fitting, etc., but the weak point heretofore has been not so strict specification requiring any special standard or systematic method of installation has been required. The consequence is that each contractor bids upon his own ideas of material, distribution and installation, the man performing the work for the least money generally being the successful competitor, which in many cases means, inferior material, poor workmanship and dissatisfaction. The insulation upon wires has been much improved in late years. In the early days of electric lighting wires were covered with cotton and coated with paraffine, much resembling our present bell wire, but this was found to be very inflammable, and in a short time it was replaced by a wire covered with cotton and white lead, and which is still known as Underwriter's wire, being then accepted by that body as a fire proof insulation and hence supposed to be safe. Later, however, it was found that it absorbed considerable moisture, causing leakage and fire by this means. "Protection against moisture meant prevention of fire," and accordingly our various rubber compound coverings made their appearance, and have developed into first-class but in some cases costly insulations. The tendency of the present time is not to place such expensive coverings upon wires, but to run them in conduits or tubes, which are lined with an insulating compound and covered with a metallic covering, protection from surrounding bodies being an insulation, as the word itself implies, bare wires of course being possible if entirely insolated. Wires were first run in tin or lead tubes, then cleated with wooden cleats or iron staples to girders, ceilings, walls, etc., in a promiscuous manner; later they were encased in wooden mouldings, or run upon porcelain insulators. Now, our standard wiring, from the points of safety, convenience, economy and, above all, accessibility, is undoubtedly the system of tubes or interior conduits. This is by far the safest and most reliable system, as a house can be tubed from top to bottom, with all necessary junction boxes impanneled in the walls, and the wires drawn through after the building has been completed, thus avoiding any broken wires, cut by nails or the plasterer's trowel. The advantages are many and obvious; the increased insulation or protection at a moderate expense, and the accessibility to all lines of repairs or removal, as one wire may be drawn from a tube and another readily inserted. The system of laying the tubes in a systematic manner is certainly a great advantage over the old way of running the wires in any direction, the rule generally being remembered that "a straight line is the shortest distance between two points," and, of course, requires the minimum amount of wire. The tubes are run in much the same manner as a line of gas or water pipes, and all forms of elbows, couplings, connectors, etc., are made for the various bends, turns, etc. With such a system the contractors are compelled to bid upon and furnish standard appliances and apparatus, the work is done in a more systematic manner and satisfaction and better service results. —*Electricity.*

PERSONAL.

Messrs. W. J. Borroughes and Joseph Wright, two representative plumbers of Toronto, were recent visitors to New-York.

Mr. Hamilton Killaly, C. E., who for many years was employed by the Dominion Government on the St. Lawrence canals, died a few days ago at Morrisburg, Ont.

The *Evangelical Churchman* pays the following tribute to the Christian worth of the late W. G. Storm: "It is not chiefly as a prominent and successful architect that we desire now to speak of him. It is rather as a Christian man. He was a member of the Church of the Redeemer, and at the time of his death was one of its lay delegates to the Synod. He took the deepest interest in all church matters. In his own church he was a zealous worker in connection with the St. Andrew's Brotherhood, and delighted in helping and encouraging his younger brethren to fight the good fight of faith. In that work his loss will be keenly felt. Mr. Storm was a strong advocate of temperance principles, and many a poor victim of the alcoholic temptation has found in him a sympathetic friend and helper. No one knows the amount of quiet good he has done in behalf of the helpless and needy. We extend our heartiest sympathy to his widow and family in their great affliction."

The Burlington Pressed Brick and Terra Cotta Company (limited), has been incorporated with a capital of $30,000.

HAMILTON

THERE is a fair amount of work going on here and prospects are rather encouraging. Messrs. Wood, Vallance & Co. will erect a large hardware ware-house at the corner of Hughson and King William Sts., under the direction of Architect Stewart.

There is some talk of putting up an office building on the corner of James and Main Sts., where at present there are some old wooden shanties which badly need pulling down. Architect Hills is putting up a weigh house at the John St. Market. Architect Balfour is going to put up a Grand Stand for the Hamilton Jocky Club to seat about 2,000 people, and also a Road and Club House.

The remodelling of the Grand Opera House is nearly completed. The accomodation will be largely increased, and for the amount of money expended the effect will be fairly good, but the carving is lifeless and too coarse. In some places where it is only a few feet from the spectator, it is coarse enough for the top of the building, and the faces of dramatic and musical celebrities are mere caricatures. It is a great mistake to introduce the human figure in carving unless it is going to be executed thoroughly well.

Mr. Geo. Tuckett's large residence on Queen St. is rapidly rising from the ground and looks very well; the carving, however, is so far disappointing; it has the common fault of being too coarse and lacks spirit. It is mostly in "Victorian Gothic" style with a little Italian Renaissance thrown in as it were, a rather incongruous medley!

Architect Mills is building a Sunday School for Zion Tabernacle at the corner of Pearl and Napier Sts., which is nearly completed.

There are a number of private residences being erected in all parts of the city.

CONDITIONS OF CONTRACT.

THE following conditions of contract have been adopted by the Queensland Institute of Architects and Queensland Builders, and Contractors' Association:

1. In the construction of these conditions and specifications, the singular number of the following words—namely, "employer," "contractor," "architect"—shall, where necessary, be taken to include the plural; the word "employer" shall mean the person or persons entering into the agreement with the "contractor"; the word "architect" shall mean the architect or firm of architects entrusted with supervision of the works.

2. The contractor, unless otherwise directed by the architect, is to provide all plant, scaffolding, tools, labour, and materials necessary for the due and proper execution of the several works included in this contract, according to the true intent and meaning of the drawings and specification taken together.

3. The architect during the progress of the works shall be the sole judge of all matters arising out of the contract, so far as relates to the quality of materials and workmanship, the interpretation and meaning of the plans and specification, the rate of progress, and the general management of the works; and against his decision, provided it be just and impartial, there shall be no appeal. Wherever the dimensions are written or printed upon the drawings, such dimensions shall be taken in preference to the measurement by scale. In the event of any discrepancy between the drawings and specification the architect is to decide which shall be followed.

4. The whole of the works comprised in this contract shall be executed with materials of approved quality of their several kinds, in the most substantial and workmanlike manner, and to the entire satisfaction of the architect.

5. All work and materials deposited on the ground, adjoining ground, or pathway by the contractor or by his order, for the purpose of forming part of the works, and on which an advance has been made, are to be considered the property of the employer, and the same are not to be removed or taken away by the contractor or any other person without the written consent of the architect. The employer is not to be in any way answerable for any loss or damage which may happen to any such work or materials, either by the same being lost or stolen or injured by weather or otherwise.

6. Should any workmanship not in accordance with plans and specification, or materials of improper or inferior description be introduced in any part of the works, the contractor shall, upon receiving the architect's written instructions, cause such workmanship or materials to be removed; and if the instructions so given shall not have been carried out within the time stated for that purpose, the architect may employ other persons to remove the objectionable workmanship or materials; and all expenses, loss, or damage thereby incurred shall be charged against the contractor, and be deducted from any money due or that may become due to him.

7. The architect shall have power from time to time, but only by an order in writing, to make any alteration, whether additions or deductions from the works as set forth in the accompanying drawings and specification. In the event of any such alterations being made, the contract shall not be vitiated, but the value thereof, if not previously agreed upon, shall be fairly and justly fixed by the architect in accordance with the schedule of prices annexed, if any, or where same may not apply, at fair measure and value In case of disagreement between the architect and contractor as to the value of such alteration, advantage may be taken of the "arbitration clause" hereinafter provided.

8. The building from the commencement of the works to the completion of same is to be under the contractor's charge; he will be held responsible for, and must make good all damages occasioned by any cause whatsoever, except such damages be caused by lightning, unusual floods, or earthquakes (provided such damage does not arise through any neglect of the contractor), and he is to hold his employer harmless from any claime for injuries to persons, or for damage to property through his neglect.

9. The contractor is to insure the building in an approved office, in the joint names of the employer and contractor, against loss or damage by fire, for the full amount of the contract, as soon as the building shall be covered in (or in the case of wooden buildings, as soon as the framework is erected), and must lodge with the architect the policies or "cover notes," and receipts for the premiums for such insurance. All money received under any such policies are to be applied in or towards the rebuilding or reparation of the works destroyed or injured. In case of neglect on the part of the contractor to insure, the employer may do so and deduct the amount of the premiums paid from any moneys due to the contractor.

10. The contractor shall not absent himself from the works without having a fully authorized and competent foreman or agent to act on his behalf. Any notice or order given to or served upon such foreman or agent, shall be considered as served upon the contractor, who will be held personally responsible for his proceedings and acts.

11. The contractor shall not sublet the work or any part thereof, without the permission of the architect. The architect may order the discharge of any workman for misconduct or incompetency, and such order shall be immediately acted upon by the contractor.

12. The contractor will be held liable for all violations of law caused by obstructing streets, side-walks, etc. He must give to the local authorities all requisite notices, and must obtain official licenses for hoarding enclosures, opening into common sewers, etc., and pay all proper and legal fees and charges. The contractor must keep up lights, etc., as required, construct proper enclosures, fences, and walks, for the protection and convenience of the public during the progress of the works. In case of any necessary excavation, the contractor must give due notice thereof to the proprietor of his agent, as also to the occupier of the immediately adjoining premises, and he will be bound to make good any damage that may be caused to such adjoining premises or buildings.

13. The contractor shall set out all the works comprised in this contract, but the employer shall survey and peg out the boundaries of the land on which the buildings are to be erected, and point out to the contractor prior to the commencement of the works all such surveys, boundaries and pegs.

14. Should the contractor not commence operations within seven days after the date of signing the contract, or should it at any time appear to the architect that there are not sufficient workmen engaged upon the works, or that there is not sufficient material upon the ground to enable the works to be completed by the specified time, the contractor shall, within 48 hours after receiving notice in writing from the architect, commence operations, or cause such number of competent workmen to be employed, or such quantity of material to be placed upon the site as he may direct. Should the contractor refuse or neglect to commence operations, or to employ such additional workmen, or to place such quantity of material on the site, or at any time during the progress of the works refuse or decline to execute anything set forth in the drawings and specification, or that may be ordered by the architect as necessary for the proper execution of the works, the employer, by the architect, may, after giving three days notice to the contractor, take possession of the works and adopt such means as may seem best for the completion thereof. The costs so incurred in finishing the works with all charges for overtime shall be borne and paid by the contractor, and shall be deducted from any moneys due, or that may become due to him.

15. If the contractor shall become bankrupt, or compound with or make any assignment for the benefit of his creditors, or shall suspend or delay the performance of his part of the contract, the employer, by the architect, may give to the contractor or his sureties, or assignee, or trustee as the case may be, notice requiring the works to be proceeded with, and in case of default on part of the contractor, or his sureties, or assignee, or trustee, for a period of — days, it shall be lawful for the employer, by the architect to enter upon and take possession of the works, and to employ any other person or persons to carry on and complete the same, and to authorize him or them to use the plant, materials, and property of the contractor upon the works, and the cost and charges incurred in any way in carrying on and completing the said works are to be paid to the employer by the contractor, or may be set

off by the employer against any money due, or that may become due to the contractor.

16. The contractor is to complete and deliver up the whole works which are included in this contract on or before the——day of——; in default thereof he shall become liable for the sum of —— per —— for each and every ——that the work remains unfinished or undelivered after the said——day of——provided that possession of the premises be given the contractor, and lines and levels of the building furnished him, within——days of the acceptance of tender. All such sums to be deducted from the balance due and charged as by the way of liquidated and ascertained damages for delay of the works, or for cause of damages as per clause 8, and not as a penalty. Reasonable allowance in the time for completion of contract shall be made for delay of works on account of bad weather, legal holidays, and strikes amongst the workmen employed.

17. Payment shall be made to the contractor at intervals during the progress of the work, as follows—viz., upon the certificate of the architect, at the rate of——per cent. upon the value of the work actually executed. The remaining——per cent. shall be paid after the architect has certified that the contractor has executed and completed the work to his satisfaction, except a sum equal to 2½ per cent. on the total amount of the contract, which shall be retained for a period of——weeks from the date of the last or final certificate in order to ensure the execution of any reinstating of improper or defective work that may be required by the architect during the above period; such reinstating shall be performed to the satisfaction of the architect before the contractor shall be entitled to receive the said balance of 2½ per cent. No payment whatsoever, whether progressive or final, will be made except upon the certificate of the architect.

18. No progressive certificate is to cover or relieve the contractor from his liability under the provisions of clause No. 6, whether or not the same be certified by the architect at the time of or subsequently to granting any such certificate.

19. The certificates for payment of instalments are to be payable at sight by the employer, and the contractor shall, in addition to his right of his immediate action on nonpayment of any such certificates, have also the following rights and remedies:

1. If the employer shall make default in paying any moneys to which the contractor may become entitled for seven days after the certificate of the architect has been presented to the employer for payment; or

2. If the work be delayed 28 days for or by reason of or under any legal proceedings taken by any other parties and not being caused by the neglect, default, or laches of the contractor, or seeking any remedy or claiming injunction in consequence of any neglect, default, or laches of the contractor, the contractor is to be at liberty at his option to suspend the works, and to require payment for all works executed, and all materials wrought up, and for any loss which he may have sustained upon any goods or materials purchased for the works, and in such case the contractor is not to be bound to proceed further with the works contracted for. The contractor is to be entitled to bank interest upon all moneys payable to him, payment of which may have been unduly delayed.

20. All drawings and papers whatever supplied by the architect, are to be kept by the contractor on the works; and the contractor hereby undertakes not unnecessarily to expose or use them for any other purpose whatever than that for which they are held in trust by him—viz., the execution of the works contracted for; and, further, that he will, upon receiving his final certificate, return all such drawings and papers to the architect.

21. In case any dispute shall arise between the employer, or the architect on his behalf, and the contractor touching the value of any alterations, additions, or deductions, as referred to in clause 7, or as to sums to be deducted as liquidated damages for overtime, see clause 16, or as to cause of damages to works referred to under clause 8, the dispute shall be referred to the decision of two arbitrators, one of whom shall be a fellow of the Queensland Institute of Architects, and the other a member of the Builders and Contractors' Association of Queensland, with power to appoint an umpire. The decision of any two of the arbitrators, or of the umpire, shall be final and binding upon all parties concerned, and from it there shall be no appeal. The award is to be made within seven days, or such extended period as the arbitrators may decide upon from the date of submission, and it shall direct by whom and in what proportion the costs of such arbitration shall be paid.

22. In case the contractor or employer should neglect to appoint an arbitrator within one calendar month next after a request duly made, or after the time specified for the appointment of the arbitrators and determination of the matter as aforesaid, the employer or the contractor, as the case may be, may appoint an arbitrator on behalf of the other party, and the arbitrator so appointed shall have the same powers and authorities as if he had been appointed by the contractor or the employer, as the case may be. Forthwith upon the appointment of the arbitrators they shall proceed to hear and determine the matter so referred to arbitration.

23. This submission to reference, and the award thereon, shall become a rule of the Supreme Court of Queensland on the application of either party to this contract.

These are conditions referred to in the annexed agreement, made on the ——day of——between the undersigned for——

In the presence of——

The Toronto Pressed Brick Co, the Ontario Terra Cotta and Brick Co., and Messrs. Taylor Bros., of Toronto, had each a very creditable exhibit at the Industrial Fair. The last mentioned Company also exhibited samples of glazed bricks in various colors of their own manufacture.

MANUFACTURES AND MATERIALS

POROUS TERRA COTTA.

Terra cotta for fireproofing does not appear to be as extensively used in England as has been the case here, observes *Architecture and Building*. We note that special mention is made of an experiment made last month at Bishop's Waltham Hants. The experiment was made in a little building of the dimensions of one room of an ordinary house, with brick sides and a terra cotta floor above, the pieces being so dovetailed as to render it almost hermetically sealed. The floor was reached by means of a wide stair case, with an ornamental balustrade, resembling that of carved oak. In the room below faggots of wood were piled up to the ceiling. Round these at the bottom were placed tar barrels, with a layer of straw. The mass was set on fire and the fire burnt with great intensity. While this was going on most of the visitors ascended the staircase and stood on the floor, feeling the slabs from time to time to see if the heat was making any impression on them, but throughout the whole trial they maintained almost the same temperature, being quite cold. By-and by the fierce flames lapped themselves round the staircase, cutting off retreat by that way, and had it been constructed of wood short work would have been made of it. However, beyond being slightly blackened with smoke, it remained as impassive as the floor above. The room was one mass of white heat, resembling in color molten lead. Had the floor fallen in at that time cremation would have been the fate of those in it. The party remained on the roof from half to three quarters of an hour a sufficient period to put the experiment to the severest test and so little had they felt the heat below that many shivered with cold. Immediately the visitors descended, a large number of the workmen and boys ran up the stairs and jumped about on the floor, which apparently had not in any way been affected by the great heat, though the fire continued to burn for a considerable time afterward. This porous terra cotta fire proofing material, which is being extensively manufactured at Deseronto, Ont., has gone largely into use in the erection of important buildings in Montreal and Toronto, during the last three years. It may be used to equal advantage in connection with brick, stone or wooden construction.

QUALITY OF BRICK.

Three main points with reference to brick have to be taken into account, says *The Brickmaker*. 1, The power of resistance under pressure; 2, the appearance of the fracture, which should present an even texture, and a fine brilliant grain, without cavities in the interior, and neither ribbony nor stony; 3, the exterior, which should be smooth and regular, the angles and edges sharp and straight. When the size of the brick is equal throughout the mass it is a proof that the brick earth has been well prepared and the brick generally well made. A brick, when struck, should give forth a clear, ringing sound. Good brick are generally of a dark reddish brown color, and sometimes they show vitrified spots on the surface; it is not well, however, to depend too much on the last fact, for it is often only an indication of the amount of heat to which the brick has been subjected, while the clay of which the brick is made may be impure and ill prepared.

Bad brick are readily recognized by their reddish yellow color, but still more by the dull sound which they emit when struck; their grain being soft, they crumble easily and absorb water with avidity. A good brick should not absorb more than one fifteenth of its own weight of water; it should appear and, in reality, be dry. A brick that does not take up any water at all is too much burnt; the mortar adheres to it imperfectly, but is a good conductor of heat. Such brick may be used in damp soil and for pavements. When a brick left in water, either scales or swells, it is of bad quality and contains caustic lime. A brick which being made red hot, and then having water poured on it, does not crack, is of extraordinary and rare quality, and those which have borne the effect of moisture and dryness during two or three winters without scaling or cracking, are excellent.

In order to try if brick will bear the effect of frost, let one be boiled for half an hour in a solution of sulphate of soda saturated cold, and then suspended by a string over the vessel in which it has been boiled. In twenty-four hours the surface of the brick will be covered with small crystals; the brick is then to be immersed again in solution until the crystals disappear, and again suspended; repeating this operation for five days, the crystals reforming after each immersion. If after this treatment a number of particles of the brick are found at the bottom of the vessel containing the solution, the brick are incapable of withstanding the effects of frost.

IMPORTED VS. AMERICAN CEMENTS.

Sackville, N. B., August 25th, 1892.

Editor Canadian Architect and Builder.

Sir,—I sincerely trust that the Government will not impose a higher duty on imported English cement; at present it is protected by a duty of 40 cents per barrel. The statement published by you of the failure and deterioration by age of Portland cement is not in accord with my 40 years experience. I have the statement of a very reliable firm of cement manufacturers, that buildings erected with their cement have been subjected to great wear and tear for more than 80 years and are still intact. The cement manufactured by this firm was used in the following lighthouses (as a rule a lighthouse is more exposed to the action of the sea and atmosphere than perhaps any other class of work): The new Eddystone, Bishop's Rock, Watling Island, The Sombrero, St. Catherines, The Minicoy (China), Dondra Head, The Welmadhwa, Ceylon, and no complaints of the failure of the cement have ever reached the manufacturer.

I have had American cement signally fail, putting me to great expense and inconvenience. I certainly will not try it again, at the head of the Bay of Fundy at least.

Yours truly,

Rich C. Boxall, C. E.

SANITATION, HEATING, LIGHTING

ELECTRIC HEATING.

Some interesting and successful experiments in the line of heating by electricity have been in progress at Ottawa, Ont., for nearly a year past. The apparatus employed is the invention of Mr. Ahearn, general manager of the Ottawa Electric Street Railway. We reproduce from the *Western Electrician*, the following particulars and illustrations of the apparatus:

A cross-section of the electric boiler for car heating is shown in detail in Fig. 1. It consists of a shell or tube 2 of oval cross-section, within which is placed another similar but smaller shell

Fig. 1.

3, the two having their ends suitably joined to form a water space between them, nozzles being provided for the circulating pipes. The vessel thus formed has its exterior surfaces insulated with strips of asbestos 4. A core, 5, also insulated with strips of asbestos, and wound with a resistance coil R of German silver inserted in the inner vacant space of the shell 3, and is of such a size as to press the wires R against the insulation of the shell 3. A similar resistance coil R is also wound upon the insulated shell 2, the terminals of the coils projecting. The vessel thus formed is placed in a casing 6, the terminals of the coils passing through insulators, and all the vacant spaces inside the casing being filled with powdered whiting. This casing is then wrapped in sheets of asbestos and inclosed in a wooden box secured to the under side of the car floor. Two of the boilers are used in each car, being placed in diagonally opposite corners, each supplying a set of circulating pipes. The resistance coils are placed within the car circuit. The nozzle in the upper side of the boiler

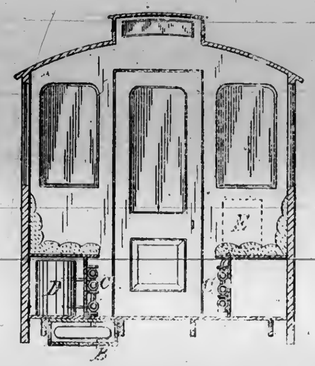


Fig. 2.

is connected with an upright supply pipe; from this the radiating pipes C branch off, running to the other end of the car, where they are connected with another upright pipe. From this last mentioned upright pipe a return pipe passes through the floor and enters the boiler by the lower nozzle. A water reservoir D is placed under the seat and communicates with the flow and return pipes to keep the circulating pipes full of water and to compensate for evaporation. An expansion tank E is placed at the end, away from the boiler, one in each set of pipes. This tank being high and flat, is concealed in the end panel of the car, and it provides for the variations in the level of the car and the water.

The liquid heater shown in Fig. 3 was next devised. This heater is of handsome design, with a water glass on its side showing the height of the water within it. This type is wound for all voltages, and has, it is stated, been used for the last three months with most satisfactory results by patrons of the Chaudiere Electric Light Company of Ottawa, which company uses the Westinghouse alternating system. These heaters are used by barbers, druggists and for domestic purposes. A livery stable keeper uses a three gallon heater, the hot water being

Fig. 3.

Fig. 4.

applied to clean harness and bathe horses' feet. The heater shown in Fig. 3 requires 3½ amperes at 50 volts. Such is its construction that when in use in barber shops the water in it is found sufficiently hot for shaving in the morning, although the current has been off all night.

In March last Mr. Ahearn had constructed and put in operation in the residence of ex-Alderman Johnstone the electric furnace shown in Fig. 5. This outfit has been in successful and and continuous operation since being installed, and has attracted much attention. The large coal furnace abandoned for the small perpendicular electric furnace shown in Fig. 5 suggests immense possibilities for electric heating. The heated water passes upward into the 63 gallon tank in the corner, from which it flows to the two upper stories of Mr. Johnstone's residence, supplying three bathrooms and one kitchen sink. The fact that

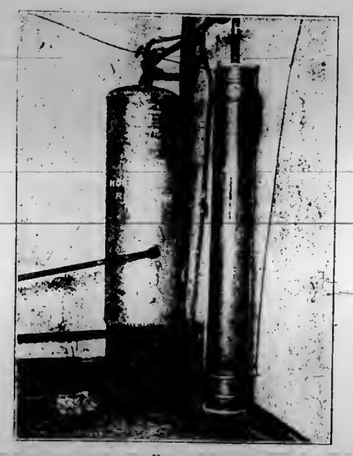


Fig. 5.

hot water is being constantly drawn off, and cold water taking its place, is a much more severe test upon the furnace than if the water was being used for heating purposes only, as in the latter case the water is being circulated always. Mr. Ahearn has applied this principle to the hot water apparatus employed for car heating.

Mr. Ahearn, proposes this year to equip all the cars, the car shops and the new power house, with his new system of electric hot water heating. He has also arranged with C. F. Sise,

president of the Bell Telephone company of Canada, to heat the new telephone building now being erected in Ottawa. This installation alone will require 6,000 feet of pipe. For this undertaking the 50 volt alternating current will be used.

THE SANITARY CONDITION OF TORONTO.

THE pollution of Toronto Bay by sewage, the filthy condition of Ashbridge's Bay, and the existence of twelve thousand privy pits within the municipal boundaries, have been a standing menace to the health of the citizens of Toronto for several years past. From the Local and Provincial Boards of Health, the medical profession, and citizens having at heart the city's welfare, have come to the Council repeated and urgent requests for the removal of these nuisances. Typhoid and diphtheria have been unusually prevalent of late, and notwithstanding there was the possibility of cholera reaching this country, a deaf ear was turned to the appeals for sanitary improvement. Now that cholera has actually found its way almost to our doors, the insanitary state of the city invites it to take up its abode and carry on its dreadful work in our midst. In view of the near approach of cold weather, there is a probability that the disease may not attack the city for some months. Advantage should be taken of this period to rid the bay of its foul contents and construct an intercepting sewer along the water front to discharge the sewage at a safe distance from the city. The privy pits, which are undoubtedly the source of most danger, should be closed up as fast as possible, and pending their extinction, should be cleaned at frequent intervals. The city's finances have been largely drawn upon of late for public improvements, but no false economy should be permitted to stand in the way of whatever expenditure may be required to guard the public health.

WATER AND WASTE PIPES.

THE leakage of water pipes behind decorated walls and in fine ceilings is a sufficient argument against casing or covering service-pipes. The repairs are generally costly in themselves; and they entail the additional services of the carpenter and decorator, as well as those of the plumber. Pipes in casings, or set in walls or partitions, as they pass from floor to floor, provide especially inviting runaways for mice, rats and vermin of all kinds. Nests are built in these places; scraps of paper, rags and food are carried into them, and they become filthy. It is only necessary to remove a covering board from almost any casing to prove this point in a most convincing manner. Even those in comparatively new buildings will be found surprisingly foul.

These casings, recesses or wall-pockets, as the case may be, serve another and usually very unexpected purpose. They act as ventilators, and distribute odors from the kitchen and cellar to all parts of the building. In the performance of this duty they are faithful and impartial. The hollow walls and floors which are nearly universal in the American system of construction greatly assist in this work. Many of the fine French flats which were first erected in the city of New York are now rented with difficulty, owing to the odors which prevade them. When shut up for a short time they are almost unbearable. Rents have of necessity been reduced to one-third the original figures, from this reason alone. The cause is usually found in the careless and ignorant arrangement of pipes and their cases. The odors from the kitchens are carried everywhere. Stale odors from closets and from food from kitchens and garbage-boxes are mingled and distributed with perfect fairness to all the occupants. The large air-shafts, usually held responsible for this state of things, have very little to do with it. The casings open at the ceiling of each kitchen, communicate with all the floor and wall spaces, and usually take their supply of odors from a point very near the range. All of them are directly connected with the cellar, and usually start in some way from the janitor's kitchen.

Numberless complaints coming from new flats of sewer-gas are finally traced to the odors of cabbage, turnips, ham, onions, etc., which have come from the janitor's kitchen. In many buildings this kitchen is directly under the parlor of the first-floor apartment, and is separated from it by one thickness of boards and an inch of plastering. That there should be foul smells on the first floor is not to be wondered at. Tests of the plumbing in these cases are made, and its profection proved.

There is nothing to be said upon the other side of the question. There are no good reasons for putting pipes out of sight. When people say, in the face of these facts, that they can't bear the suggestiveness of having the pipes where they are visible, they make an acknowledgement that they prefer hidden filth, danger to life, health and property, to a right construction. Life and health cannot induce them to accept and frankly tolerate their plumbing work.

Pipes carried openly through a building are not dangerous because their condition can be constantly observed. If accidents occur, the point at which the break takes place can be reached at once and repairs easily made. The quality of the work gains materially, because the plumber takes pride in putting up work which is to be exposed. He has a natural and very justifiable pride in having the workmanship creditable to himself. This pride is increased by certain traditions of the trade, and there is a double gain to owner and occupant.

Exposed pipes may be made to pass through floors without leaving an an opening. The floor around the pipe can be made perfectly tight, and the passage of odors cut off completely—at least, as perfectly as the nature of plaster will permit. This is an enormous gain, while the runaways for rats and mice, roaches and water-bugs, are entirely done away with. These vermin can then be exterminated. This is practically an impossibility in houses where casings protect them and afford perfect breeding-places. Cut off from free passage to all parts of the houses, they prefer more congenial quarters, where rapid transit and fields for colonization are provided.

As decorative features of the rooms, cast-iron pipes at least are often treated in a beautiful way. The body of the pipe is colored a very dark-bluish gray, scarcely removed from black. The bands are silver or nickel bronzed, or have silver or nickel leaf applied to them. Occasionally the whole pipe is finished with two or three shades of bronze. Lead and wrought-iron pipe receive somewhat similar treatment. The lead is often polished and varnished. There is, however, no difficulty in making the decoration of the pipes strikingly effective.

It is satisfactory to know that architects and builders are beginning to break away from the old custom, and expose their pipes wherever the prejudices of the owners can be overcome. Some of the best men in the profession are treating the plumbing work in a manner to show constructively its importance and value. The result is a great gain both to owner and occupant.—*Mechanical News.*

BRASS FOR DECORATIVE PURPOSES.

THE toughness of brass, allowing of economy of material in its use, so securing lightness of construction, together with its brilliant, enlivening appearance, has maintained it in constant favour for various articles of household furniture, while in chased, engraved and repoussé designs, cut open work and in the round, hammered or cast, it has become an important factor in interior decoration, the more so that it tends to harmonize neighbouring colors, as well as to form effective contrasts with hard woods, whether light or dark.

Its scope has been enlarged by the variety of tints given to it by certain superadded elements in the fusion of copper and zinc. Among these are golden orange, greyish green, violet moiré, olive and olive green, and brownish and reddish hues of different intensities, to which is to be added the effect of fire gliding, the peculiar lustre occasioned by which is altogether different from that resulting from the mere application of gold leaf to a metallic or other surface.

Decorative devices include antique or fanciful or ideal figures—human, animal or legendary—masques, flowering plants, arabesques, scrap and scroll work. In furniture, brass is utilised for tables or their supports, fire screen frames, chandeliers, candelabras, brackets, lamps, picture and mirror frames, fire dogs, cabinet mountings and so forth. Key plates, handles of doors, central ornaments and corner pieces for panels, usually in cast relief or incised ornament, are included in the general uses to which it is put. Decorative brass requires for its best effect prooounced designs free from complexity. Objects from nature when represented in this metal are commonly conventionalised selections being made of prominent characteristics.

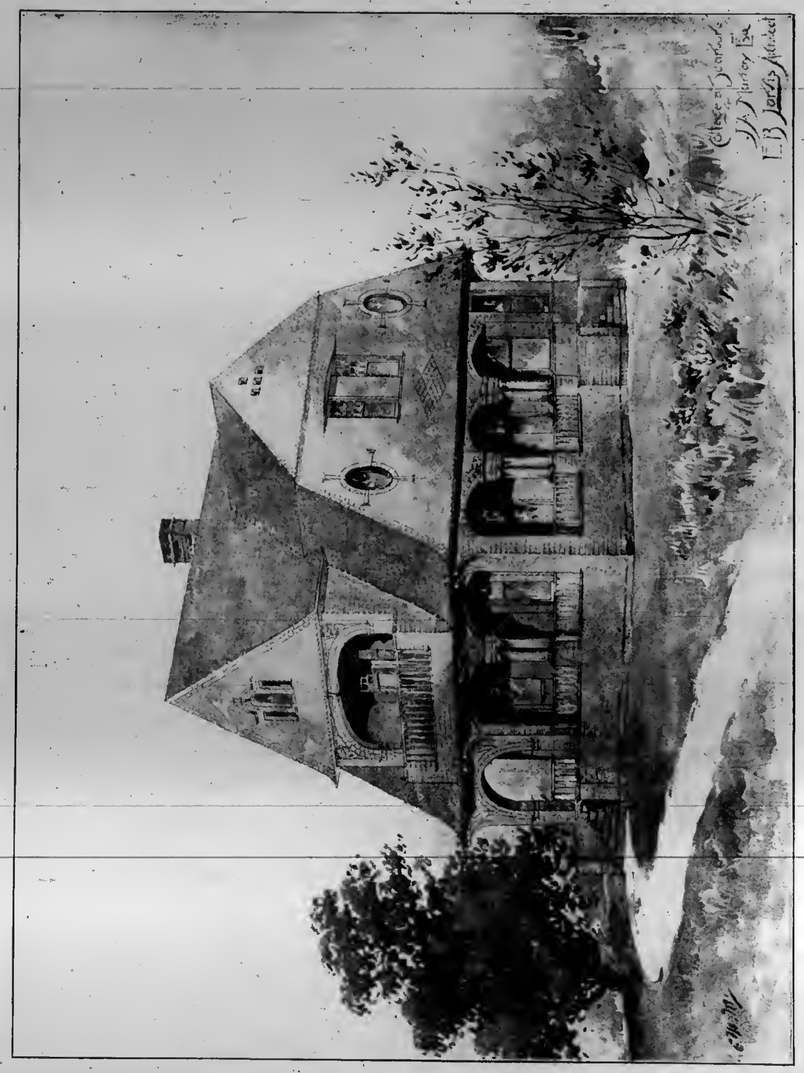
The Italian preference for carving and sculpture over working in metals left brass in abeyance in the period of Italian Renaissance, but it was otherwise in that splendid outburst of artistic power, the French Renaissance, when this metal obtained full recognition.—*Furniture and Decoration.*

QUERIES AND ANSWERS.

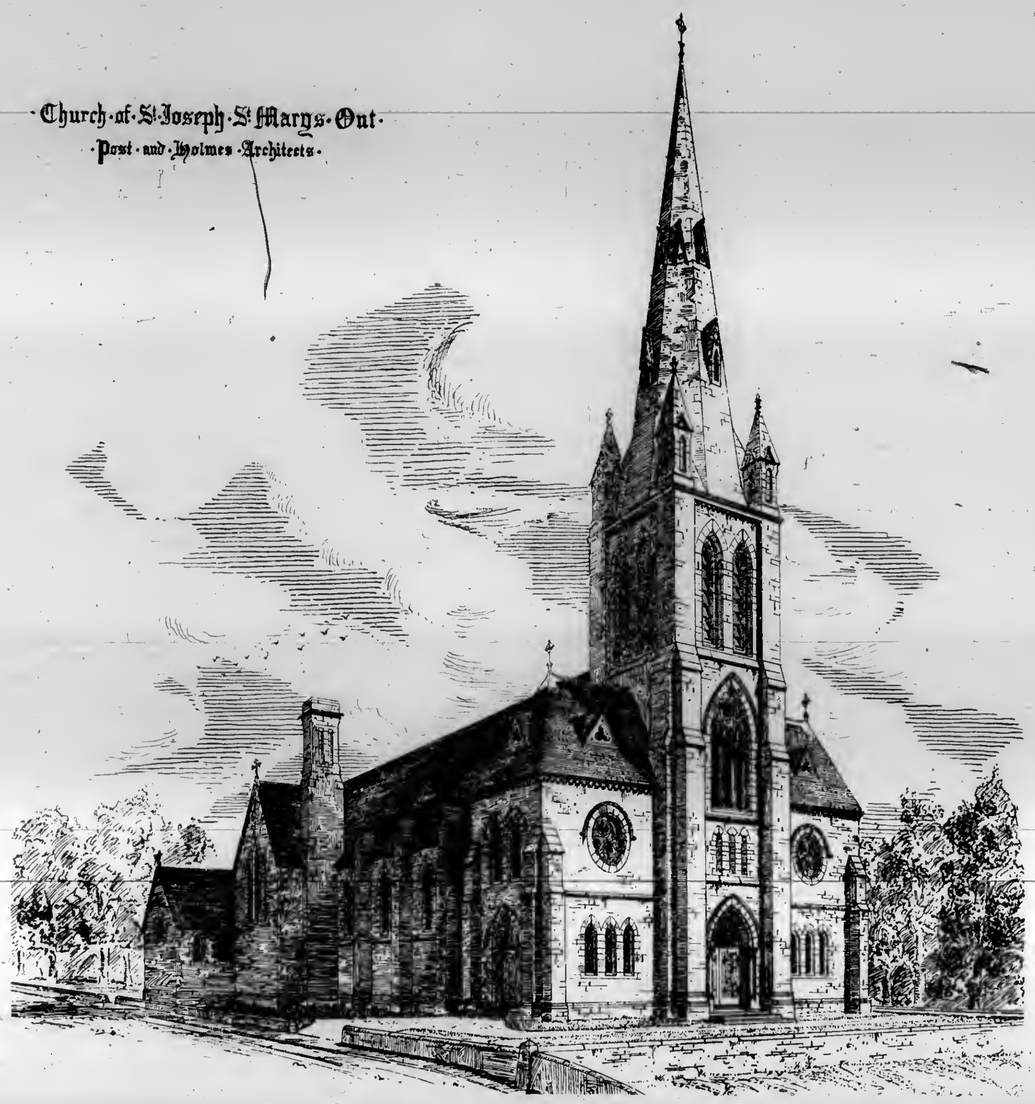
A TORONTO subscriber writes: Upon taking down a building on King Street, I discovered a crack in the wall of the adjoining building, which, if subjected to a slight jar, would probably be the means of precipitating the front of the building into the street. This defective wall was in no way supported by the building which was taken down. I would like to know whether, under the law, any responsibility attaches to me by reason of my having caused the removal of the building to which I have referred?

ANS.—The law provides that you should give the adjoining owner six months' notice of your intention to remove the building. In default of such notice, you are liable for any accident which may occur to the defective building.

An increase of $107,231 is shown in the value of new buildings erected in Hamilon the present year as compared with 1891.



Church of St Joseph St Marys Ont
Post and Holmes Architects



Mantel in Provosts Rm.
Glasgow Monicipal
Buildings

CAN. PHOTO-ENG BU

[From Furniture and Decoration.]

Club House for the Toronto Athletic Club.

E. J. Lennox, Architect.

CANADIAN ARCHITECT AND BUILDER.

VOL. V.—NO. X. TORONTO AND MONTREAL, CANADA, OCTOBER, 1892. PRICE 20 CENTS / $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
14 King Street West, - TORONTO, CANADA.
64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	S. G. CURRY, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton
TREASURER	D. B. DICK, Toronto.

COUNCIL:

WM. G. STORM	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
JOHN E. BELCHER	Peterborough.
EDMUND BURKE	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	V. ROY, Montreal.
1ST VICE-PRESIDENT	J. NELSON, Montreal.
2ND VICE-PRESIDENT	H. STAVELEY, Quebec.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
J. J. BROWNE	Montreal.
J. HAYNES	Montreal.
D. OUELLET	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. J. HILL, President.
GEO. MOIR, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JOHN ALDRIDGE.
BENJAMIN BRICK.
WM. PARK.
JAS. CRANG.
M. MURPHY.
J. LISTER NICHOLS.
WM. PEARS.

JOHN L. PHILLIPS, Secretary.

THE next convention of the American Institute of Architects will take place at Chicago on the 20th and 21st inst., coincident with the inaugural exercises of the World's Columbian Exposition.

THE demands upon our space this month preclude the publication in this number of more than one of the instructive papers read at the recent convention of the Province of Quebec Association of Architects. We hope to be able to present the others in our November number.

THE architects of the Province of Quebec are complaining of the action of the Provincial Government in imposing upon them a professional tax, thus placing them on the same footing as lawyers and doctors, while at the same time refusing to their Association the rights and privileges accorded to the other professions. They rightly object to being recognized as a profession for taxation purposes only.

THE concrete floors in the new Royal Victoria Hospital, Montreal, although as yet subject to no wear, are full of holes, and will probably have to be replaced by something more substantial, such as granolithic. The difficulty appears to be that the concrete is too rich, and the layer is of two great depth. A very coarse grade of sand is required to make good concrete, and this cannot be obtained in the vicinity of Montreal.

THE burden of taxation imposed upon manufacturers, resulted a few years ago in the removal of a number of factories from Toronto to suburban towns and villages. One of the greatest needs of the city to-day is a greater number of manufacturing industries affording employment to the artisan class. It is hoped that the by-law under which manufacturing plant will hereafter be exempt from taxation, will induce manufacturers to locate in a city which has many other advantages to offer.

THE severity of the climate in winter in the Province of Quebec, calls for certain distinctive requirements in the construction of buildings, especially residences, to ensure the stability of the structures and the comfort of the inmates. For example, a double roof has been found to be an essential in house construction. With a single roof, the snow, which there falls in such abundance, would melt and cover the roof and sides of the house with ice. To avoid this, the roof is made double, with an air space between. Thus the upper roof receives no warmth, and the snow usually, crisp and dry, instead of being melted, is constantly blown away by the wind.

SEPTEMBER 30th was the date set for the close of the preliminary competition for designs for new the public buildings which are proposed to be erected at Victoria, B. C. All the designs received will be submitted to two non-competing architects, who, in conjunction with the Chief Commissioner of Lands and Works, will advise which five designs shall be selected for a final competition, and in the final competition, which design, in their opinion, should be placed first, the author of which will then be entrusted with such portions of the works as the government may decide to proceed with, on the usual terms. The authors of the five designs selected for the final competition will be paid an honorarium each of $750. The cost of the building must not exceed within ten per cent., the sum of $500,000.

SEVERAL boiler explosions, attended with disasterous results to property and human life, have recently taken place in various parts of Canada. The most recent accident of this nature occurred a few days ago in the basement of one of the large business buildings in Hamilton. One of the large boilers used for heating the building exploded, wrecking a second boiler and setting fire to the premises. The fire department fortunately succeeded in putting the fire out. The boiler must have exploded under a very low pressure of steam, otherwise the results would certainly have been more serious. Occurrences of this kind emphasize the need for a higher standard of proficiency on the part of persons entrusted with the care of steam plants. Steam boilers in the hands of incompetent persons are almost

as dangerous in the basements of buildings as a package of dynamite. The law should require persons who aspire to take charge of steam boilers to show by examination that they possess the knowledge which would qualify them for the position, and a penalty should be imposed on persons assuming the duties of such a position without having undergone examination. Unless some provision is made which will insure competency, we may expect to hear of disasters even greater than those which have already occurred.

THE class of persons who regard architects as the possessors of but little knowledge that is not shared by the public at large, and their services as being of trifling value, while steadily diminishing, is by no means extinct, even in our cities. While few persons can be found who consider themselves competent to be their own physician in case of serious illness, and few also who would undertake to act as their own lawyer in a case involving important interests, there may yet be found any number who believe themselves competent to be their own architect, and who with the object of saving architects' fees, will undertake to plan and superintend the erection of buildings in which thousands of dollars of their capital is to be invested. It is scarcely necessary to say that such attempts almost invariably result in expensive blundering and life-long regret; notwithstanding, there can usually be found somebody else prepared to repeat the experiment. Our attention was drawn to a case of this kind the other day. A well-to-do resident of a Canadian city decided upon erecting a residence in keeping with his position, and having ideas of his own on the subject, concluded to be his own architect. Accordingly he drew up a plan to his liking, and set men to work to take out the excavation and build the foundation walls. At the completion of this stage of the work, he found himself confronted by difficulties which he had not foreseen, and which his want of knowledge made it impossible for him to overcome. In this extremity he found his way to an architect's office, and asked to be assisted out of the dilemma in which his conceit had placed him. On examining his client's drawing, the architect found a cellar with a twelve foot ceiling, a chimney with a flue less than half the size required to carry off the smoke from the furnace, and other defects equally glaring. After much thought the architect succeeded in bringing order of chaos, and it is safe to say that the number of those who think they know all about architecture has been reduced by one.

THE third annual convention of the Province of Quebec Association of Architects, to a report of the proceedings of which much space is devoted in this number, was in some particulars the most successful which has been held since the inception of the organization. It included an exhibition of drawings which was a source of much interest, and which it is hoped will be made an important feature of future meetings. For the first time the members had the pleasure of listening to a number of instructive papers contributed by members of the Association. The visit of inspection to various public buildings recently completed and in course of erection was a feature of the occasion which proved to be full of enjoyment and profit to every one who participated. The banquet afforded opportunity for the expression of some thoughtful remarks regarding the Association's past history and future aims. In these particulars the convention was a gratifying success. In point of attendance, it was somewhat disappointing. A large number of the architects of the city who are members of the Association were conspicuous by their absence. We regret to have to record this fact, which reveals an apathy on the part of the Absentees concerning the welfare of the association which must prove a serious hindrance to its progress. It is a pleasure to know, however, that a considerable number of the members are earnestly desirous of assisting by every means in their power to place the organization in the position to accomplish the objects for which it was called into existence. Much has already been accomplished, and a work of incalculable advantage may be done if every member will resolve to faithfully discharge his responsibility, even though he may be obliged to do so at the cost of some personal sacrifice. At future meetings the opportunity for a profitable discussion upon the papers presented, should be afforded, as in this way information of great value may be elicited. The Association enters upon the new year under the guidance of an efficient staff of officers, and should at the close of the current year, be able to show a marked advance in the direction of its ultimate goal. We hope to see the classes for students revived at an early date, and the students and members of the Association heartily co-operating to make them of the greatest possible interest and value.

ILLUSTRATIONS.

UNITED EMPIRE LOYALIST MEMORIAL CHURCH, ADOLPHUS-TOWN, ONT. POWER & SON, ARCHITECTS, KINGSTON, ONT.

HOUSE ON JAMESON AVE., TORONTO, FOR MR. W. P. ATKINSON EDWARDS & WEBSTER, ARCHITECTS.

CHURCH OF ST. MARY MAGDELENE, MANNING AVE., TORONTO DARLING, SPROATT & PEARSON, ARCHITECTS.

DRAWING ROOM MANTEL. A. C. HUTCHISON, ARCHITECT, MONTREAL.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE third annual convention of the Association was held in the Association rooms, St. James Street, Montreal, on Thursday and Friday, Sept. 29th and 30th.

The President, Mr. F. X. Berlinquet, of Quebec, presided at the first session, which opened at 10 o'clock.

The following members were in attendance:

F. X. Berlinquet, President, in the chair; J. Nelson, first Vice-President; A. F. Dunlop, D. Ouellet, A. T. Taylor, V. Roy, J. F. Peachey, H. Stavely, A. Gendron, S. Lesage, C. Baillairgé, J. J. Browne, J. Z. Resther, H. C. Nelson, J. R. Rhind, A. Boileau, A. Raza, E. Mann, J. Perrault, M. Perrault, H. M. Perrault, A. C. Hutchison, L. Z. Gauthier, J. Venne, and G. Languedoc.

An interesting collection of architectural drawings adorned the walls. The list of subjects and exhibitors is as follows:

Eric Mann—"Evans Buildings, Montreal"; "Design for Scotch, Baronial Mansion."

Perrault & Mesnard—"Longueuil Church"; Monument Nationale, Montreal"; "Laval University."

A. C. Hutchison—"Sketch for Church"; "Design for Bank"; "High School Building, Montreal"; "Sketch of Mantel."

J. J. Browne—"Presbyterian College, Montreal"; "Residence, St. John, N. B."; Stormont Cotton Mill"; "Monument, Montreal"; "Design for Fraser Buildings."

A. T. Taylor—"Second Premiated Design for Municipal Buildings, Glasgow"; "Physics Buildings, McGill College"; "McDonald Buildings, McGill College"; "Montreal Branch Bank Building, Montreal."

Wright & Son—"Design for Bank, Montreal"; "Residence, Dorchester Street, Montreal."

A. F. Dunlop—"Temple Building, Montreal"; "St. James Methodist Church"; "Dunlop of Dunlop, Ayrshire, Scotland"; "Residence, Dorchester Street, Montreal."

J. Nelson & Son—"Design for Lennoxville College."

F. X. Berlinquet—"Interior of Beauport Church."

Jos. E. Huot—"Church, St. Anne de Beaupre."

Jos. Venne—"Front elevation of Church."

J. C. A. Heriot—"Design for City Front"; "Design for Residence"; "Design for Country House."

D. Ouellet—"Exterior and Interior of St. Joseph's Church, Quebec."

J. W. & E. C. Hopkins "Merchants' Bank, Montreal"; "Warehouse, Craig Street, for J. C. Wilson"; "Interior of Church, Dublin."

J. F. Peachy "Interior St. John's Church, Quebec"; "Design for Post Office, Quebec."

C. Baillairgé—"Interior of Church"; "Monument Aux Braves."

After a few prefatory remarks by the President, Mr. Roy rose to complain of defects in translation in the newly printed copies of the constitution and by-laws. To prevent the recurrence of such defects in future, he suggested that the Association should appoint a Secretary who understood both languages, and mentioned the name of a gentleman who would suitably fill the position. The officers had done everything in their power for the success of the Association, and if the defect mentioned were remedied, the success of the Association for the coming year would be insured.

The minutes of the annual meeting held in Quebec on the tenth day of September, 1891, were read and confirmed.

The following report of the Council was submitted and re-read in French and English:

Your Council since the annual meeting held in Quebec on the tenth day September, 1891, held ten regular and seven special meetings, the attendance being as follows: A. C. Hutchison, 17; W. E. Doran, 13; A. T. Taylor, 12; V. Roy, 11; J. Nelson, 11; A. Raza, 11; A. F. Dunlop, 11; C. Clift, 6; F. X. Berlinquet, 5; J. F. Peachy, 3; M. Perrault, ; J. J. Browne, 1.

At the first meeting of the Council held after the last annual meeting, a committee of two was appointed to consider the question of building inspection in this province and to report. After some time one member of the committee unable to obtain a meeting with his colleagues, submitted a report giving his views as to the lines on which laws regulating building should be framed and suggesting the appointment of another committee to more fully consider the matter. The Council, owing to the difficulty of getting members who could give the time necessary to serve on this committee, have not been able to reappoint it.

Messrs. Berlinquet and Baillairgé, of Quebec, and Messrs. V. Roy, W. T. Thomas and A. T. Taylor, were appointed as a Board of Examiners. Previous to the semi-annual examination held in Montreal in the month of July, two vacancies occurred in the Board; one by the resignation of Mr. V. Roy, and the other by the decease of Mr. W. T. Thomas. The vacancies were filled by the appointment of Messrs. J. Haynes and A. C. Hutchison.

Two examinations were held during the year: one in Quebec in January, and the other in Montreal in July. At the former, one candidate, Mr. Remi Lemay presented himself for final examination; having successfully passed it, his name was entered on the register. At the examination held in Montreal six candidates presented themselves for the preliminary examination to enable them to enter upon the study of Architecture. Four of the candidates succeeded in passing the examinations.

In the month of May last, Mr. C. Clift tendered his resignation as Secretary. The Council regretted having to accept of it in view of the valuable services he had rendered the Association in its inception and formation.

Mr. A. C. Hutchison, a member of the Council, was appointed Secretary, and the vacancy thus caused in the Council was filled by the appointment of Mr. J. J. Browne.

Early last fall the Council, with a view of bringing the members of the Association together at frequent intervals for mutual improvement and interchange of opinions, arranged for monthly meetings at which papers of interest to the profession would be read and discussed. Papers were prepared

and read by Messrs. Hutchison, Doran and Haynes. The Council regret that the opportunities thus afforded the members for meeting together were not taken as full advantage of as they might have been, but hope that the new Council will afford such opportunities during the ensuing year, that the members will take full advantage of them.

With a view to afford student associaties opportunities of advancing their studies in Architecture, lectures were delivered weekly for three months on the styles of Architecture, and a class for the study of pen and ink drawing was formed. These lectures and classes were not as largely attended as was expected, but as the formation of these classes last winter was somewhat of an experiment, the Council hope that if the lectures and classes are continued during the ensuing winter months, that students will fully appreciate the facilities of study thus afforded them.

The Council regret the delay that has taken place in the printing of the By-laws and Act of Incorporation, but as a copy has now been furnished to each member, the want of them which may have been felt has been removed.

The tariff of professional charges and practice prepared by the preceding Council in conformity with the Act and presented to His Honor the Lieutenant Governor in Council for ratification was, owing to the change which took place in the Government of the Province last February, left in abeyance, and as your Council did not consider the time opportune to present it to the new Government immediately after their accession to office, they did not do so until after the close of the session; in the meantime another clause was added fixing the charge for valuations of property. The tariff as amended was laid before the Government on the first opportunity that presented itself, and its ratification was personally requested by the members of the Council who waited upon the members of the cabinet. Since then a correspondence has taken place with the Honorable Provincial Secretary respecting the tariff of charges and professional practice of architects in the United States and in Europe, and it is hoped that a confirmation of our tariff will soon be reached.

During the last session of the Legislature a Bill was introduced providing for the granting of certain privileges to contractors, architects, workmen, and parties furnishing materials for building. As the privileges to architects provided for in the Bill had not been asked for, and are considered unnecessary by the Council, several members of the Government were communicated with and requested to prevent the Bill from becoming law; it was, however, withdrawn, before discussion upon it took place.

When the office of Sanitary Inspector became vacant by the decease of the late occupant, your Council addressed the city council requesting them to make the salary attached to the office sufficient to secure the services of a thoroughly competent sanitary engineer, and to only appoint one who was thoroughly qualified.

In response to an invitation from the Ontario Association of Architects to attend their annual meeting and dinner last February, Messrs. Clift and Hutchison on behalf of the Council attended and conveyed its greetings.

During the last session of the Dominion Parliament a deputation from the Ontario Association waited upon the Government to urge upon them the enforcement of the Customs Tariff on plans prepared in the United States and sent into Canada. Your Council appointed a deputation to support the Ontario Association in bringing the matter before the Government.

Your Council regret to record the decease of two members of the Association since our last annual meeting, namely Mr. W. T. Thomas, in June, and Mr. W. H. Hodson, last week. Resolutions of regret and condolence were passed by the Council and entered upon its minutes.

The whole respectfully submitted on behalf of the council.

The Treasurer's statement was submitted showing the gross receipts for the year to have been $1245.53 and the expenditure $1028.11 leaving a balance on hand of $217.42. Accompanying the Treasurer's statement was the Auditors' report, stating that they had examined the accounts and found them correct.

It was moved by S. Lesage seconded by H. Stavely that the reports of the Council, Treasurer and Auditors be adopted. Carried.

The Association then proceeded to ballot for the election of officers for the ensuing year. The election resulted as follows:

President—V. Roy, Montreal.
First Vice-President—J. Nelson, Montreal.
Second Vice-President—H. Stavely, Quebec.
Treasurer—J. Z. Resther, Montreal.
Secretary—A. C. Hutchison, Montreal.
Members of Council—J. J. Browne, J. Haynes, H. M. Perrault, A. T. Taylor, A. F. Dunlop, Montreal; D. Ouellet, Quebec.
Auditors—W. E. Doran, S. Lesage, Montreal.

It was moved by A. Gendron, seconded by J. Perrault, that the next annual meeting be held in Quebec, the day to be fixed by the council in accordance with the by-laws. Carried.

There being no further business the meeting adjourned to meet again in the afternoon for the reading of papers.

Mr. Taylor desired to thank those who had assisted the Hanging Committee by sending examples of their work. He hoped that their example would be followed by others, and that members would also be found willing to present to the Association architectural books, which would form the nucleus of an instructive library. A vote of thanks to the Hanging Committee was moved by Mr. Brown, seconded by Mr. Rhind, and adopted.

AFTERNOON SESSION.

Mr. Victor Roy, the newly-elected President, called the convention to order and announced that five papers were to be read, the first of which, by Eric Mann, was entitled "Classic Architecture in Relation to Detail, with a Few Notes on Construction in Building."

Mr. Mann explained that the paper he was about to read was originally prepared to be read before the students, and was only presented to the Association owing to his having been unable to prepare something more suitable.

The paper, which is one of especial interest to students of architecture, is printed elsewhere in this number.

Mr. Chas. Baillairgé followed with a paper on "Escape from Buildings in case of fire."

Mr. A. T. Taylor presented a paper on "The Relation and Application of the Sister Arts, Painting, Sculpture, to Architecture," Mr. Rhind a paper on "The Architect as a Business Man and Artist," and Mr. Hutchison a paper on "The Plenum System of Ventilation as Applied to the New Surgical Buildings of the Montreal General Hospital," the latter being illustrated by a large diagram.

The President expressed satisfaction with the character of the papers to which they had just listened, and suggested that great benefit would result if monthly meetings of the Association could be arranged.

Mr. Hutchison said that such meetings were not a success last year, but he hoped it would be possible to do better in future. Personally, he would be pleased to contribute for the general benefit of the members any points of interest arising out of his experience.

Mr. Brown expressed a desire to see a spirit of greater fellowship prevailing among the members, and an indication of the determination of the Association to fulfil the objects of its existence.

Mr. Taylor having called the attention of the President to the presence of Mr. Curry, President of the Ontario Association of Architects, an invitation was extended to that gentleman to address the meeting.

Mr. Curry, after expressing the pleasure with which he had listened to the lectures, said that one of the greatest drawbacks to the progress of the Ontario Association, and he supposed of this Association also, was the apathy on the part of the members. With a membership of nearly 150 in the Ontario Association, and of nearly 70 in Toronto alone, only about 35 were usually in attendance on the meetings. The reason was, that members placed their personal business first, instead of the interest of the Association. He commended the plan adopted by the Toronto Architectural Guild, the members of which once a month go direct from their offices and dine together at a restaurant, and there discuss in an informal way matters of interest to the profession. The guild was very exclusive, admitting to its membership only desirable men and such as would attend the meetings. Those who failed to attend were dropped from membership. The organization had done much to promote friendship in the profession. The formation of a Dominion Association had been mooted, but he advised that they should endeavor to make a thorough success of the Provincial Associations before attempting the larger undertaking. Unfortunately some members of the Ontario Association, instead of seeking to assist the Association to elevate the standard of the profession, were seemingly only anxious to know what personal benefit was likely to accrue to themselves in return for their fees. These members took a wrong view of the subject. Notwithstanding, from their standpoint even, there were benefits to be derived. The Association library might be pointed to as one such benefit, and one which could be made of increasing value. The test of native building stones recently conducted by the Association was also of decided value to architects. In conclusion, the speaker remarked that goodfellowship and a desire to promote the good of the profession would best promote the success of the Associations.

THE BANQUET.

In the evening a considerable proportion of the members of the Association with a number of invited guests, pertook of a banquet at the City Club.

The toasts of Her Majesty, the Queen, and the Lieutenant Governor of the Province of Quebec having been duly honored, letters of regret at not being able to be present, were read from the Hon. Messrs. DeBoucherville, Beaubien, Flynn, Pelletier, Hall, Taillon, Casgrain, and Nantel. Letters of regret had also been received from the members of the Council of the Ontario Association of Architects, the President of which, Mr. Curry, was, however, present. The Secretary was sorry he had had no reply from the Canadian Society of Civil Engineers.

The Chairman: "Gentlemen, I have much pleasare in proposing the toast of "The Corporation of Montreal," represented here to-night by our worthy Mayor. It would be superfluous for me to try to speak in favor of the Mayor, for the simple reason that you know him better than I do, I hope he will give a few words of encouragement to this new Association."

The toast was drunk with enthusiasm.

The Mayor: "Mr. President and Gentlemen, I can assure you that I feel proud to be called to respond to the toast of the City and members of the Corporation. First, let me say that I had the honor to be a member of the Provincial Parliament when I think your Association was inaugurated by a charter, which with the assistance of the members for the City of Quebec, we succeeded in having granted: It is a satisfaction to reflect that our action in this regard has borne good fruit. The charter given to your Corporation has in the city of Montreal at least, chartered a body of men whose architectural skill excites the admiration of visitors to our city. It is the practice of some to borrow architectural talent from the other side; but let me say I have erected some buildings, and I always employ a resident architect. (Cheers). I can say as much on behalf of the gentlemen from Quebec. Montreal owes its great position today, as far as buildings are concerned, to the men I see around me, who have erected those noble buildings that are the pride of our city. As far as the Mayor is concerned, he may be only a cipher and figurehead; but let me tell you that the corporation, with all their faults, are trying to make Montreal a place to be admired. Sometimes we may be reproached with

heavy taxation ; yet what money we have to spend is, I think, spent in an honest and fair way by the representatives of our city. My friend, Mr. Roy, I am very proud indeed to know that you have been elected to-day President of this grand corporation. You are a credit as a body, and I hope that your society will live and prosper, and that the buildings that you will erect will equal any other buildings in the world."

The Chairman : "Gentlemen, we have a toast to propose, and that toast is a worthy one, for it is the toast of our sister Association of Ontario. (Cheers). I am glad to tell you that we have the President here amongst us, and I hope that next opportunity some of us will be able to return the compliment. (Applause)."

The toast was duly honored.

Mr. Curry : "Mr. President and gentlemen, I have to thank you for the very kindly manner in which you have drunk the toast. I think you have done it much better than we toast the Quebec Association. However, you have one advantage over us, you have better speakers than we have. We are indifferent speakers as a body; I am not by any means the best, but I am not the worst either, so you can judge for yourselves and form an idea of our calibre. I must say I prefer the actual work to the speaking. (Laughter). However, this Association and the Ontario Association have the same work before them, and that is, I think, educational work (applause). We have to educate the profession, and I think those of the profession will admit that there is a heavy work to do in that line. Next we have to educate the public, which I think is a much easier task. Our present trouble consists very largely in the fact that the profession as a body is badly educated. The members are as a whole rather inferior to what they ought to be. This is true of course of every profession, but I think we should strive to raise ours to be the equal of any (applause), and carry it beyond, if it is possible to do so. The architect requires to know everything, especially in the opinion of his client. He is supposed to be a good business man ; to know all about construction ; to know everything that a sanitary engineer knows—but not as some sanitary engineers know it (laughter). He is also supposed to be versed in heating, ventilation and acoustics—to know how to make a room a certain size in which a speaker can be heard with advantage to himself and to the audience ; he must be a thorough draughtsman, and know the history of architecture, and Heaven knows what else (laughter). In the end he has to become a specialist is some one branch or more. At the same time, it is really necessary that an architect should have a knowledge of all the branches that are necessary to the proper erection of buildings. He cannot know much about heating and ventilation unless he knows something of the methods by which they are to be carried out. A man cannot teach others anything, unless he knows something about it himself. An architect should above all things, have a pretty thorough knowledge of art. The question may be asked 'what is art?' That will have to decide itself. We know how our opinions change, we can even see it in the fashions of the day. The hat you wear to-day possibly you would not care to wear five years from now. So it is, we are continually progressing, still we can lay down a rule that what is reasonably good in art to-day will always be good. We can look back through the past and see that what was held to be good in architecture at any time, is always good. If a thing has any merit it will be recognized. Now the question that we have to do with as an Association is, what steps are we to take to produce a better educated lot of men than we ourselves are ? It is not sufficient that we should educate men up to a certain standard ; we have got to make them perfect within reasonable bounds. We can strive for perfection, although we can seldom or never attain it. There is little encouragement given to a man at present to become proficient. There are several things to discourage him. A man will say to himself, 'I am going to become an architect of merit ;' he settles down to work, and devotes himself to study. The result is that he remains unknown, and does not get anything to do. He may be thoroughly competent ; but someone else gets the work. Of course opportunities may come that will allow him to force his way to the front, and after that he can climb the ladder to the highest rung. It is our duty to raise the standard of the profession to the highest possible point. And how is that to be done? Well, we have already made considerable progress. Our Associations exist under special acts of the legislatures of our respective provinces. We in Ontario were able to secure a charter that did not give us all we wanted certainly ; but which nevertheless improved our position considerably. It is a question how we are to be able to carry out our duties, with the difficulties before us. We, however, hope to carry them out, though we have to make a struggle. We have that word 'registered' inserted in the act, and all our members refuse to use the word. They say that if they are architects, they are architects, and that it is not necessary for them to register or do anything else. If they have studied for their profession, they should be entitled to call themselves architects, and those who have not given the necessary time to the study should call themselves something else, not architects. We do not want to insist that those who wish to build must come to an architect to have the work done ; but we do ask that those who have studied and who have become members of the Association, through passing proper examinations or by whatever means may by be decided upon, should have the sole right to call themselves architects, and that the public, when employing a man should have some guarantee that he is a capable man and that he is what he represents himself to be. Then, if a man employs an incompetent builder, he will only have himself to thank for it. Now, I think that the Ontario Association of Architects has the desire, first and foremost, to educate. They have not so far taken any steps to make a tariff of rates, or to help themselves individually. We have thought it wiser to pursue an even course, to do what we can for the education of our members. We have now a library sufficient for ordinary purposes, so that the young student is thus saved considerable expense. The thing can be carried on indefinitely ; but we cannot do a great deal with a small amount of money. The fees are already high enough, and some members even complain as it is. They want the Council to show them some value. That we cannot do. But this we can do, we never propose to *give* them value ; but we propose to show them that they have *got* value. They paid their fees to become members with the object of educating the young members, and in so doing, advancing the profession and making such men an honor to the profession. If they are not prepared to pay fees for that object, then the sooner they retire the better. You, I suppose, are in the same position here. You have members who seek individual to gain by being members of the Association. Such men are not desirable. Only those members are desirable who wish to see the Association progress and see the members become an honor to the profession. It may be very nice to you to profit directly by a brother architect's bungling work; but, after all, these things are a drawback to the profession, and the public point to them as samples of architects capabilities, so the profession suffers. What we want to see is that when anything is entrusted to any member of the profession, good value is given, and that there can be no reason to grumble at the way in which the work has been carried out. I think I have occupied your time sufficiently, and will conclude by thanking you again for the very hearty manner in which you have honored the toast.

The chairman then called upon Mr. Baillargé, of Quebec, for a song, and that gentleman complied, singing a French ballad in most acceptable style.

Mr. Browne : "Mr. Chairman and gentlemen, as soon as you have composed you minds sufficiently after that beautiful song, I have the honor of proposing the toast of "The Canadian Society of Civil Engineers." The honor of proposing that toast is one which I esteem most highly. Canadian engineers beat the world. We are proud of them, and proud to see a member here to-night, and will only be too delighted to hear from him."

The toast was enthusiastically honored.

Professor Bovey : "Mr. Chairman and gentlemen, I am the victim of a deception. I was told that when I came here I should have a good dinner, and I should hear some good speeches, and that was all I should have to do. But now it seems I have to take the place of a far better man, Mr. Kennedy, our President, and I am unable to do that, and can only thank the members for the honor they have done us. I should like to take advantage of a tale which Mr. Curry was good enough to tell me during the dinner. A guest, when called upon to speak, got up and said he supposed he had had an invitation to be present in order that he might enjoy himself (laughter) ; but perhaps I might be allowed to speak not for the Canadian Society of Engineers, as they can speak for themselves, but generally. I agree with Mr. Browne that the Canadian engineers have a great reputation in all parts of the world. I would say that we at McGill College are looking forward with great pleasure to the visit of the Association to our buildings to-morrow, and I think you will agree with me when I say that for architectural effect, we have buildings that are unsurpassed, even if equalled, in any part of the world. I should not have dared to say this some time ago, but I have visited all institutions of this kind in Europe and the States, and I do not hesitate to say that there is not one of them better than, if there is any equal to ours in McGill. Time will not permit me to speak of all the benefactors who have helped to this end. We have not to thank one man only. We have first to thank Mr. William Workman, who was the first to help in this particular line. We have also to thank benefactors from all parts of the world. We have received assistance from places as far away as San Francisco, and even Mexico, as well as from Germany and other parts of Europe. I would especially refer to the almost unexampled munificence of one benefactor. I think we must be proud to have a man of such unbounded generosity among us as Mr. William Macdonald, and his generosity is not more remarkable than the wonderful manner in which he has carried out the work he has set himself to do. He only insists on one thing, and that is that everything must be carried out in the best possible manner. If there is anything wrong with the buildings, the architect alone is to blame. I have often heard it said, that although we have had large donations given us, we are never satisfied, and we are not; we want a great deal of money now. I should be sorry to hear any university say that they had enough. It would mark a crisis in the history of that university, and the point where that university is on the down grade. The more money a university can get, the more good a university can do. I will speak of one department, the department of architecture. Now there ought to be a department specially devoted to architecture in the great universities of the Province of Quebec, Laval, and also our own

great institution ; and I think that you, gentlemen, should all do your utmost to bring about this most desirable state of affairs. Many of you have rich clients and, if you have not persuaded them to spend too much already (laughter), you might persuade them to assist in founding, not merely a chair of architecture, but a department of architecture (cheers). It is of the highest importance I think in these days that students for this profession especially, should have the very best preliminary training. Young fellows preparing for the architect's profession, should have the very best training that school and college can afford. The best educated man in these days is bound to come to the front. That is the way in the United States. We have men in Montreal perfectly well able to superintend this education. The noble buildings we see on all sides, put up by our own men, are in themselves evidence that our architects are equal to anything that may be required of them. It seems to me strange that when any particular building for some special purpose is required, there seems to be a desire to go to the other side of the border, as if the work could not be done here. Sometimes—I am not quite sure—but I think that the buildings erected by foreign architects have tumbled in (laughter). I think our own men are best able to deal with our own buildings in our own climate (applause). I believe that the architectural details can be better worked out by our own men than by men who know nothing of the conditions with which they have to deal. I shall not detain you longer, but will again thank you for the honor which you have done me, an honor which I owe to my connection with McGill University. I must also thank you on the part of the Council and members of the Canadian Society of Engineers for the hearty good wishes you have expressed towards that great corporation. I believe your Association will raise the status of the profession ; that is the way in our Society. We have a Dominion charter, and we are an open corporation ; but an open corporation will in the long run have a greater effect than a close corporation. The moral effect of an open corporation is excellent, and in England has proved sufficiently strong to retain for its members all great works of architecture. A close corporation has of course certain advantages also. If a Dominion Association could be formed, you could exclude and keep out all undesirable characters, and retain only such men as would be known, not only in this Dominion, but also over the whole continent."

The Chairman : "Gentlemen, I will now propose a toast to the Press."

The first reply was made by Mr. Coté, who urged united effort on the part of all for the welfare of Canada.

Mr. Richard White : "Mr. President and gentlemen, I find it hard enough to say what I would like to say in English, and I cannot gratify your chairman by speaking in French. I am very pleased to be here this evening, and I am very pleased to find that you are inaugurating yourselves as a body. Judging from the experience of other professions, it is necessary that you should have an association of this kind. We find merchants, professional men, bankers and other classes having associations for their own mutual advantage, and there is no reason why your body should not also organize. I hope you will have every success in the objects for which your society was started, the general advancement of your profession, and the erection of beautiful buildings that will be an honor to Canada. I wish you every success."

Mr. C. H. Mortimer, of the CANADIAN ARCHITECT AND BUILDER, also responded.

Mr. Gendron was called upon for a song, but having a slight cold, delivered a speech instead. He said : "We have applied for a charter, and we have got it ; but it was first mutilated. We want a tariff, and a tariff which shall provide a just recompense for an architect's services, the same as in the legal and other professions. We have now in the house a tariff which we consider fair, and which we expect to see passed. I must say something for the Mayor of Montreal. He is the friend of the architects. He rendered justice to us at Quebec."

The Mayor : "Gentlemen, I am going to propose a toast that I know every one here will drink with the warmest enthusiasm imaginable. I am sure that every gentleman who is here will join with me in drinking the health of a gentleman who has so ably presided at your board, a gentleman who has been elected to fill the high and honorable position of President of your Association. I have known Mr. Roy for many a day. We have not been on the same side of politics, but we have always been friends. Mr. Roy is, like myself, a Montreal boy ; he has worked himself up to the honorable position which he now holds. In choosing for your President men like Mr. Roy, who has worked honestly to do credit to himself and credit to his name as a Canadian, you do honor to yourselves." (Cheers.)

The toast was honored enthusiastically.

The President : "Gentlemen, the noble words which the Mayor has just spoken touch me most deeply. I do not say they are true, for I have learned the complimentary facts he has stated to-night for the first time. If I am this night President of the Association of Architects of the Province of Quebec, it is not by reason of having solicited the honour. I was greatly surprised myself when, after having threatened the Association to resign several times, I found that I had been elected President. But, in this world we are not made for ourselves alone. I said to myself, 'I am the victim of something or somebody,' and when I found it was happiness to work for others, I fell into my role. Gentlemen, I thank you for the honor you have done me, and know that all I can do to make the Association a success, and all that we can do, will be cheerfully done. I have great confidence that we will attain our objects. There are ambitious men in our Association, but the greatest number are those who love the good of others. When the Association is recognized by the Legislature, the proprietors and capitalists will recognize them. The advantage of our Association is, that if all the details are well understood, the public will only employ architects recognized by the Association. It is their duty ; it is their interest. When our profession shall be held in proper respect by the public, you will see noble and good monuments erected. That is what works for the good of the public. We are all certain to live. The architect lives in every country; but when he is known, he lives better, for he has less work to do and more time to study his lines. I thank you cordially, and I shall do all in my power to cause the Association to increase and prosper in every way. I think that in this year we will try and show some lines of progress, and we will try to act so that all the architects will join with us to second us in our efforts."

Mr. Browne : "Mr. Chairman, I have the honor to propose the health of a man respected by all, who has held high positions amongst us, who has done a great deal for the society ; that is, our retiring President, Mr. Berlinquet." (Cheers.)

The toast was cordially honored.

Mr. Berlinquet : "Mr. President and gentlemen—In replying to the very flattering compliment which you have just paid me, I feel a certain sense of personal responsibility. The subject of Canadian architecture has already been treated at great length, and the progress of our Association has been the subject of much remark. I have great satisfaction, to which feeling is added a sentiment of vanity (fierté), or, better still, of pride (orgueuil). Our association has already given evidences of virility and stability (applause). But yesterday we were scattered over the whole surface of the Province of Quebec, and we did not know each other. To-day we are united into a corporation, united by a community of interest, for the purpose of advancing the profession, and obtaining for it the recognition which it merits among the ranks of the liberal professions. The work we have undertaken is a work of civilization and patriotism. Particularly will we labor to diffuse knowledge that will cause the progress of the exact sciences. I hope that the diploma of the Association will one day be highly prized. There remains for me one more duty to fulfil, namely, to thank you personally for calling me to the Presidency of your Association. I hope you will continue to second the efforts of your promoters, and work in a fraternal spirit. Our efforts to become a corporation are meeting with their recompense. It is that spirit of devotion which has made the stability and fortunes of all institutions" (applause.)

Mr. Dunlop : "Mr. President, I beg to propose a toast to "The Quebec members of this Association." I think that they are deserving of a great deal of thanks for coming here, and the only trouble is, we do not ask them to come here often enough. I know, for my part, that when we go to Quebec we are treated right royally, and we are glad to have an occasional opportunity of returning the compliment."

The toast was drunk heartily.

Mr. Baillairgé : "Mr. President and gentlemen, I thank you for the way in which you have honored the toast. I am sorry we are unable to be here in greater numbers, but the members here will express their appreciation of the way they have been treated. I am not accustomed to addressing audiences of this kind, but will call upon Mr. Peachy, who has been a city councillor, and is therefore an experienced orator."

Mr. Peachy : "Mr. Chairman and gentlemen—My honorable friend has paid me a compliment which I do not deserve. In the city of Quebec I worked for the city and I did my best ; but I never shone as an orator, and after the elegant speeches I have heard this evening, I am very diffident about addressing you. I am charmed at having come here, not only with the number of the members, but with the friendly spirits of which the society is composed. In the city of Montreal we observe that architecture has made immense strides ; we see the architects of Montreal occupying the highest positions ; the buildings of Montreal are equal to any in the United States. We, in Quebec, have not the same resources that Montreal has ; but, all the same, we shall follow in the right track, and do all we can for the instruction and education of our young architects."

The last toast, "The Retiring Officers," was responded to by Mr. Doran in the following terms :

"Mr. Chairman and gentlemen—I may take it for granted that in toasting the retiring officers, you desire thereby to express your approval of the greater number of their actions, and in the efforts they put forth for the advancement of an Association that was only in its infancy. It has, however, now attained a certain amount of growth, and the problem is, how to increase that growth and how to nurse the plant so as to make it a plant worthy of the soil. It is true that we have not accomplished everything we desired, particularly with reference to the act of incorporation sought for from the Legislature. We received something, but not all we asked for. The Quebec Legislature followed the bad example of the Ontario Legislature by mutilating the act by giving powers to 'registered architects,'

rather than to 'architects,' simply. However, for my part, I am of opinion that, having accepted the Acts, such as they were, the profession made a great mistake in not assuming the name required. I think that until the members of both Associations look seriously into the question, and assume the title given them, they will not, nor cannot have all the benefits, because, as it was pointed out by the President, up to and until the formation of this society, anyone could arrogate to himself the title of architect, and any one can still, and how are the public to distinguish? I think for my part that architects are foolish in not availing themselves of the protection, meagre as it is, afforded them by the act. In conclusion, gentlemen, allow me to thank you for the cordial way in which you have drunk the toast."

Some more songs and speeches brought a pleasant and profitable evening to a close.

SECOND DAY.

The members assembled at the Association rooms at 10 o'clock on Friday morning, and entering carriages in waiting, were driven to points of interest in the city. En route to the Royal Victoria Hospital, the attention of the visitors was directed to some of the old landmarks, such as the building which served as the residence of the first Governor of Lower Canada, now doing humble duty as a coach-house; the old Legislative buildings, now a hotel; the site of the old city wall, which still bears the appropriate name of "Fortification Lane"; Ontario street, formerly traversed by a creek, on the frozen surface of which when in youth some of the leading architects of the present day were accustomed to practice on the "ringing steel." "It is such features of reminiscence as these which go to make a city interesting," exclaimed one of the visitors, a remark in which everybody could coincide.

At the Royal Victoria Hospital the party were taken in charge by Mr. Rhind, under whose supervision the large buildings have been erected, and by whom the points of most interest in their construction were shown and explained. Those of our readers who examined the illustration of these buildings which we published a year or more ago, will remember that the site is irregular and uneven, yet this fact, which would ordinarily be regarded as a disadvantage, has by the skill of the designer actually been turned to advantage, whereby the bottom storey of one wing is on a level with the top storey of the other. The buildings have been erected of Montreal stone, and present an enduring appearance. The planning, being the work of Messrs. Saxon Snell & Son, the noted hospital architects, of London, was the subject of much interest. The buildings, which will cost about half a million dollars, are nearing completion, and will it is expected be ready for occupation early next year.

From the Royal Victoria Hospital the party were taken to the new Technological Building in connection with McGill University, of which Mr. A. T. Taylor is the architect. It is a most substantial structure, and its perfect adaptability to its purpose, evidences the painstaking thought bestowed upon it by the designer. The various parts of the building are isolated from one another by fire-proof doors. Professors Bovey and Workman received the visitors in the most cordial manner, and personally conducted them through the building, explaining as fully as time would allow the work which was being done, and the apparatus employed. After a peep into the draughting rooms, pattern rooms, machine shop and blacksmith shop, each fitted with the appliances necessary for imparting instruction of a practical character to the students, they were asked to behold what Prof. Bovey declared to be one of the best equipped testing laboratories in the world.

This laboratory contains two testing machines, representing the most perfect English and American patterns, each with a capacity of 100,000 pounds. These machines are operated by means of a small electric motor. They are capable of determining both the tensile and crushing strength of materials. A bar of iron, one inch in diameter, was subjected to a tensile test in the presence of the visitors, and after stretching three quarters of an inch, finally broke under a strain of 40,000 pounds. The laboratory also contains a chemical balance capable of weighing 125 pounds or the fraction of a grain, a *fac simile* to a small scale of the Montreal water works, by which the head of water necessary to supply a given population may be determined; apparatus for measuring the volume and rate of flow of water in a running stream, etc.

Here, as stated by Prof. Bovey, may also be seen the only standard cement testing department in Canada. The visitors were shown an automatically working testing machine. Cement briquettes are placed in a copper vessel containing water and subjected to a temperature of 100 degrees. If, after 24 hours, the briquettes blow, they are given a second trial. If, after the second trial, the briquettes blow they should be discarded. As in cement testing trouble often results from variation of personal manipulation, arrangements are being made in this department by which such manipulation will be done automatically.

Other features of interest were the electrical department, which contains a 250 h. p. dynamo driven by a sixty h. p. engine. There is not a belt in the place, the dynamo being driven straight on end. There are two engines each 500 h. p., and the space occupied by each engine is only 589 feet. The bottoms of the engine beds are hollowed out, which has the effect of preventing rocking.

One of the most interesting and valuable features of the institution is the library, which contains 6,000 volumes of scientific books, being one of the most complete libraries of its kind in the world.

At the top of the building, enclosed in glass, is a museum of mechanical models, which for completeness is said to be unequalled anywhere in the world. These models are the work of a celebrated German maker named Releaux, and were many of them made expressly for this institution. They illustrate almost every conceivable mechanical movement, and will be of great service, not only to the students of the school, but also to manufacturers and inventors. They are valued commercially at $8,000. Between the School of Technology and the new Physics building, which was next visited, there is a vacant space on which Prof. Bovey expressed the hope that another building would shortly be erected. When asked if his expectation was that this new building would be devoted to architectural education, he replied in the affirmative. He pointed out that even at present accommodation exists in the Technological building for this purpose, and the hope was expressed that the architects might be able to induce some of their wealthy clients to make the endowment necessary for the equipment of a Department of Architecture.

The Physics building, which is as yet incomplete, seems likely to be as perfect in its arrangement and appointments as could be desired. There is also in course of erection a new library building with a capacity of 150,000 books. The college library at present numbers 30,000 volumes. The stack-room is to be made thoroughly fireproof. In addition to the ordinary reading-rooms, there will be special study rooms in the basement.

Taking farewell of the college grounds and buildings, the party paid a visit to the new High School building, of which Mr. Hutchison is the architect. The front of the building is of pressed brick, and presents a very satisfactory appearance, while the planning of the interior appears to have been accomplished in an equally successful manner. The departments for the male and female pupils are at opposite ends of the building, with wide corridors between. Access is had to the lecture rooms from both departments. There are spacious play rooms in the basement, a library, a large gymnasium, and an assembly hall with a seating capacity of 1,200. The lighting facilities throughout the building are excellent.

From the High School the party returned to the Association rooms on St. James street.

It was moved by J. J. Browne, seconded by F. X. Berlinquet, that the Association tender its thanks to Principal Sir William Dawson for giving permission to the members to visit the new Science Buildings of McGill University, and also to the Dean and Professors of the Faculty of Science for their kindness in showing the members of the Association through the buildings.

It was moved by J. F. Peachy, seconded by J. Venne, that the thanks of the Association be tendered Mr. J. R. Rhind for his kindness in showing the members through the Victoria Hospital.

It was moved by J. Nelson, seconded by C. Baillairgé, that the thanks of the Association be tendered Rev. Elson I. Rexford, Rector of the Montreal High School, for his kindness in permitting the members to visit the new school and showing them through it.

The members then took leave of each other, and an occasion of much interest was brought to a close.

THE LATE W. H. HODSON.

Mr. W. H. Hodson, one of Montreal's old time architects, has passed over to the majority, an acute attack of pneumonia having ended his useful career. He commenced the study of architecture with one of the best firms in Manchester, England. Completing his studies there, he emigrated to this country some

THE LATE W. H. HODSON.

time in the fifties, practicing with great success in New York and Brooklyn. Coming to Canada in 1857 or 1860, he located in Montreal, and probably first distinguished himself on the building occupying the north east corner of Bleury and Craig streets, amongst others carrying out the works successfully of Messrs. Owen McGarry's and D. Ford's residences, St. Ann's church and St. Ennis, Alexandria. Mr. Hodson was a man of sterling qualities, his honesty being almost proverbial, his energy integrity lasting to the end.

THE TORONTO TECHNICAL SCHOOL.

Following is an abstract of the address delivered by Mr. John A. Duff, Principal of the Toronto Technical School at the opening of the second term on Oct. 3rd.:—

It has been announced that I am to speak to-night on "The Benefit of Technical Knowledge in Mechanical and Industrial Pursuits." It would probably be inferred that I would endeavor to enumerate the advantages and advocate the claims of Technical Education in general, but I do not think that any one will be disappointed at hearing that such is not my intention, for I feel sure that everyone will be more interested in hearing what facilties for such education are provided by the Toronto Technical School, and by explaining the scope and bearing of the subjects taught I think I can more effectively than in any other way make clear to you the advantages to be derived therefrom.

The history of the Toronto Technical School is brief. In December of last year the City Council passed a by-law, appointing a Board of Management and giving them an appropriation of $6,000 and the free use of St. Lawrence Hall. The Board at once began the work of organization; teachers were appointed, and the courses of study decided upon, and St. Lawrence Hall having been found unsuitable, this building was secured and the necessary alterations made with such expedition, that by the first of February the work of the session was well commenced. The attendance from the first was large, and was well maintained throughout the term, and very satisfactory progress was made.

Such has been the past. There is every reason to hope that the coming year will be still more successful and that the Toronto Technical School will rapidly become a great power for the dissemination of scientific knowledge and habits of correct thought. With additional teaching power we have been able to make the course of study more comprehensive. Trigonometry will be taught twice a week instead of once, which was all the time we were able to devote to it last year, and, if necessary, the classes in Arithmetic and Measuration will be subdivided. Arrangements have been made for three classes per week in Chemistry and Physics, which will enable us to provide a tolerably complete course on electricity—that mysterious power which seems destined to usher in a new era of civilization. There is thus provided for the current year the following distinct courses of study: Mathematics, including Arithmetic, Mensuration, Algebra, Euclid, Trigonometry; Practical Geometry, Descriptive Geometry, Mechanical and Architectural Drawing; Mechanics, including Statics, Kinematics and Dynamics; Chemistry and Physics, including Hydrostatics, Heat, Sound, Light and Electricity.

Each student is allowed to select his own studies subject only to the requirements of the time table. With only ten teaching hours in the week it is impossible to make provision for all the classes without having two different subjects occur at the same time, and thus to some exent the freedom of choice in the selection of studies is curtailed. The time table has, however, been carefully arranged, so that the least possible inconvenience will be felt from this source. For example, if a student has so far forgotten his Arithmetic that it would be necessary for him to take lessons in that subject, he would not be able, until he has become familiar with Arithmetical operations, to derive much benefit from the lessons in Mechanics. We have therefore put Arithmetic and Mechanics down for the same hour, and the students who find it necessary to review their Arithmetic, and who wish to study Mechanics, will find it not a hardship but very much to their advantage, to take Arithmetic during the present session and defer the Mechanics for another year. As the success of the student and therefore of the school depends largely on the proper selection of the course of study, let me briefly describe the different subjects taught, and incidentally mention some of the advantages derived from each.

Let us begin with Mathematics, the interpreter and herald of scientific knowledge, and without which little real progress can be made. Mathematics is one of the most potent instruments of scientific investigation, besides being the only foundation upon which exact scientific knowledge can be built. In Science and Engineering, theories are of little value unless they are exact and definite, and we cannot have this exactness without Mathematics. A knowledge of Mathematics is not necessary in order to understand the general laws of nature, but it is necessary in order to state those laws with exactness or make any practical application of them. Anyone can understand that water will flow through pipes, but no one can calculate the quantity which will flow through a given pipe in a given time without a knowledge of Mathematics. I do not mean to say that Mathematics must be pursued to its highest developments, but it is necessary to have at least a good working knowledge of Arithmetic, Algebra and Geometry.

The course on Arithmetic—the corner stone of Mathematics—will comprise instruction in numeration and notation, the operations of addition, subtraction, multiplication and division, the use of fractions and decimals, ratio and proportion, the method of extracting square root and the theory of logarithms—in short a complete course in Pure Arithmetic, including all the arithmetical operations which are used in the other branches of Mathematics and Science, but excluding Commercial Arithmetic, which is the application of the forgoing rules to the computation of interest, discount, stocks, annuities, &c., and which finds its proper place in the curriculum of a Business College.

Along with Arithmetic are taught the rules of Mensuration, by means of which the areas of surfaces and the volumes of solids may be calculated and compared. A knowledge of these rules may be required by any man at any time or place.

In Algebra the work will be the same as that which is ordinarily taught in the High Schools of Ontario, which is all that is usually required in pure or applied science. I will not occupy your time with a more particular ennumeration, but I wish to impress upon all intending students the vital importance of Algebra in chemistry and physics. In these sciences formulae occur which can only be properly expressed by algebraic symbols, and the only practical method of solving problems or determining an unknown quantity, is by means of algebraic equations. But if Algebra is of so great importance in Chemistry and Physics, it is absolutely indispensable to the proper study of Natural Philosophy or Mechanics. Very few calculations involving force or motion can be made without its aid, and without Algebra a knowledge of Mechanics must always prove to be incomplete and unproductive. What has been said of Algebra is true to almost as great a degree of Trigonometry and Euclid's elements of Geometry, Euclid has the further advantage of being one of the most perfect systems of logic that has ever been constructed, and no one can master Euclid without becoming a logician.

Let me here remark that the aim of higher education ought not to be so much to fill the student with dry facts, as to teach him how to use what knowledge he already possesses in other words to teach him how to think properly and to act accordingly. And one of the greatest works that a Technical School can do is to teach mechanics the *art of thinking*. To do this there is no study so efficacious as Mathematics, for there is no other branch of knowledge so exact and definite, and there is no other in which the reason alone is employed.

In Chemistry, it is proposed to teach the mode of occurrence, the nature, and methods of preparation of the different elements and compounds which are of importance in everyday life, special attention being given to those substances and processes which are of technical value, such as electrolysis, coal, and the manufacture of coal gas, iron and steel, mortars and cements.

Lying in the border land between Chemistry and Physics, is the study of the constitution and properties of matter:—a few lectures will be devoted to this very interesting subject.

Under Hydrostatics will be taught the general character and properties of liquids, and the theory of the common hydrostatic and hydraulic instruments, such as the hydrostatic balance, hydraulic press, spirit level, hydrometers, electrometers, etc. Along with hydrostatics, though scarcely belonging to it, come the physical properties of gases and the atmosphere, the theory of the barometers, pumps, balloons and siphons.

The course on Heat will embrace the nature, sources, transmission and general effects of heat, the theory and construction of thermometers, the determination of the melting and boiling points, freezing mixtures, distillation and evaporation, and the theory of steam engines.

Lectures will be given on the elementary theory of Sound and Light in, which the theory and construction of optical and musical instruments will be described.

Electricity will be taught in two divisions. The relation of Chemistry to electricity, and the theory and construction of electric batteries, will be described in connection with the course on Chemistry. In connection with Physics, there will be a course on magnetism and current electricity, the theory and construction of the dynamo, telephone and telegraph, and the applications of electricity in daily life.

In Chemistry and Physics the lectures will be illustrated by experiment as far as our apparatus will permit. We hope that very soon, though perhaps not during the present year, there will be a laboratory in connection with the school, in which practical work in Chemistry and Phys es may be done by advanced students. The advantages to be derived therefrom must be apparent to all, and let us therefore hope that it will soon be an accomplished fact. There will be a course on Practical Geometry, which is intended to give facilty in the use of drawing instruments and the construction of geometrical figures. It will be found very useful as an introduction to the course on Descriptive Geometry or the theory of projection. That on Descriptive Geometry will comprise the representation of objects by means of a plan and elevation, and problems leading up to and solved thereby, such as the determination of the form of the intersection of two cylinders or cylinder and a cone, together with instruction in oblique and perspective projection. This course, which involves the theory of drafting, is of great utility not only to those who are trying to perfect themselves as mechanical or architectural draftsmen, but to sheet metal workers and any whose occupation requires them to have some knowledge of working drawings, as pattern makers, boiler makers, machinists, etc. In connection with the Descriptive Geometry, practical instruction will be given in the drafting room in instrumental drawing, lettering, etc., for which purpose copies and models of machine and building construction will be available. This instruction will be given to the students individually and for this purpose the drafting room will be open, and an instructor will be present during every teaching hour of the school. A student who takes this course of practical work in the drafting room should be able by the end of the year to read a drawing without any difficulty, and also to make a fairly good original drawing, and at the end of two years he should be a fairly good draftsman.

The course on Mechanics will embrace the theory of vectors, the representation, measurements and laws of forces and motions, the theory of equilibrium, theory of the lever, pulley, and other simple mechanical powers, the calculation of stresses, theory of the simple beam, the transmission of force and motion, friction, work, energy, power, the efficiency of machines and the elements of machine design. I hope that this brief outline of the courses of instruction will enable intending students to choose wisely the subjects which they most require. But should there be any who are still unable to make a choice, the teachers will be glad to give whatever further information may be required. Most students will find that they will be unable to pursue more than two or three courses of study during the year. I would advise those who thus find it necessary to defer some of their studies, to take their Mathematics first, for the reason which I have already given, that a knowledge of Mathematics is essential to a proper study of the other subjects. From what I have said or from a reference to the prospectus it might be inferred that we expected to complete all our courses of study in one year, but such is not the case. In Algebra, Euclid, Descriptive Geometry, and perhaps some of the other subjects, two years will be required to complete the course, and it is expected that the advanced classes in these subjects will be formed next October. And, without interfering with the perfect freedom of choice now enjoyed by students wishing to pursue a special line of study, it is hoped that we will then be able to announce the programme for a regular course embracing two or three years. The experience of the past winter has convinced me that in Toronto the demand for technical education is urgent, but the citizens may rest assured that on the part of the Board of Management or the teaching staff of the Technical School no effort will be wanting to supply that demand.

LEGAL DECISIONS.

In the case of Lane vs. The Dungannon Agricultural Driving Park Associations, recently decided by the Court of Queen's Bench, Toronto, the contractor for the erection of a building for the defendants during its progress gave to various persons orders upon the defendants for sums due them by him, in the following form: "Dungannon, Sept. 12, 1890. To the directors of the Dungaonon Driving Park Associations. Please pay to D. M. the sum of $ —, and oblige (signed) T. F. H., contractor." The court held that these orders were not in themselves good equitable assignments of portions of the fund in the hands of the defendants. The evidence, however, showed that there was only one fund out of which the directors could be expected to pay the orders; that the nature of that fund and its origin were well known to all the parties, that when the contractor promised the persons with whom he dealt orders upon the directors, he meant to give, and these persons expected to get orders which were to be paid out of the contract price, and that the directors understood the orders as intended to deal with portions of the contract price, and to be payable only out of that particular fund. It was held that the court should look to the real intention of all the parties to the transaction, and give effect to it by declaring that the contractor did make an equitable assignment to each of the order holders of a portion of the fund.

TORONTO BUILDERS' EXCHANGE.

Some time ago we published particulars of the organization and growth of the Toronto Builders' Exchange; and on several occasions since have noted the steady development of the organization.

So great has been the progress of this body, that some time ago it became apparent that more commodious rooms would be required for its accommodation. Two or three weeks ago the Exchange took possession of new premises at No. 8 Victoria st. These premises comprise a large Board Room, suitable offices for the Secretary, Committee rooms, etc. In short, they afford every needed facility for the efficient transaction of the business of the Exchange.

On Thursday evening last the new Exchange rooms were formally opened by a banquet and social entertainment, at which upwards of 150 members of the Exchange and invited guests were present. Tables loaded with tempting viands stood waiting their arrival. After due attention had been paid to these, the balance of the evening was devoted to speeches, recitations music and social chat. The President of the Exchange, Mr. W. J. Hill, in a happy manner presided; the vice chairs were occupied by Mr. George Moir and Mr. George Oakley. The musical accompaniments were played by Mr. W. H. Hewlett.

The list of those present is as follows:

Invited guests—Messrs. H. B. Gordon, Grant Helliwell, Robt Ogilvie, Edmund Burke, S. G. Curry, Frank Wickson, J. Reggin, J. W. Siddall, James Smith, Prof. Wright, (School of Practical Science), J. Maguire, M. Guy, R. G. Kirby, Henry Simpson, R. J. Edwards, H. J. Webster, Chas. Walton, C. E. Bavington, S. H. Townsend, Henry Langley, Price, W. R. Gregg, Harry M. Blight, Harry Rich, W. H. Hewlett, John Knox, J. A. Pearson, Thomas Westlake, Thos. Young and D. Phillips representing the CANADIAN ARCHITECT AND BUILDER.

Members—Messrs. John Aldridge, Edward B. Axworthy, Benj. Brick, Jeremiah Bedford, John Bedford, Fred Bedford, Henry Bedford, Fred. Bayliss, James McCurdy, J. J. Blain, J. Bulley, John Brodigan, William Best, James Crang, Jethro Crang, John Vick, James Claxton, Richard Chalkley, John E. Curtis, William H. Rowe, John Carlyle, James Pears, Richard Elliott, L. B. McKenny, Capt. Neelon, M. A. Piggott, A. T. Fox, Jesse Ashbridge, Edward Gearing, John E. Goddard, John M. Gander, J. Lister Nicholls, Alfred Gardner, G. W. Gore, W. J. Hill, George Gall, Robert Harrison, W. F. Lewis, T. Hoidge, William Duncan, R. Hewitt, John Hanrahan, William Isaac, James Isaac, Daniel Livingstone, George Wright, Frank B. Lockwood, Henry Martin, William Maguire, C. F. Mitchell, John McMurren, George Moir, F. G. Nicholson, Archibald Orr, Robert Orr, George Orr, George Oakley, Fred Holmes, Scott (Ontario Lime Association), Isaac Price, John Price, William Park, James Priestley, Henry Phillips, Thomas Robinson, Robert Robertson, Thomas W. Self, Robert Snarr, William Simpson, Robert Simpson, Joseph Price, Thos. Sawdon, W. R. Simmons, Andrew Thomson, James B. Thomson, David Williams, James A. Wickett, John Wickett, William N. Watson, J. Watson, Geo. W. Walker, John B. Barnard, C. C. Witchall, Robert Whillans, William Whillans, William Woods, Ewart Farquhar, Samuel Young, and John L. Phillips, the Secretary.

The following gentlemen had charge of the entertainment:

Messrs. W. J. Hill, Geo. Moir, George Oakley, David Williams, John Aldridge, Benjamin Brick, William Park, James Crang, M. Murphy, J. L. Nichols, William Pears, Henry Martin, W. J. Burroughes, John M. Gander, Edward Gearing, Frank Powell, and to their well directed efforts is principally due the success of the occasion.

The toast of "The Queen," was proposed by the President, and responded to by singing "God Save the Queen."

The company were then favored with a song from Harry M. Blight, entitled "Polly," and on being encored Mr. Blight sang "Heart in Hand."

The toast of "The Toronto Architectural Guild" was then proposed by the President, accompanied with the names of Mr. Curry, Mr. Langley, Mr. Gordon and Mr. Smith.

In responding to the toast, Mr. Curry spoke as follows: "On behalf of the Architectural Guild I thank you most heartily for this toast, and for the manner in which you have just voted us 'jolly good fellows.' I think those who are acquainted with us architects will agree with me when I say we are 'all jolly good fellows.' I am afraid though, at times some of the members of this association are inclined to think we are not. Of course, there may be a little friction sometimes between us; but I think that on the whole we understand each other pretty well. Some architects in giving out contracts do so on the basis of getting too much value for the money spent; it is a question often of getting too little money for the work done. I think the builders are somewhat to blame for this state of affairs themselves, as a great many of the builders tender for work for much less than its proper value. If it was possible for the builders to make some arrangement among themselves, whereby they could get a proper amount of money for a proper amount of work done, it would be more satisfactory all round than trying to cut each other's throats. Now, there are architects and there are builders who are desirous of getting work, no matter at what cost—all they want is the work, to be able to say they have the work—who will tell you how they have been able to erect a certain building at an amount considerably less than some other of the builders can do. There is a competition among the architects to do business on the cheap plan; and the result is most unsatisfactory alike to the architects and the builders. As it is growing late in the evening and so much to follow, I will close by thanking you for your kind attention, and for the hearty way you have come together this evening and laid aside all grievances.

Mr. Langley said: I am very glad to have an invitation to meet so many of you this evening—so many faces I have been used to seeing for the past twenty-eight years. I will not endeavor to make a speech, as I am not a speech-maker. I heartily endorse everything Mr. Curry has said, especially as to the rates at which contracts have been taken.

Mr. Smith said: I thank the Builders' Association for the great pleasure of my being here this evening. I feel like a stranger in the city of Toronto when I see so many builders here. There were very few when I came to the city—very few of the fine buildings we now have in the city of Toronto were to be seen then. To the builders of Toronto we owe more, I think, than to any other class of men for the proud position our city occupies to-day. Any stranger coming into the city of Toronto, and especially American and English visitors say, Toronto takes second place to none. I came to Toronto in 1857, and I don't think many of you were in existence then (a voice—we were all built since then). I recollect the first year I was in business I only made $3.00. I only got $3.00, remember $3.00, for putting up a house, and then had to pay the taxes—don't talk about hard times any more. Here we have in this city nearly 200,000 inhabitants. I have travelled over a great part of the continent, and I can say our great buildings are equal in design to any of the great buildings on the continent. I suppose a good many of you are acquainted with me and a good many of you are not. I should like to shake hands with you all before I leave.

Mr. Gordon replied in the following words: As I look around and see the large number of intelligent faces here this evening, who are making their mark and leaving their mark in the way, as Mr. Smith has already put it, of the great buildings which are springing up on every side. I remember that you are the men who are making these lasting memories in our great city. We may look forward to good times when we have men of your calibre amongst us. The exchange of ideas, the exchange of thought and the stimulus of your meetings will have a beneficial effect upon business in this city in years to come. The very idea of a Builders' Exchange suggests a broad and comprehensive platform. While sitting here listening to the eloquence of the gentleman who preceded me, I was struck with the hospitality you tender to your guests on the opening of your new rooms; you have made an exchange of hospitality this evening, and if your hospitality is of the kind we are partaking of this evening, certainly you are adepts in the hospitality line, and I don't think you require any advancement in this line. You have certainly shown us all how to extend courtesy. Now as I look around and see the intelligent faces of men who have grown grey in their various trades, and see how they have prospered, I think it must be a good idea this building Exchange, where all can meet together and exchange ideas; I trust though that in this exchange of your ideas you are careful to be very lenient with one another. I hope in your exchange of ideas you will exercise moderation and throw about your ideas the cloak of charity. As to the method of tendering and this vexed question as to the price the tenders are put in at, and the difficulty there is of getting return for work done, I think that some satisfactory arrangement could be arrived at between yourselves which would do away with these vexatious questions. It has been done in times gone by, and if it was possible for the intelligent men of that day surely it is possible for you in a very short time to raise your tenders together, and then we will not have this everlasting cut in the prices to which we have been subject in the past. It would be a great relief to us all if means could be devised whereby a fair price could be got for work which is tendered on. The only way to accomplish this, is to have some properly constituted board to regulate prices, which would have the endorsation of the architects,—men who would have the endorsation of the Architects' Association, representatives from the various trades; men whose standing and position should be such that they would not be subject to reproach, men on whom the architects could rely, and furnishing, as it would, a comprehensive platform. We would then get better prices for our work, as hinted by Mr. Langley. I hope that the committee which have the exchange under their control, will speedily take means to accomplish this end.

Prof. Wright, of the School of Practical Science, spoke briefly in effect as follows: I am greatly pleased at seeing you all this evening. All I wish to say is, I hope that these new rooms and the formation of the Exchange will be beneficial both to the Builders' and the Architects' Associations and to the architects of this city at large. I am surprised this evening to see such a large gathering of builders here. I had expected to see about two dozen, instead there are over one hundred present.

Harry Rich then sang, "Boys of the Old, Old School," which pleased the boys of the old old school so well that Mr. Rich was forced to respond to an encore, in replying to which he favored them with "Polly."

The toast of "The Builders' Exchange" was then proposed by Mr. Curry, who made the following remarks:—"This Exchange will be able to show what the builders can do in the way of benefitting themselves, and also the architects, as our interests are practically one. It is a difficult thing to say just what could be done to promote the best of feeling between the architects and the builders, but something should be done to place things in a better position than they now are. It cannot be considered satisfactory when builders are competing to obtain work at rates which will simply give them day's wages at the best; that is the condition of things at the present time. At the same time it is a very difficult thing to say what would be satisfactory to all parties. Certain of the builders propose certain remedies; nothing could be accomplished without the builders being unanimous on this question. You must learn to have confidence one in another. If you can cultivate confidence, it will place you on the road to secure the needed remedies. I think the architects will do all in their power to assist you. Of course the architects do not care to interfere in matters not considered their own. Sometimes the trade unions undertake to dictate to the architects what they should do. I am not at all opposed to trade unions myself in any sense. I don't believe there are any of us who are desirous of having our work done for less than will maintain a man in comfort. It would be very unjust to get work done at a price which would insure but a bare existence. We can surely make more than a mere existence. Now, I hope this Exchange will result in the builders coming together and talking the matter over, and having greater confidence in each other, and arrange matters so that in future this unreasonable competition will not go on, although it seems to be the principle of the present day that everything must be cut down, to the detriment of the great majority, while the few reap the benefit. There are many points to be considered as between the architects and builders. In this matter of tendering, say a builder puts in a tender, and his tender is the lowest; an architect has to consider all tenders thoroughly, and he will accept the tender that is most judicious in the interest of the proprietor and the contractors. Then the builder who has put in the lowest tender thinks he is being played upon, and gets indignant. Now, it comes in as between the architects and builders very often that the contractors are trying to get the work done with as little work as possible, and the architect with as much as possible. I have been told that it was my duty to get all I could out of the contractors. The contractor, I think, should tender to do the work at such a figure as will allow him to perform the work to the thorough satisfaction of the architect. I think one of the great faults of the present day is that specifications are more or less useless. They are drawn up by the architect in rigmarole style. There has got to be a specification of some sort or other. An architect is not infallible; he cannot know everything. It is this question of inferior specifications which causes a great deal of dissatisfaction. If the architect knew just what class of work a proprietor wanted or about what he wanted to expend, there would be less friction in these matters. Now, I think it would be in the interests of the members of this Exchange to try if some means could not be adopted whereby a reasonable profit could be got for work done. If you find an architect is unreasonable in the manner of work to be done, you need not take work from his office. I think it would be well to drop out of that architect's office; that is the only way to put things straight. If the architect is unreasonable and unjust, why do not go near him. At the present time it is a very difficult thing to try and raise prices; everyone wants work; they must have work often, and they attempt to get it at a very low figure. Something should be done to improve the present condition. I think combines useless.

Mr. W. J. Hill, the President of the Exchange replied as follows: "On behalf of the Exchange I have to thank you for the hearty manner in which you have drank the toast of the Builders' Exchange. Away back in the early sixties, the first builders' association was organized in the city of Toronto. From that time until February last the organization assumed various shapes. After considerable talk last winter, certain members prominent in connection with the builders' section decided to write to the United States for information necessary to the establishment of a Building Exchange and as to what basis they were run on in the United States. Soon after application was made to the Ontario Government for an Act of Incorporation. The Builders' Exchange was formed for the purpose of providing valuable business information to its members. Immediately after we obtained our charter in February last, we enrolled 37 members, and from February up to the present we have issued certificates to 137 members. We have formed Sections known as the "Stone Cutters Section" "Builders' Laborers Section" and the "Carpenters' Section." The Plumbers' Section" will likely be formed inside of the next week or so. The felt and slate roofers intend to form a section soon. A short time ago we decided that our rooms were too small; we hadn't the accommodation for meetings that we required, so we set about making arrangements for new quarters. We have agreements with the Masons' Section and the Stone Cutters' Section. I want to say to our members to-night, stick to your agreements. There has been a little friction in one quarter but this has blown over. We have a Board of Arbitration in connection with our Exchange to settle disputes. There are a few questions as between architects and the builders that might be put on a better footing. I am satisfied that the outcome of this meeting will be the issuing of a few more certificates. I invite Mr. Smith and every member of the architects' association to our rooms at any time. You will find some of us there always. We intend to make this our place of business. Members of the Exchange gather here in the mornings, and transact general business here." I have again to thank you heartily for the manner in which you have responded to the toast of the Builders' Exchange."

The Vice-President, Mr. Geo. Moir, in replying to the toast, said: "I think the President knew very well that the time was short, and he also knew that I hadn't very much to say; and what little there was required to be said he took care to say himself. He has covered the whole ground most carefully. I can only endorse every word he has said in regard to the cordial relations which ought to exist between the architects and builders generally. I think we are all in the same boat. It is all very well to say that architects are with the proprietors all the time—I don't think this is the case.

Mr. Henry Simpson then favored the company with an exhibition of ventriloquism which occasioned great amusement. Many were the jokes got off at the expense of some of the members.

Mr. Harry Rich sang "Two Sweathearts" in capital style, and again had to reply to an encore. His encore number was "You Grow More like your Dad Every Day," which made a great hit.

The next feature of the programme was a short entertainment by Mr. George Oakley, illustrative of an Irishman's boyhood days on the farm. His impersonations of the cattle in the farm yard were very realistic.

The toast of "The Ladies," proposed by the President, brought forth a happy response on behalf of the fair sex from Mr. Elliott.

The company dispersed shortly after midnight with the feeling that they had spent an evening of solid enjoyment and profit.

WOODWORK IN ART.

I see it stated that Kerr Natter, the distinguished Austrian sculptor who recently died in Vienna, was in his youth a wood-carver, and by the practice of his humble craft rose to eminence in the highest of the plastic arts. Now, not a few of the best known artists of this country have served a similar apprenticeship. Sir Francis Chantrey, who died with a hundred thousand pounds, rose from the carving of ship's figure heads, through second-class portrait painting, to quarry in the gold mine of his very respectable, if not transcendent talents. The first serious efforts in art of Prof Herkomer and of Mr. Seymour Lucas were made with the gouge and chisel on a block of wood. James Burnet, too, practised as a woodcarver, and Opie professed the baser craft of a carpenter, and Romney of a cabinet maker. It is only another illustration of the truth that to the real artist the medium is nothing—nothing but a means to reach a higher end.

London Graphic.

A MANTEL SIX THOUSAND YEARS OLD.

It is seldom that wood, which was grown more than four thousand years before the Christian era, is used in the construction of a present day residence, and yet this really happened recently in Edinburgh, Scotland, where a mantel was fashioned from wood said to be six thousand years old. The wood, an oak tree, was found in a sand pit at Musselburgh, thirteen feet below the surface. Professor Geike, of the geology chair of the University of Edinburgh, after personally examining the strata in which the oak was found, said the tree, which was five feet nine inches in diameter, must be at least six thousand years ago, and describes it as a relic of neolithic man. It was in a fine state of preservation, due to the sand, and was easily workable.

FRAUDULENT CONVEYANCE—CONTRACTORS.

Where a firm of contractors who had undertaken to grade certain sections of a railroad, being unable for want of means to carry out their contract, conveyed to appellent all their property for equitable distribution among their creditors, appellant undertaking to complete the work and turn over the profits to the grantors' creditors after reimbursing herself for expenses incurred; the Kentucky Court of Appeals held (Cavanaugh vs. Riley) that the creditors of the grantors had no right to complain of the conveyance.

Mr. G. S. Dore has been appointed Sanitary Engineer of the city of Montreal, as successor of the late Mr. Radford.

The liquidator of the Danville, Que., slate quarry has sold the property to J. C. Stockwell and James Morrill, for $5,800.

The Laprairie Pressed Brick and Terra Cotta Company has been incorporated at Laprairie, Que., to manufacture bricks, tiles, etc.

Messrs. Taylor Bros., of Toronto, have purchased a device which will enable them to utilize the gas from the coal used as fuel under steam boilers for burning brick.

The Douglas Pine, one of the gigantic trees of Canada, is named after its finder, David Douglas, a botanic discoverer, at one time in the service of the Horticultural Society of London. He was an untiring explorer, and ultimately lost his life in a pitfall made for trapping wild cattle, being gored to death by one of these savage animals, which was in the pit.

CLASSIC ARCHITECTURE IN RELATION TO DETAIL, WITH A FEW NOTES ON CONSTRUCTION IN BUILDING.*

BY ERIC MANN.

The object of this paper is to draw the closer attention of students and assistants in architecture to the necessity of carefully looking into the work of detail in connection with the preparation of working drawings. How often do we see, an otherwise good piece of work spoiled in finish by badly executed detail in the moldings of cornices, string courses, dormer windows, porticos, exterrally and in panelling, plaster work, and inside finishings generally. In this connection I would strongly recommend the student or pupil to work from the examples of Sir W. Chambers' treatise on the "Decorative Part of Civil Architecture," and the works of Palladio contained therein, and to make drawings of the orders and detail the various members, from the pedestal, with its base, capial and dodo; the column, with its base, shaft, neck and capital; the frieze and entablature with the cornice as given.

The enlarging of the members of the various parts of the five orders, gives a pupil an excellent training in proportion, along with which he learns how to construct the various moldings. Nearly all these moldings enter into the composition of daily practice in stone, wood, plaster or iron work, and it is of the greatest importance that a correct style in forming these moldings, and a sound knowledge with regard to when they are correctly formed and proportioned, should be cultivated, as we see so much bad work done, evidencing a half educated author in the designs being carried out, no matter however small or great the work may be.

As the orders of architecture are the basis from which we chiefly derive the decorative part of our work, a few words on each order in passing will be in place here. As you all know there are five orders. Three, said to be of Grecian origin, are called Grecian, by the names of Doric, Ionic and Corinthian. The remaining two, being of Italian origin, are called Latin orders; they are distinguished by the names of Tuscan and Roman. Little is known at what period the orders were invented, and of their improvement we can only judge by the fragments of antique structures built in different ages, and still to be seen in various parts of Europe, Asia and Africa. The existing specimens of classic often quoted as examples of all that is fine, graceful and beautiful in architecture, may be taken as the Temple of Concord, portico of the Pantheon, and other parts of this structure in the Doric and Ionic; the arch of Constantine, Interior of Pantheon, Temple of Bacchus, and others, in the Corinthian, not forgetting the great Colloiseum in Rome, a specimen of Doric treatment. Besides these, in the sixth, or composite order we have the great Arch of Titus and others.

We find that a great author in classic architecture, named Perrault, has compiled a statement of comparative proportions of the various celebrated buildings in ancient Italy and Greece. His great intelligence and depth of research, has rather upset the pretensions of the great Vitruvius on the diminution of the shafts of columns.

A great deal might be here said on the subject of classic architecture, but the short comments I have made will be sufficient to illustrate the connection between the subject, and the object of my paper.

Following on this, I may add a few more words on the pupilage system in the old country. The pupil there is indentured or bound by a deed to be so many years, say five, in the office, and has to pay from three to five hundred dollars for this privilege. During this time he is put through a course of training, but at the same time is subservient to the rules of the office, and has to give all his time and work for the benefit of his employer. I have known pupils who turned out fairly good draughtsmen in two years, and are giving the benefit of their work to the architect whose office they are in.

This practice of working at classic architecture from books and examples is what is generally adopted in training a pupil for the first year, and if he is apt and likely to have a taste for the profession he has chosen, he will find that what I have said in the early part of this paper is not without its weight.

Although this reference to pupilage may appear like a digression from the object of my paper, yet it may serve to show the idea I have in connecting the early training with the successful and unsuccessful draughtsman.

Again, the careful working out of detailed work is one of the pleasantest parts of the office routine. The plans and elevations require to be well studied. The parts requiring drawing to enlarged scale must be correctly and carefully done, every molding and part exact as to size and figure; without this, full sized drawings cannot be correctly turned out. The pupil will find it comparatively easy to make a full sized detail, if he has got a perfectly correct enlarged scale drawing in front of him, and on this principle alone rests the secret of turning out correct detail for construction.

It is an evident matter to tell by the general design and detail of a building whether the architect employed has been carefully educated or not. I would like to draw your attention to the front or facade of St. Peter's Cathedral now being erected on Dominion Square. It is supposed to be an example of classical architecture, but if you study the detail after a course of Palladio; you will see how faulty it is. The pilasters, pediments, etc., of the front windows, bases and shafts, moldings, etc., are all out of the proportion laid down by the ancients, and which are accepted and worked upon at the present day. We have but few examples in Montreal of this class of works. The bank of Montreal is one specimen worth looking at, however.

Closely following on "detail," we find one of the most important elements embodied in the work of the architect's profession, namely, construction. By construction we mean the creation in solid materials bit by bit of the architect's conception and designs in a thoroughly practical, sound and workmanlike manner, and this is not, as it may look at first sight, such a simple task; on the contrary, it is the alpha and omega of the whole building, and demands close attention and watchful application on the part of the architect, because we consider that the architect is the creator of the structure as shown in his completed drawings, and we take it for granted that he has the genius and judgment necessary to carry to a successful issue the work of his brain and hands. The builder is the instrument set to carry this work on in accordance with the architect's intelligent plans and detail drawings, and under his instructions and directions. At this point, I would like to say, that builders as a general rule, are rather inclined to underrate the importance and nature of the architect's position, and to relegate to themselves a number of the duties devolving on the architect alone, and do not even stick at offering advice and guidance to the architect's clients or would be clients. This may be another digression, but I think that the profession ought to be upheld and its dignity fully maintained by us all.

The primary duty in construction, is a proper superintendence of the work during its progress. The foundations, on the sufficient construction of which so much rests, ought to be put in on a well levelled bed, free (if on a good earth bottom) from irregularities of surface, round stones, etc. The stones for footings should be large, and as much of a thickness as possible. The corners in all cases should have large heavy stones, and the joints broken so as to prevent an angle joint.

The building of rubble masonry represents a sort of puzzle, but the best built walls show a fair even surface on both faces, and also show in construction a sufficient number of through or bond stones in the wall. What exactly is a "sufficient" number, it is rather difficult to say, but an intelligent mason is always ready to do what is right on the architect's direction. Nothing is so miserable in building to look upon as a weakly built wall of small stuff packed full of rubbish and bad mortar from the trowel, and sad as it is to relate, this work can be seen going on here and there in the city to-day.

The proper external pointing of walls is a very vital matter, and one sometimes neglected, especially late in the season, when the mason is anxious to fill in round the walls; especially strong mortar ought to be used for this work, and the wall plentifully pointed and filled from the footing up as the work advances.

The matter of carpenter and joiner work is what may be termed the "skeleton" of the building, and in its fitness of framing and soundness of material, lies in a very large measure the quality of the house after one one year's occupation. How often do we see houses going sadly to pieces after one year's trial. The heating up begins to try the woodwork sadly. The studding, joisting, etc., begin to shrink and go, with the result that the plaster work shows gaps and cracks, notably in angles and staircases. A certain amount of this almost inevitable shrinkage is generally conceded and looked for, but if the timber is well dried and nailed, it is not nearly so marked, as in the case of wet stuff, which does not appear damp when being put up. In arranging the joisting of a building it is a good plan to have all the positions where plumbing work is situated trimmed "clear," with double trimmers, so as to prevent any cutting of joist for bends, etc.; also all openings to staircases, etc., ought to be double trimmed.

To prepare a building for the plasterer requires some thought and care. In the summer season it is not so particular, but in all cases we must see that the rough floors are well laid, and partitions all in place, the door casings all on, the grounds for plaster, carefully and well nailed on, care to be taken that they be left quite level and straight on face, as the neglect of this leads to unevenness in the skirtings, or "chopping," and consequently the loosening and breaking of the bond of the plaster. All roof openings should be attended to, and all necessary beads and casings put in place.

The hanging of the inside doors is another matter for attention. A good joiner will hang a door so that the door when shut appears about the same on both edges, but a badly hung door usually catches on either top or bottom hinge and presses in on the casing, all owing to not having been hung truly plumb; the casings of course must be quite square and true when put up. Locks may also be put on to look very slip-shod like, and not present that level, clean surface which the face plate ought to show on the door rail. The putting on of architraves is also important, especially when the skirtings and architraves are of especial design—the fitting at angles shows at once, and declares itself a poor or a good job.

In the matter of plumbing, gas and sanitary work, a very great deal has been said and written. You are all aware that our plumbers are not plumbers at all, but "sanitary engineers." I would, however, much prefer to deal with a good, sound, practical plumber, and there are many such in our own city. I consider that in all branches in the complex construction of a building, the architect's attention and vigilance are essentially necessary, and the plumber's "man" requires to be directed, however little he may like it, and now and then corrected, even. The improvements made in sanitary ware and the adoption of all iron soil and inside drain pipe, the ventilation of soil pipes, inside closets, etc., has made our houses very superior to what they were some fifteen years ago. I strongly advocate the system of open all ware, w. c. basins set on slate or marble slabs, copper lined cisterns with self-action, steel sinks, and where it can be afforded, white ware sinks, as for baths; procelain is very fine, but is exclusive as to cost. Copper lined is a good bath, also, and white ware open basins are to be recommended. For the soil pipes, should they have to pass under the cellar floor, extra heavy iron pipe should be used, enclosed in a trench covered on top with heavy wood covering, so as to be got at the entire length at any time; if possible, soil pipes are as well to be run on the wall, fully exposed to view, and every bend and connection accessible from bottom to top.

A great deal more might be said on this subject—in fact it is almost endless—but as long papers are not necessarily interesting ones, I will conclude by hoping that this one may have been found of some interest to most of you, and to join the President in his hope that my confreres will see their way to giving us papers as the season advances.

*Paper read at the Third Annual Convention of the Province of Quebec Association of Architects.

HAMILTON CORRESPONDENCE.

HAMILTON, Sept. 23rd, 1892.

EDITOR CANADIAN ARCHITECT AND BUILDER.

SIR,—In your issue of this month, your youthful correspondent at Hamilton has over-reached himself in his anxiety to belittle the sculptor who executed the carving on the Grand Opera House here, and who is now engaged on Mr. Geo. T. Tuckett's palatial residence. The mean attempt was made because that gentleman laughed at a stupidly crude and utterly impracticable drawing that the youth had made for the sculptor to carve from for Mr. Tuckett's building.

To show the absurdity of this (not to say wilful and malicious) mis-statement, I may state that no carving was done on Mr. Tuckett's residence until the 15th of September, several days after your valuable journal reached me. The sculptor, when I I drew his attention to the article, only smiled at the weak attempt of the lad to injure his reputation as an artist, as well he might, a reputation indelibly carved on most of the public and many of the private buildings that adorn, not only Hamilton, but many of the other cities of Canada.

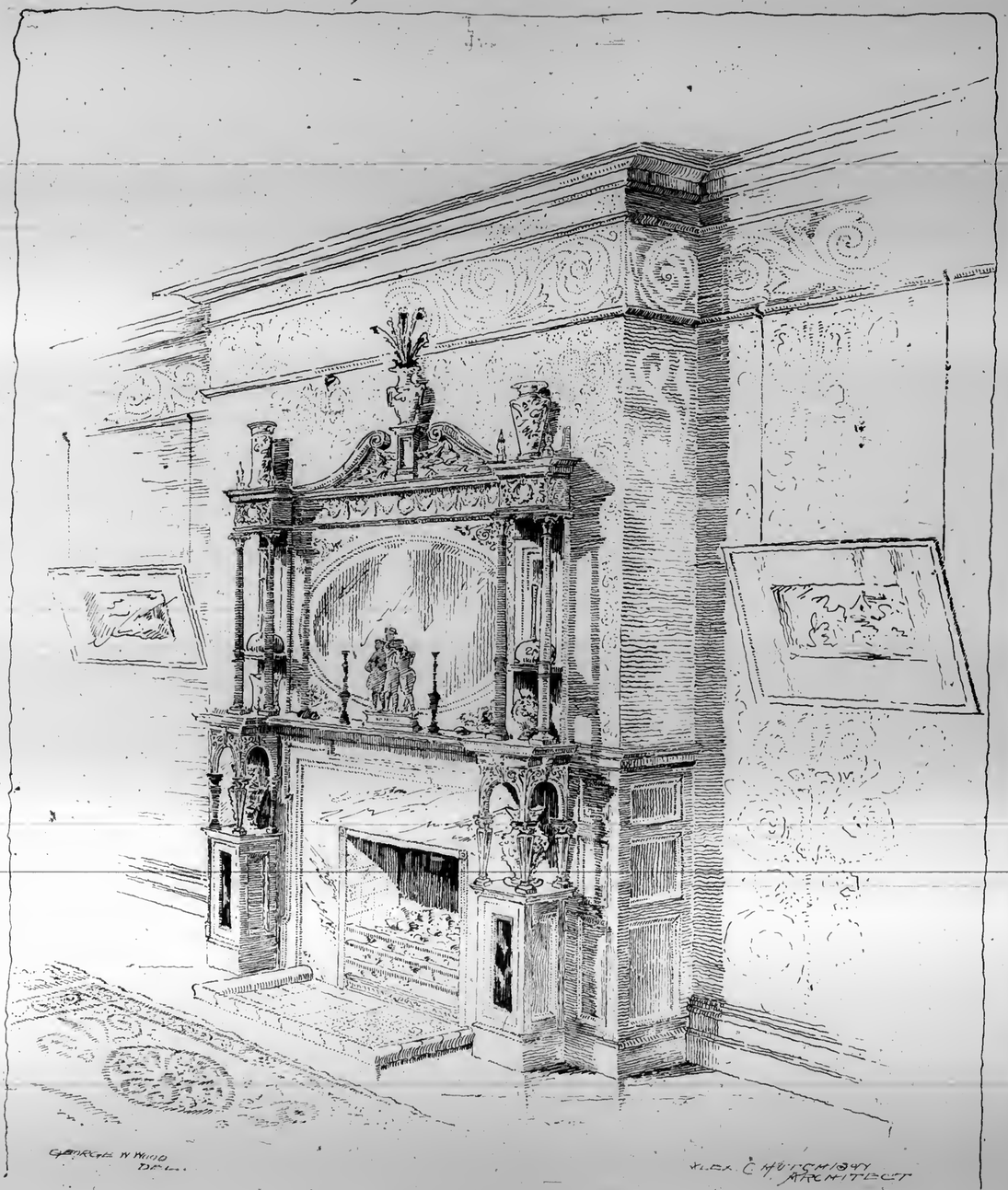
Yours truly,

DORIC.

The life classes in connection with the Toronto Art Students' League have resumed their work, with every prospect of a successful season before them. The numerous sketches adorning the walls of the League rooms in the Imperial Bank Building bear testimony to the industry of the members during the summer months.

UNITED EMPIRE LOYALIST MEMORIAL CHURCH, ADOLPHUSTOWN, ONT.

POWER & SON, ARCHITECTS, KINGSTON, ONT.



Drawing Room Mantel.

House on Jameson Avenue, Toronto, for Mr. W. P. Atkinson.

Church of St. Mary Magdalene, Manning Avenue, Toronto.

Darling, Sproat & Pearson, Architects.

CANADIAN ARCHITECT AND BUILDER.

VOL. V.—No. XI. TORONTO AND MONTREAL, CANADA, NOVEMBER, 1892. { PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
64 TEMPLE BUILDING, MONTREAL.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	S. G. CURRY, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	E. J. RASTRICK, Hamilton
TREASURER	D. B. DICK, Toronto.

COUNCIL:

WM. G. STORM	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
JOHN E. BELCHER	Peterborough.
EDMUND BURKE	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	V. ROY, Montreal.
1ST VICE-PRESIDENT	J. NELSON, Montreal.
2ND VICE-PRESIDENT	H. STAVELEY, Quebec.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
J. J. BROWNE	Montreal.
J. HAYNES	Montreal.
D. OUELLET	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. J. HILL, President.
GEO. MOIR, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JOHN ALDRIDGE.
BENJAMIN BRICK.
WM. PARK.
JAS. CRANG.
M. MURPHY.
J. LISTER NICHOLS.
WM. PEARS.

JOHN L. PHILLIPS, Secretary.

WE had hoped to be able to print in this number the remainder of the papers read at the recent convention of the Province of Quebec Association of Architects, but the space at our disposal proves not to be sufficient for the purpose In consequence the interesting paper by Mr. Baillairgé, of Quebec, on "Means of Escape from Public Buildings in Case of Fire," is held over until next issue.

IN placing heavy weights on a floor, such, for instance, as a safe, it is often desired to know which is the best position for safety. This is easily determined. The floor boards will show the direction of the joists, and the safe should be placed in such a position that it rests on the ends of the joists, so that several of them support it. If the safe were placed against the middle of a wall to which the joists run parallel, the weight would all rest on two, or at the most three joists, and at the worst place, viz., the centre.

A BUREAU of Hygiene and Sanitation has been organized to prepare a collective exhibit for the Columbian Exhibition illustrative of the present condition of sanitary science. Dr. F. W. Brewer is the Superintendent of the Bureau. In this connection we observe that the Provincial Board of Health of Ontario has decided to assist in collecting the material for a Canadian special Sanitary exhibit at the World's Fair. With that object communication will be had with the local boards of health and with manufacturers and dealers in sanitary appliances.

THE preliminary arrangements have been made for a Canadian art exhibit at the Columbian Exhibition.—A Committee, representing the various art societies, will select the subjects at exhibitions to be held in Montreal and Toronto in February. A hanging committee will be appointed and a competent person to represent Canadian artists at Chicago. The hanging committee will assume the responsibily for the safe return of the exhibits to Canada. It is to be regretted that the enthusiasm which is being manifested by the artists has not also taken possession of the architects.

WE understand that some sixty designs were submitted in the preliminary competition for plans for public buildings at Victoria, B. C., to which reference was made in our last issue. Mr. S. G. Curry, President of the Ontario Association of Architects, and Mr. A. T. Taylor, member of the Council of the Province of Quebec Association of Architects, have been appointed to judge the designs, and to select the five which in their opinion possess the most merit. The authors of these will be required to submit designs in a final competition. Messrs. Curry and Taylor are at present in British Columbia making an examination of the preliminary designs.

Building contractors might well learn the lesson of how to estimate from the contractors for public works, who, while dealing with contracts of vastly greater magnitude, vary but slightly in their tenders. As an example, we may cite the case of the tenders for the construction of the Soulanges Canal. For section 11, five of the lowest tenders were in this order: $278,812, $281,749, $183,479, $289,649, $262,865. For section 12, six of the lowest tenders were as follows: $234,561, $235,218, $239,342, $240,990, $244,000. For section 13, several of the lowest tenders ranged as follows: $532,129, $552,629, $556,537, $559,695, These figures indicate that a more business-like method of esti-

mating prevails among contractors for public works than among building contractors, by which results much more accurate are secured by the former than are usually achieved by the latter.

A GREAT deal of well-merited praise has been bestowed upon the St. Clair tunnel as a type of modern engineering skill. The important feature of ventilation, however, appears not to have been successfully worked out. A suit for $75,000 damages is now pending against the Tunnel Co., the plaintiff being the widow of a brakeman named Hawthorne, who died from suffocation while the train on which he was working was passing through the tunnel. It appears that the train parted in the middle while in the tunnel. Hawthorne was on the rear part and was suffocated before assistance reached him. The company is said to be considering the question of using electric cars in the tunnel.

THE first prosecution under the new scaffold by-law of the city of Toronto, took place during last month. The prosecutor was the city Building Inspector, and the defendant, Mr. James Hill, a Cleveland contractor who is building a brick chimney stack one hundred and seventy-five feet high for the Toronto Street Railway Co. Mr. Hill contended that his men were perfectly satisfied with the scaffold, and further, that the most dangerous part of the work had been completed, but the magistrate refused to allow him to proceed until the scaffold was re-constructed from the bottom up in accordance with the requirements of the by-law. For the information of builders who may not be familiar therewith, we print elsewhere in this issue the provisions of the law.

A PROPOSAL has been introduced by Alderman Lamb in the Toronto Council for improving the present market accommodation. The suggestion is that an architectural competition be instituted for the purpose of procuring designs for the alteration of the present St. Lawrence market. It has likewise been suggested that it would be desirable to erect new buildings on the esplanade, convenient to the proposed Union railway depot and the steamboat landing. The latter proposal is one well worth considering. The lake front would be almost as convenient of access as the present location, and unless the present buildings can be so altered as to provide all necessary accommodation for the next fifteen or twenty years, it would be more satisfactory to erect new ones.

The recent outbreak of diptheria in one of the choicest residential districts of Toronto, has drawn attention to the foul condition of the sewers as being the most probable source from which the disease could emanate. It does not appear to be a rule of the city service that the sewers must be flushed at regular intervals; consequently it is left to the rain to cleanse them, and there having been but little rain for a month or two past, they have become the receptable for all manner of filth. This condition of affairs, bad enough in itself, is accentuated by the fact that the only means in use for the ventilation of sewers are the gratings in the manholes in the centre of the street and on a level with the pavement. From these manholes there is being constantly emitted into the atmosphere the poisonous gases engendered by the foul contents of the sewers. It is quite time that some proper method of ventilating the sewers was adopted. It would be a comparatively easy matter to placein inconspicuous positions a sufficient number of ventilating shafts for this purpose.

A railroad man in Broad Street Station, Philadelphia, recently said that the Pennsylvania Railroad Co. have for years been looking for something to take the place of glass for use in glazing the station roofs and for similar positions. He said that the heat and smoke given off by the engines, added to the vibration caused by moving trains, has the effect of breaking the glass, however well it is bedded. The cost of putting in new glass always is considerable because of its high position and the difficulty of getting at it, but that is nothing to the expense that would be sure to come should a piece of cracked glass fall and injure a passenger. Railroads have not only to buy the best because of economy, but have always staring them in the face possible suits for damages. What is required is some sort of a glass having imbedded in it a steel wire mesh so that should the glass crack the wire will hold the pieces up. A paragraph in a foreign paper states that a material of this kind has lately been put on the market in Germany. It is, however, only made in small sheets, and is therefore practically useless.

A correspondent of the Montreal *Gazette*, writing from St. Johns, Nfld., takes a sombre view of the future of that city. He points to the fact that the value of property destroyed in the recent conflagration amounts to upwards of $20,000,000, while the total sum paid in insurance reaches only $4,800,000, leaving the community poorer by $15,000,000. "One cannot but smile," says this writer, "at the shallow, optimistic views propounded by some here, who have little insight into the reality of matters. These talk flippantly of building up at once a fine city far superior to the former; and even hint airily that the fire is rather a good thing, and that we will soon be in a better position than ever. It is well to be hopeful, but to indulge in childish fancies and hug illusions can do no good. The expenditure in work, and the increased employment given will create a temporary boom and seeming prosperity; but our capital is diminished, our houses, public buildings, educational establishments, halls, etc., have to be restored, and all this implies hard work continued through years. We have to go back fifteen or twenty years, and like a colony of beavers whose dam has been swept away by a flood, begin the work afresh. The beavers are not jubilant or jaunty over the flood that has broken up their homes and destroyed their labors, but quietly go to work and grimly face the disagreeable facts of existence as part of the ordinary course of nature. Our shallow-pated optimists, who are generally non-workers and only talkers, void of all practical talent, had better 'consume their own smoke.' Their idle chatter only irritates the real workers."

It is stated on the best authority to be the intention of the Montreal Street Railway Company to extend its lines as fast as possible to the outlying districts, with the object of attracting population from the crowded central parts of the city, to build up the suburbs and increase the street car traffic. Such a policy would no doubt result profitably to the company and would be the means of greatly improving the appearance of the city as well as the conditions of residence therein. In this connection we quote with approval the following from an editorial article which recently appeared in the columns of the Montreal *Gazette*:—"The Quebec order of domestic architecture runs to terraces. A man's lot is twenty-five feet front running to a lane in rear which is too often the common receptable for all the refuse of the abutting proprietors' dwellings. His end wall, like his lane, is common to his neighbor. This fashion of crowding may be a survival from the days the towns had walls to keep out the Indians and intra-mural space was too valuable to waste in gardens. The fact that the area of the city was small also no doubt tended to strengthen the traditional style, which had a further excuse in the desire of the people to live as near their places of business as possible, owing to the poor means of transport available. The house-building ways of Montrealers have also been copied by their suburban neighbors, even when there was no excuse in the dearness of the land occupied. The result is that Montreal and its offshoots present one of the most densely populated areas, outside of New York city, on the continent. The city would be healthier as well as more attractive and home-like, if there was greater individuality in the citizens' residences—if families lived in houses, instead of being domiciled in sections of a block. It is unfortunate that the era of suburban development now promised from the modernizing of the street car service, does not also promise all that is desirable in the way of a change. Farms miles out in the country have been surveyed and sold on the 25-foot plan, and, because the people do not think for themselves, the vendors have met with a success that was hardly anticipated. The process of emancipation from the old rule may evidenely be slow unless some real estate man, more keen than his rivals, sets the example that once seen will be appreciated. There is such a thing as costly economy in house building, and Montrealers illustrate one phase of it when they sacrifice individuality, homelikeness, healthfulness and appearance for the sake of half the cost of a dividing wall."

The CANADIAN ARCHITECT AND BUILDER, $2 per year

ILLUSTRATIONS.

RESIDENCE OF MR. J. L. MORRISON, CORNER WINCHESTER AND METCALFE STREETS, TORONTO.—J. WILSON GRAY, ARCHITECT, TORONTO.

THE PLENUM SYSTEM OF VENTILATION, ILLUSTRATING PAPER BY MR. A. C. HUTCHISON.

COTTAGE FOR MR. A. F. LOBB, TORONTO.—E. J. LENNOX, ARCHITECT, TORONTO.

COTTAGE ON AUSTIN AVENUE, TORONTO, FOR MR. WALTER DAVIDSON.—J. FRANCIS BROWN, ARCHITECT, TORONTO.

LAKESIDE ROAD COTTAGES.—J. FRANCIS BROWN, ARCHITECT, TORONTO.

ARCHITECTS' FEES.

CHARLOTTETOWN, P. E. I., Oct. 28, 1892.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR, I would be glad if you could answer the following questions in the next number of the CANADIAN ARCHITECT AND BUILDER:—

What is a fair charge by percentage for preliminary drawings (plans and elevations) specifications and estimates of proposed alterations and repairs to a large public building built of free stone? The building was erected about 50 years ago and is in a very bad condition, parts of the work being almost dangerous. There was included in the preliminary work a careful report upon the present condition of the building, and the cost was figured at $18,000. The work, however, was never carried out.

Yours truly,

C. B. CHAPPELL.

[The charge for full professional services for a public building is 5% of the cost of the building when completed. In case of the abandonment of the work, the commission is calculated from the estimated cost of the building, and is for the degrees of partial service as follows:—

1. Preliminary studies, 1/5 of the full commission as above.

2. Preliminary studies and general drawings and specifications sufficient for estimate and contract, ½ of the full commission as above.

3 Preliminary studies, general drawings, specifications and details, 4/5 of the full commission, as above.

For the alteration of premises a charge in excess of the above is made for surveying, measuring and plotting an existing building, and for such other extra work as may arise in the preparation for or supervision of alterations. This charge is based upon the time occupied.—EDITOR C. A. & B.]

A REPLY TO "DORIC."

HAMILTON, Oct. 22nd, 1892.

Editor CANADIAN ARCHITECT and BUILDER.

SIR,—In reference to "Doric's" letter in your last issue, I must say there was no intention on my part to injure anyone's reputation; such an idea never entered my head. The two buildings referred to have been the principal jobs here this season, and I simply criticized the carving as a matter of course; as far as that goes, I strongly reiterate what was said in the notes, and feel quite satisfied that competent judges would do the same.

"Doric" says: "No carving was done on Mr. Tuckett's residence until the 15th of September, several days after your valuable journal reached me." The ARCHITECT and BUILDER was not published till Saturday, September 17th, and, as you know, the notes were in your possession at least one month before that date. At the time these were written I positively state a large amount of the carving on Mr. Tuckett's residence was not only started, but very nearly finished, if not quite; there has been nightly little done on some of it since then.

As far as the drawing referred to is concerned, I had not the slightest idea that the sculptor had laughed at or in any way criticized it till reading "Doric's" letter; it quite surprised me. I contend, however that there is nothing crude or impracticable in it, and am quite ready to have my copy of the drawing inspected. The idea is certainly somewhat new, and doubtless it was reluctance to leave the rut of old ideas that caused the sculptor's hilarious criticism.

In conclusion let me say, that although this sculptor may have done highly artistic work on many other buildings in Canada, it does not in the least alter the present case; in fact it is more to his discredit that this work should have been turned out.

I am, yours faithfully,

C. H. ACTON BOND.

THE O. A. A.

November 5, 1892.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR, What has become of the Ontario Association of Architects to which I have paid a subscription for two or three past years. We in the country look anxiously in the CANADIAN ARCHITECT AND BUILDER for some signs of its existence, but month after month goes by and we begin to think it is dead. Surely for an Association of such importance to the Province, we, the members, might expect to hear something between the annual meetings, but now we never even see any reports of board or Council meetings, which used occasionally to appear. We have been waiting now for nearly two years to see the results of Mr. Townsend's investigations and experiments on the building stones of the Province, which Mr. Curry recently stated was of decided value to architects, and naturally we should like to know whether any progress is being made towards the erasion of the word "Registered" from the Act. I see in a speech of Mr. Curry's at the meeting of the Province of Quebec Association that the work of the Ontario Association has apparently dwindled to the training of students, and that he expects we should all pay for this laudable object, and he infers that he does not want men to be in the Association who are not willing to do this without expecting to receive benefits. I think we all joined the Association under the notion that it was to be for some rather more general good to the profession than that, and personally I do not see the advantage of remaining a member for the sole purpose of educating young fellows in Toronto.

The Quebec Association has hit upon an excellent idea, that of monthly meetings of the members in town. Now, if the city members would meet monthly, read and discuss papers and have the papers and discussions published for the use of country members, we should certainly be benefitted. It seems to me that the policy of our Council is to keep quiet why, I do not know, unless it is that they fear to excite opposition, but I would remind them that opposition is generally very beneficial and in this case would certainly rouse us to do something for the Association in the way of helping against contrary influences, whereas now we are gradually losing all interest.

Now that the Association has shown us that some communication between the architects of the Province is a good thing, I for one would certainly like this communication to be kept up, and if the Association cannot do it except for two days or so in each year, there is certainly room for some other organization, at any rate for the use of country members.

Mr. Curry says that the Toronto Architectural Guild dine together once a month or so and discuss matters of professional interest. He says that the Guild is very exclusive, by which I conclude he means that it is composed of probably the members of the Council who happen to live in Toronto and other members of the profession who have large practices. Now, most of these, if not all, must be members of the O. A. A.; then why, if they can meet and talk together as a Guild, can they not do so as the Association and let us outsiders have the benefit of their discussions? I would gladly subscribe that they may dine together if they would only do this for me in return.

I do not wish to put myself forward as the mouth-piece of country members, but I feel sure they must all feel pretty much as I do, and it would be a good thing for us all if others would write to you their feelings in the matter.

I suppose there is to be a convention next February, and I have no doubt that the city members will do their best to make the country members welcome, and I do not forget how well they have entertained us, but pleasure apart from the meetings of the convention, will do us from the country very little real good. I understand now since Mr. Curry's visit to Montreal that we are very selfish to expect any good; we ought to come up in flocks or droves to benefit the students, but unhappily I cannot afford to do that, and I am afraid I must confess to being one who puts his "personal business" before the training of the youths.

Apologizing for the length of my letter, I am yours truly,

A COUNTRY MEMBER.

TORONTO ARCHITECTURAL CLUB ORGANIZED 1889

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—Will you kindly allow me space in your columns to draw the attention of the architects of Toronto to the work of the Toronto Architectural Club? It has been felt by the committee that some special effort must be made this year to augment the membership, and that a better understanding of its aims and objects might accomplish this end. This seems especially desirable as the club commences this session in new quarters, under a new name, and I may add with new and higher aspirations.

In a city the size of Toronto it requires the active co-operation of every member of the profession to make such an organization the success it deserves to be. To those who have not had the privilege of attending its meetings in the past, it might be said that the importance and interest of the papers read have been of such an order as to place the Club on an equal footing with other architectural associations not only of this country, but also with those of the United States and of England.

Owing to the fact that during last season classes were conducted for the benefit of students under its auspices, the impression may have been formed that it is merely a students' club. This of course is not the case.

A series of papers and lectures, interspersed with exhibitions, socials, etc., is being arranged for the winter's programme, which will be of undoubted merit. It is then asked that the efforts of the officers and the labours of those who prepare the papers may be backed by the regular attendance not only of the architects of the city, but also of their students, and of that large class which is, in a non-professional way, interested in the advancement of art and architecture in our country.

The meetings are held fortnightly, in "The Forum" on the south-east corner of Yonge and Gerrard streets. At the next meeting, which will be held on Monday evening, Nov. 21st, Mr. J. Wilson Gray will read a paper on "Glimpses of Chicago and the World's Fair Buildings." A hearty invitation is extended to all interested to be present that evening, and to have their names enrolled as members.

Yours truly,

A. H. GREGG,
President T. A. C.

THE INTERIOR OF A HOUSE.

The following paper on the above subject was read by Mr. C. H. Acton Bond, of Hamilton, at the meeting of the club on October 17th :—

It is a little difficult to know exactly where to begin in speaking of the interior of a house, as so much may be taken under this heading. The object of this paper, however, being to start a discussion, it will be as well to plunge right in and chance the consequences.

Whatever may be the size or cost of a house, its interior should suggest "A Home," and it is with this as an ultimate result always in view that I shall treat the subject. Of ordinary sized houses and those where a minimum of expenditure is allowed for the interior, very little will be said, as deductions can be made from the more elaborate schemes to suit these particular cases.

That portion of the interior of a house that comes under the supervision of the architect ordinarily includes the finish of doors, windows, walls, ceilings, floors, mantels, etc., and in considering these it will be necessary to speak of the various woods and their finishes, wall hangings and decorations, relief ornament, hardware, marble, tiles, grates, etc. Every apartment in the house should receive a distinctive and suggestive treatment according to its purpose, but there should yet be preserved a harmony throughout; that is, the contrast between adjoining rooms or halls should not be inharmonious, as this produces a very unpleasant effect and gives a feeling of unrest to the occupant. It will only be necessary to speak in detail of the principal rooms, as this will give a sufficient idea of the whole scheme. The general practice of treating the dining room rather heavier and in darker tones than the other rooms seems to be very appropriate; the serious business of eating is transacted here, and the occupants are usually sitting and in a comparative state of rest. In the drawing room it is quite the reverse, and a much lighter treatment is suitable. The parlor or sitting room should have a treatment somewhat between; the reception room being chiefly devoted to social formalities, should receive a light and simple but dignified finish; there should not be much elaboration in the halls, and the tone ought to be rather subdued with a view to harmonize with the various rooms. The bed rooms generally should be finished in a light and cheerful manner. Special rooms, such as a billiard room or smoking room, would have to be finished very much according to the taste of the owner.

If a room is badly proportioned, it can be greatly improved by a little thought on the design of the finish, as the length, width or height can be strongly emphasized by lines in that direction. In designing the woodwork it is well to bear in mind the final completion of the scheme, so that it may have a look of unity. The main lines should be carried round unbroken as much as possible, and wherever features are introduced, such as cabinets or sideboards in a dado of panelling, they should work in with the general heights; it is a very difficult matter to apply successfully any scheme of decoration to a room in which this has been neglected.

If it is decided to finish a house in natural hardwood, some care will have to be given to its selection for the different rooms. Antique, English or quartered oak, walnut, rosewood, black ash and similar woods would do for the dining room, the lighter woods, such as bird's eye, curled or white maple, satin wood, sycamore, or white mahogany, being suitable for the drawing and reception rooms; in the sitting room, cherry, sycamore, gum-wood, white walnut, etc., could be used, and oak, cherry, or gum-wood, would be appropriate for the halls; in the bed room it would be better to choose from the lighter woods.

Of course, the hardwood finish should all be built up, as this gives the best results; it allows the wood to be better seasoned, and prevents cracking and warping. The veneer should be about ¼ inch thick, built on a thoroughly dry pine core made of small pieces well glued up. When the hardwood is being put up, the house should be well heated, as this will avoid to a great extent the opening of joints, etc., after the work is completed.

For the finished floors white oak is very suitable, as it is a good hard wood and looks well; maple, pitch pine or white pine would make a good floor for the kitchen apartments. The flooring should be in narrow widths and could be laid rectangularly across the room, diagonally or in simple patterns, with butt or mitre joints. Pattern floors of different woods tongued and grooved together or simply glued on a backing, are sold by a number of manufacturers. This is known as parquet work and would look very well in some halls. Care should be taken not to have too much variety in the pattern of the woods.

For vestibule or conservatory floors, encaustic tiles, mosaic work or rubber tiles would be more suitable than wood.

In finishing wood consideration should be given to its natural effect, and this should be followed as much as possible; for instance, red mahogany looks best with a highly polished surface, but oak looks best when finished dull. For all ordinary finishes hardwood should be well filled. Wheeler's is one of the standard patent fillers, but there are many good ones on the market. Some painters prefer to mix their own, and usually make them of corn starch, plaster of Paris and linseed oil. Coarse grained wood, such as oak, ought to have two coats of filler. A very satisfactory way of treating oak is to give it two coats of linseed oil after being filled and each coat rubbed down with beeswax and turpentine to a dull finish. For woods such as cherry, maple, sycamore, etc., two coats of hard oil varnish applied after being filled and each coat rubbed down with pumice stone and oil, will give a good result; for a highly polished surface, from four to six coats will be required according to the nature of the wood. For finishing natural pine, apply one coat of white shellac instead of the ordinary filler, and then finish with two or three coats of finishing varnish rubbed down at each coat.

Boiled oil is commonly used for painting on account of its drying qualities, but raw oil is more reliable and gives a better result in the end; lead paint should be used in preference to zinc as the latter shrinks and creases. The hardwood floors should be filled and finished with Butcher's or some other reliable hard wax finish, or this may be done with beeswax and linseed oil.

There is such a variety of ways to treat a wall that it will be impossible now to speak of every method. The whole height may be finished in wood paneling, or the woodwork may just come high enough to form a dado; often it is nothing more than a base, and when this is so, the space above can be broken up in the decoration as dado filling and frieze, or just filling and frieze. Sometimes the frieze can be omitted with good effect, and the wall finished with small mouldings at ceiling or merged into ceiling without any break.

The most common wall decoration is wall paper, but of this not much will be said. It is produced with flat and relief patterns. Block, satin and mica or silk papers all give good effect. An excellent idea in wall papers has just been brought out in New York; it is known as the "Soudanese" pattern. In this the dominant color of the filling is carried into the dominant color of the ceiling; thus the frieze serves to interblend the wall and ceiling. Ingrain papers are now being used with patterns stencilled on after being hung. Good effects can be obtained if the colors are well chosen. Munro's ingrain papers are the best.

Besides wall papers there are many other hangings used for walls, such as tapestry, silk, embossed leather, Japanese leather, Lincrusta-Walton, anaglypta, stereo-relief, lignomur and a number of others. Japanese leather is a relief hanging decorated by bronzes and gold by the manufacturers in antique effects; it makes a very suitable filling for a dining room where there is a dado of oak. Lincrusta-Walton is a composition relief material, stamped; the relief work is very sharp and clean, but has rather a precise effect; it can be painted or decorated to taste. Anaglypta is another stamped relief material; it is not so sharp in its relief as Lincrusta, but has more of a modelled effect. Stereo-relief is a fire-proof composition hanging, cast in flexible moulds; it can be obtained in both high and low relief and with a perfect undercut; from the process of its manufacture the stiffness and preciseness of stamped hangings is avoided, and a free artistic effect is gained. Lignomur is composed of chemical wood fibre in bold relief; it can be painted, stained or varnished just as if it were natural wood.

The ways of decorating walls without hangings are just as numerous as the many varieties of hangings in existence and it will be impossible to speak of them all now, as this alone would require a whole evening. They may be painted in many ways and left either plain, with stencilled ornaments, or frescoed; if the plaster is stucco finished, an effective way is to gradate the color, and if consideration is given to the way the light comes into the room, beautiful results can be got. Immense color combinations can be got by studying the tints on autumn leaves; the harmony on them is perfect and the tints are so varied that the scope of their application is unlimited.

Linspar is a mineral composition for decorating walls and ceilings; it can be used as a stucco finish, combed or brought out in relief, and is well adapted to modelling ornament. Some painters get the same effect with a composition of their own; it is then usually known as plastico; papier mache and other relief ornaments can be worked in with it and the whole decorated as desired. An effective way to decorate relief hangings, such as lincrusta, anaglypta, etc., is to paint them, rub verdigris into the hollow, and then apply gold leaf by a roller or pad; this will just catch the high lights and accentuate the relief; the result is an antique effect and looks immense. Whistler, the American artist, obtained a striking effect in a small room by a very novel method; he painted the walls a pure black and then overlaid this with a semi-transparent yellow; the result was a misty foggy look, and the room appeared to be much larger.

Rooms treated in the Adams or Rococco styles may be finished in white or ivory enamel, picked out with gold or silver; for the very best work of this kind the wood should be of cherry, as it is so close grained and hard; the next best wood for the purpose is white wood or poplar. The wood should first be filled, then given two or three coats of white lead paint and finished with two coats of enamel, rubbed down at each coat. The white lead paint is put on to give a body to the work. Plaster should receive a coat of white shellac instead of being filled and then about four coats of white lead; after this the enamel is applied as on the woodwork. Patent enamel may be used, but, if preferred, it can be made with zinc white and light hard oil varnish. Zinc white is used in preference to lead in the last coats, as it is a purer white, but would not do for the foundation on account of its shrinking quality. Silk hangings can be panelled or draped all around the room either with a frieze of other materials or of silk festooned and caught up with relief ornament, having swags of cord and tassels. This of course does not include every way of treating walls—for instance, they could be kalsomined or whitewashed!!

Ceilings may be tinted, papered, panelled or finished in relief work. Heavy oak beams and cross beams make an excellent dining room ceiling; the panels could be filled with relief hangings, modelled plaster or stucco work, which would look well if tinted a rich brown and broad plays of lights introduced in it from the direction of the windows by chromos and vandykes. Ceilings of plaster ribs and modelling give great scope to the decorator, as also do ceilings having stereo-relief or carton-pierre ornament. Ceilings can also be painted in oils or water color. Alabastine is a patent water color preparation which can be obtained in delicate tints and gives good results.

The mantels should be of similar finish to that of the room, and grates and hearths chosen with a view to the general harmony. An open fireplace having an enamelled cream color tile backing, hearth of similar tiles with Mexican onyx border and facing of Mexican onyx, with simple oxidized brass edging frame would be very suitable in a room finished in ivory enamel. Enamel tiles are preferable to glazed where delicacy of tint is required, such as would be in this case Briquette tiles should be used for backings, as the flat tiles are liable to be cracked off by the heat. Care should always be taken to proportion the hearth, both in size and color, to the rest of the work. Bronzed relief linings look well with the darker woods. Enamelled and ordinary pressed bricks can be used for both fire places and mantels. With the Roman, Carthaginian and moulded bricks now made, great variety in design can be obtained. Other materials, such as stone, marble and slate, are used for mantels, and in England cast iron is largely used, painted to correspond with the room.

Hardware is a subject which should be taken up separately, but as this forms part of a complete whole, something must be said about it. This, as every other part, should be chosen with regard to the ultimate effect. Furniture can be obtained either plain or ornamented, and in a great number of finishes, such as plain brass, bronze, nickel plate, silver plate and gold plate. Most of these finishes have sub-finishes; for instance, oxodized effects and matching one finish with another. Iron is finished effectively by the Bower-Barff process which converts the surface of the metal into magnetic oxide of iron and makes it absolutely rustless; this is very appropriate for halls and rooms finished in oak.

In a large house it is well not to carry the same finish all through, but consider the effect of the different rooms. A drawing room finished in enamel and gold would look well with gold plated furniture, and so on. Of course, it would not be well to get too much variety this way, and a little care must be exercised. A look of completeness is given to the work if attention is paid to small details, such as finishing that portion of a butt hinge which shows inside a room to correspond with the hall; the heads of window head screws should also have the same finish as furniture of room.

In conclusion, it is only necessary to repeat that everything should be designed and selected with regard to the whole effect, and if this is done we ought to have as a result, a thoroughly artistic and satisfactory home.

PUBLICATIONS.

WE have been favored by the Secretary with the R. I. B. A. Kalendar for 1892-93, which we find to be quite as instructive as usual.

Mrs. Schuyler Van Rensselaer's papers on the great English Cathedrals, which have been appearing in *The Century Magazine* for some years, have at length been issued in book form, making a handsome, royal octavo volume of 400 pages. These articles which have been written by an amateur for amateurs, have been carefully revised by the author and greatly augmented, and with the splendid illustrations by Joseph Pennell —154 in number—present a vivid panorama of St. Pauls, Canterbury, York, Wells and the other great Cathedral churches of England. The book, considered either from an historical or a critical standpoint, is a valuable addition to ecclesiastical literature. Published by The Century Co., New York. Price $6.00.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION FOR A CITY HOUSE.

THE CANADIAN ARCHITECT AND BUILDER invites competitive designs for a city dwelling, to cost $15,000, and to be erected on a lot 30x125 feet. The lot will face the narrow way, south, the long way, east. The main west wall of the building must stand on the party line between the lots, and the main east wall must come upon the street line. There is to be no enclosed area for lighting.

The building is to contain three clear stories above ground, to be constructed of stone, or of stone and brick, with sloping or flat roof. No overhanging tile or shingle work will be allowed.

The entrance may be on either front, at the option of the designer.

The number and location of rooms and the purposes which they are to serve is left to the judgment of the designer.

Competitors will be required to furnish plans of basement and three upper stories, and elevations of south and east front. Perspectives may be submitted at the option of the competitors. Floor levels must be marked on tee side of the elevations.

This competition is restricted to architectural students and draughtsmen in Canada.

Drawings must be made on sheets of heavy white paper or bristol board, 14 x 20 inches in size, and must be drawn sufficiently coarse to allow of their being reduced to one-half the above size. Drawings must be made in *firm, strong lines*, with *pen* and *black* ink. No color or brush work will be allowed. Each drawing must be marked with the *nom de plume* of its author, and the author's name, *nom de plume* and full address, enclosed in a sealed envelope, must accompany each drawing sent in.

Drawings must reach the office of the CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto, on or before the 4th of January, 1893. The right is reserved of publishing any drawing sent in. Drawings will be returned to their authors within a reasonable time after the competition is decided.

The first premium will be $15.00, and the second, $10.

The merits of the designs will be decided by a committee composed of three members of the Ontario Association of Architects, and their decision will be final.

COMPETITION FOR PUBLIC BUILDINGS AT VICTORIA, B. C.

The decision in the preliminary competition has just been announced. Out of sixty designs submitted the five exhibiting most merit are declared to be those by the following architects:—J. Francis Brown, Toronto; Thomas C. Sorby, Victoria; F. M. Gardner, Chicago; W. J. Rattenbury, Vancouver; J. M. Connor, Boston, W. H. Skillings, Seattle, the last named two having joined on one design. We congratulate the Canadian architects upon the excellent showing they have made in this competition, and especially Mr. Brown, who has but recently commenced practice. It is to be hoped that a Canadian architect may succeed in winning first place in the final competition.

THE ERECTION OF SCAFFOLDS.

WE reprint below the by-law recently passed by the City Council of Toronto governing the erection of scaffolds:

All scaffoldings used by bricklayers or other builders in the erection, repairing, altering or improving of buildings, chimneys or other structures, shall be built and constructed as follows:—

BUILDERS' SCAFFOLD.

Standards or uprights to be of live, sound Norway pine, tamarac or spruce (tamarac preferred). Distance between each standard eight or ten feet, and butts of said standard placed in the ground to the depth of not less than two feet six inches, and when placed upon stone flagging or granolithic sidewalk, to be put in good sound cement or other barrel, or a box two feet square by two feet six inches high, and filled with sand or other suitable material. The standards to be not less than four and half inches at butt, and two and a half inches at the top diameter, and in a very high scaffold, to be increased in size.

Ledgers same material as standards, not less than three inches diameter at small end, and no ledger to be taken off the standards that would allow a greater distance from the ground than ten feet. Putlogs to be of ironwood, white oak, or other suitable material, the said putlogs to be butted, flattened or squared at the end which enters the wall, and not to be removed according as the scaffold rises. One course of planking, the entire length of scaffold, must remain on each tier of the said putlogs. The putlogs not to be less than three inches diameter clear of bark. Three putlogs to be placed under planks twelve feet in length, that is to say, one putlog at each end and one in the centre. (When planks sixteen feet long are used five putlogs shall be used.) Planks to be two inches in thickness, and of sound pine, spruce or hemlock, ten or twelve inches in width.

Scaffolds to be stayed from ledgers on to the joists through the openings, and in the absence of openings, to be stayed by other sufficient means.

Racking braces to consist of poles and tied with ropes. Ropes not to be less than sixteen feet in length, and five-eighths of an inch thick, except in case of small scaffolds, when rope one half inch thick may be used.

Ladders in all cases to reach five feet above the landing stage, so that plenty of hold will be afforded men when landing off.

When bricks are laid from the inside of fire-proof buildings, there shall be a temporary floor of two-inch plank laid on the girders or temporary joists all around the inside of walls and not less than six feet wide, and when bricks are laid from the inside of buildings not fire proof, which have joists not over fourteen inches apart, then the temporary floor may be of one-inch boards six feet wide and placed all around the building.

In all cases where the inside scaffolding is built from the foundation the same as the outside scaffolding, the temporary floors above mentioned shall not be required.

When trestles are used, the height to be from four to six feet and to be made substantial, of good material, and when a scaffold is formed by putting trestles one upon another it shall not be over eighteen feet in height, that is to say, not more than three trestles shall be used of the height of six feet each.

Where required all overhead protections to be placed fully under scaffolds. When building out to the street line, boards or planks to be placed where the workmen pass under.

All scaffolding used by carpenters, in the erection, repairing, altering or improving of buildings, chimneys or other structures, shall be built and constructed as follows:—

CARPENTERS' SCAFFOLDING.

All uprights of said scaffolding to be 4 x 4, sound and free from objectionable knots, the brackets nailed to them and to the building, and to be one inch in thickness and not less than ten inches wide, properly nailed to building and upright; and when there is no opening to nail said bracket, then a piece one inch thick and six inches wide to be notched to secure the bracket, and nailed solid to the wall and to the upright. The boards laid on this to walk on to be two-inch plank, sound and free from knots, or else two one-inch boards, laid one on top of the other.

When bracket scaffold is put up, the leg to be sound and not less than 2 x 6 on edge, set at the proper angle to prevent the bracket from tipping from the wall.

When scaffold projects from windows, the bracket to be one inch thick by not less than ten inches wide and six inches deep, both brace and bracket well nailed to window, and the brace well nailed to bracket also.

The City Commissioner shall forthwith after he has approved of the plans of buildings proposed to be erected, as required by Section 32 of By-law 2468, see that the scaffolding used in the construction of such building shall conform with the foregoing provisions of this By-law, and prosecute all persons who may proceed with the erection of buildings using scaffolding which is not constructed in accordance with this By-law, and in the event of the City Commissioner finding a scaffold, which in his estimation is unsafe, and after due notice to the contractor, the same is not made satisfactory, the said Commissioner may take such proceedings against him as he has power under this or any other By-law.

Any person convicted of a breach of any of the provisions of this By-law shall forfeit and pay, at the discretion of the convicting magistrate, a penalty not exceeding the sum of fifty dollars for each offence, exclusive of costs.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT and BUILDER).

The Building Inspector wishes to secure the amendment of the by-law governing the erection of fire escapes, so as to bring the owners of large boarding houses under its provisions.

It is understood to be the intention of the newly appointed Sanitary Engineer to endeavor to secure the adoption by the Council of a by-law to provide for the regulation of plumbers and plumbing.

The death of Mr. Geo. H. Mount, who for nine years filled the position of assistant to Mr. Lacroix, the City Building Inspector, took place at St. Hyacinthe last month.

The sum of $20,000 has been subscribed for the erection of a monument to the late Sir John A. Macdonald. The committee, representing the citizens, which has in hand the erection of the monument, will proceed at once to collect the subscriptions. A number of sculptors, foreign and Canadian, have been asked to submit designs.

Mr. Douglas Sladen gives the following description of the old cathedral of Notre Dame at Montreal, in a letter to the New York *Sun* reporting the doings of the Duc d'Orleans and the Compte de Paris on the occasion of their visit to the city. "In America Montreal is the City of Churches, and the finest of them all is Notre Dome, rebuilt in 1824 on the site of the church of 1672, with towers 227 feet high, and a good deal of the majestic appearance of St. Sulspice, of Paris. The Seigneurs of the island of Montreal are the Fathers of St. Sulspice. Inside, no church on this continent so recalls the carving and color and richness of mediæval Catholic churches, like the roof of Ely Cathedral, or the wood screens of Totnes and Dartmouth. There are many suggestions of Dartmouth in the interior. One must examine it in a subdued light, or not too closely, for its ornamentation bears the same relation to the solid richness of mediæval work as Japanese goods prepared for Western markets bear to the genuine old Japanese, made for some great Daimo, and sold and resold, until they arrive at the stall of the curio seller. The galleries have very handsome wooden areading, and there is a great deal of carving about the reredos and the pulpit and elsewhere, but the effect is the effect of things that would be poor without paint—not of painted oak. Though it will not bear critical examination from an eye accustomed to the work done when the monks were their own masons and carpenters, the whole effect is rich and singularly harmonious and spirited. This great church will seat from ten to fifteen thousand people.

A commission composed of Mr. H. Wallis, Mechanical Superintendent of the G. T. Railway, Mr. Howden, Government Inspector of Dredging, and a third party yet to be named, has been appointed to inspect and report on the work done in Montreal harbor during the past year.

HAMILTON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

As might be expected there is not very much work going on just now, but for this season of the year the outlook is not bad.

Architect Clohecy is making alterations to the Loretto Convent, which will cost about $10,000.

Extensive alterations will be made to Christ Church Cathedral Sunday School by Architect Mills who has just completed the Zion Tabernacle Sunday School.

A residence to cost about $10,000 is to be erected by Architect Balfour on James street south for Mr. C. M. Counsell.

Messers Lawry & Son are making important alterations and additions to their pork factory on Wentworth street under the direction of Architect Balfour.

A large addition will be made to the Hamilton Pottery by Architect Mills.

Architect Balfour is making additions to Gomph's brewery and also to the Grant-Lottridge brewery.

Architect Stewart is putting up a residence on Hughson street.

A hotel is being erected on top of the Mountain, in the east end, where it is intended to construct another incline railway.

The intersection of John and King streets has been selected as the site of the proposed monument to the late Sir John A. Macdonald. The base is now in course of erection. The statue itself is expected to arrive shortly from England.

Carving in this city seems to receive very little attention from the architects, and the result is in the majority of cases that the building would look better if it were left off; on the recently completed Bank of Hamilton, however, the carving is very successful; it is well designed and well executed; on the City Hall the execution of the carving is good, generally speaking, but in some places the design is not at all up to the standard; one of the panels on the main tower is particularly bad. On the Public Library the carving is entirely devoid of artistic merit, and it seems a pity that on a building of this character such should be the case. On the Canada Life building the carving is very good, and not only improves the building, but is a credit both to the architect and sculptor.

A joke is going the rounds at the expense of the watchful guardians of the peace in Hamilton. A well known plumber and two of his assistants found it necessary to work all night in repairing some pipes in a store. They were discovered by the police, who mistaking them for burglars, quietly surrounded the house and had a patrol wagon in waiting to receive them. When their identity became known, the representatives of law and order retired with as much dignity as the circumstances would permit.

THE ARCHITECT AS A BUSINESS MAN AND ARTIST.*

By J. R. RHIND.

The architect must be, first, a business man, second, practical, and third, artistic. Is is of the last I have most to say.

The first is necessary to the drawing up of agreements, and conducting and negotiating for the carrying out of work, so that extras or omissions, should any occur, may be settled in a fair and just manner, and so that the employer may be protected from any loss by the failure of the builder to fulfil his contract. The want or lack of a business way of settling work, drawing up agreements and specifications, or badly drawn and insufficiently illustrated plans, are primary causes of misunderstanding and disagreement, lead to litigation, entailing serious loss of time and giving much worry and trouble—and worry will kill a man in half the time that hard work will—and making one ask the question: "Is life worth living?" I would certainly answer, "Not the life of an unbusinesslike architect." Business capacity will come by experience, though sometimes dearly and bitterly bought, and wise is the man who takes his mistakes in a right spirit and avoids the sunken rocks and treacherous under currents which he will surely meet, as every one of us here has no doubt done, who steers his business affairs by the light of his past experience, and guided by common sense, carefully avoids past mistakes and blunders.

There is, as you all of course well know, great differences in clients; with some clients from the first moment you put pencil to paper to the last stroke of the pen as you sign your name to the cheque in payment of your services, it has been a series of successes; everything you do is appreciated; this gives zest and pleasure to your work; you feel inspired as you design; you strike out good and original ideas; your suggestions are approved of and carried out. With a client of this kind you invariably get the pick of the contractors (a good contractor is more than half the battle) to carry out the work well and quickly, and when you are finally and promptly paid you sign your name to your cheque with an extra flourish and dash, and feel that though easily earned, you gave good value for your money.

But the other kind of client, who first bargains what you are to be paid and who thinks your charges exorbitant, you never seem to be able to please. After making innumerable drawings, your plan is at last decided on, you call for tenders which of course come to far too much money; the plans are reduced and invariably spoiled, the work is cut down to the cheapest kind, the cheapest and nastiest contractors are given the work. The work goes on; your amiable client thinks it is not good enough and blames you; he begins to alter and add here and there, wants better inside finishing, better locks, better everything, till the bill of extras amounts to almost as much as the whole contract price; your client refuses point blank to pay, and if the poor unfortunate architect has not got every order for extra work in writing, he gets up one fine morning and finds that he has to attend that abomination of abominations, a court of law, to be questioned and cross-questioned by an "imp" of a lawyer, and is ready to declare to himself as he wearily drags his limbs homeward, "Life is certainly not worth living."

These are the two extremes of the business part of the profession, and let us all pray that we may never meet the kind of client last described.

Next comes the practical part of the profession. The architect must know and use the most suitable material for the many different parts of his building, and proportion them to withstand the strains that will come upon them, in the strongest, most enduring and economical manner. This knowledge can to a certain extent be acquired by study alone and by being taught by another, but this is not sufficient, you must have practical experience, that is, the actual seeing of the work as it is carried out. When you make a mistake yourself or the builder makes a mistake, for the best of us are not infallible, then your inventive faculty in construction comes into play, and you are as it were "put on your mettle" and in rectifying your mistake you learn something which you did not know before and perhaps would never have learnt, unless you had blundered. Experience thus gained is one of the richest jewels in the architect's practice; it can only be obtained by experience, and wise is the man who humbly and thankfully stores this precious knowledge and who is able to bring it forth and apply his mayhap dearly bought, but rich experience, when occasion demands, and thereby successfully overcomes the difficulties in his way. But foolish is the man who does not profit by his experience. The pitfalls in his way are many, but he often discovers his calamities when they are brought about by his own pig-headed stupidity.

Now we come to the third, and to the architect the indispensable quality, viz., the Artistic—it is this quality which distinguishes the architect from the civil engineer, or mere builder. It is not bound by any rules that can be acquired and retained by memory ready to be fired off when occasion requires. One must have the artistic quality or he cannot design, it is like music, one must have an ear before he can distinguish one melody from another.

This artistic feeling is stronger and keener in some than in others; we cannot all be geniuses, but that should be no hindrance to our designing in good taste. We cannot all be Mozarts or Beethovens, but that is no reason why we should not enjoy the simplest melodies, or join in singing a chorus, or warble a song, though perhaps some of us in trying to warble might not add to what you would call "the concord of sweet sounds."

In short, one having an ear for music, it is possible to be trained to be a musician in the same way one having natural taste can be trained to design in good taste, by being told what is good and what is bad, and thus to be enabled himself to discriminate between good and bad, to have pointed out the difference between ornamental construction and constructed ornament; on this last hinges the whole question of good and bad architecture—one must construct first, and then ornament the construction. One sees this ornamental construction brought to the highest point of beauty in the architecture of the middle ages, but when construction became the main object and the architect tried to see with what little support he could erect his buildings, they began to have an attenuated appearance, and though strong enough as time has proved, these buildings can never satisfy the artistic feelings within us; they look like what my countrymen would call "no very canny," and you feel a certain relief when you get a good distance away from them. Some of the principal qualities of good design are: the building must be strong and look strong, and to look strong, it must have strength and more than enough to set the mind at rest and satisfy you that it is, as the Yankees would say, "there to stay."

I do not mean to say that the stronger you make your building look the more satisfactory the effect. One is just as liable to err on the side of heaviness and clumsiness as attenuation and meagreness, but there is a just proportion between height and breadth and depth which the trained eye alone can discriminate and which never errs on the side of weakness.

To make a thorough good design one must not draw a pretty picture only and go no further, but must draw every particle of detail full size; the detail of a building goes more to show the well trained architect than the whole design; the general design may be good, and the detail being what you would call unarchitectural, it condemns the whole building; on the other hand the design may be meagre and the detail good, and thereby it retrieves the whole building and brings it into the sphere of good design.

This study of detail is one of the most interesting and absorbing in the profession of an architect, and the correct rendering of detail goes more to show the educated architect than any other point in a building.

The best way to study detail and design is from the actual building, not only to stand and look at it, but to measure and draw it, transfer it to your sketch book and make it your own, and you will discover as you draw fresh beauties which you did not before observe. I do not mean the buildings on this continent, but those of Europe. One to get the purest water must go to the fountain's head; in the same way one must study the works of the the old masters.

If this Association is to attain to the highest degree of usefulness in the architectural profession in Canada and has at heart the raising of the profession to the highest and most respected position in the land, we must endeavor to do all in our power to this end. Let us begin with the training of our students who are the future architects of the Dominion, and determine that they shall have every opportunity and facility to gain a true and correct knowledge of architecture and the many branches of knowledge with which the architect of to day is familiar, especially the highest training of an artist in its broadest sense. Let us have a travelling studentship, to be won in competition, to enable the most capable of our students to enjoy the inestimable privilege of studying in Europe. I say privilege, because it does not matter how clever one may be, he is heavily handicapped in the race for excellence unless he studies in Europe the glorious works left to us by our fathers.

We are in a new country untrammelled by any school or manner of design; our requirements are different from any part of the States or Europe; we have more difficulties to contend with in the construction and design of our houses than any other country in the world; we have tropical heat and arctic cold, then let us make it our aim to make this architecture of Canada characteristic of Canada. The architecture of the past has all been guided more or less by conditions of climate. In Southern Europe we see the flat roof and open piazza and balcony, and the cap mouldings and string courses give the idea of holding up or binding together. In the North of Europe we see the steep roof, the mouldings and string courses are undercut to throw the water off the walls—each telling their tale, the one of a hot, dry climate, the other of a cold, wet climate.

Let us then take the clue from the old masters and design as they did, to suit the climate; we can then be sure we are so far in the right path.

We will have a more difficult problem to solve; we have the warm climate of Italy and the cold climate of Northern Russia, but we have the advantage of seeing how each country designed, and in being guided by Nature let us have a style characteristic of the climate and country.

All this cannot be done in a day, nor a year, nor a lifetime; no style was ever invented in so short a time; it took hundreds of years, but it was always steady progress; let us determine not to progress backward, as the Irishman would say, but let us leave the world further advanced than it was when we entered it.

* Paper read at the Third Annual Convention of the Province of Quebec Association of Architects.

DECORATION AND FURNITURE

SOME NOTES ON THE RELATION AND APPLICATION OF THE SISTER ARTS, PAINTING AND SCULPTURE, TO ARCHITECTURE.*

By A. T. Taylor.

Architecture, Painting and Sculpture, like the three graces, should be interwined in inseparable bonds in our monumental art. Each may live apart and be beautiful in itself, but the perfect life can only be consummated in conjunction with each other. Architecture, the first-born of the sisters, flourished for a while, but conscious of her needs, took under her sheltering wing her younger sisters, Mural Painting and Monumental Sculpture. Painting and sculpture apart from architecture are later growths, and I cannot but think all suffer from the severance. The earliest examples of painting and sculpture known to us were always employed to heighten the effect and intensify the functions of the architecture, and many of the finest treasures of our picture galleries and sculpture galleries to-day were originally conceived and designed with the setting of some cathedral or noble building.

Let us glance briefly, 1st, at mural painting and color as applied to our architecture, and 2nd, at sculpture and carving in the same relation.

First, of color decoration.—The love of color is natural to man. All savage people have in common the love of bright colors, and we instinctively rejoice in the poly-chromatic feast spread before us in nature, ever varying with the changing year.

Recent researches have demonstrated the fact beyond dispute that in all ages and amongst all peoples color has had an important place in architecture. Hiltorph in his investigations in Sicily and the Acropolis of Selinas and other temples, found abundant traces of rich color on all the buildings, and recent investigations in Greece have abundantly proved the liberal use the Greeks made of color on the exterior of their temples, etc. The custom also prevailed extensively all over France in the middle ages and during the period of the Renaissance, but gradually declined in the reign of Louis XIV. Viollet le Duc, the late eminent architect and antiquarian made a careful examination of Notre Dame cathedral at Paris, and found unmistakable evidence that a large portion of the facade had been radiant with color, and even in England many of the cathedrals there show also remains of colour, but the climate has dealt too rigoronsly with them to leave much evidence.

Under the sunny skies of Italy, to this day, they revel in the most beautiful colors on the outside of their buildings. The Duomo at Florence and the older Baptistry are glorious in colored marbles, and not a little of the indescribable beauty and loveliness of Giottos' Tower there, is due to its color as seen under soft Italian skies. St. Marks at Venice, both inside and out, is rich in colored marbles and gold mosaics, mellowed by time into beautiful hues.

Somehow when we moderns took to borrowing Roman orders and architecture the dead forms only were reproduced and the rich color was forgotten.

The monotony and dullness of the average streets of cities are very depressing. Some years ago in London the average fashionable house had a dingy colored compo-cement front, and the back was too dreadful to think of; then there came a reaction, and armies of painters appeared, and lo! the fronts of the houses blossomed out in claret color, and sage greens, and blood reds, and mustard yellows, and other colors hard to give a name to; and, although in some cases presenting a somewhat incongruous and piebald appearance, were yet infinitely better than the suicidal looking fronts of old. The next stage was better still—that of using honest material of natural pleasing color which would withstand the smoky atmosphere. So terra cotta and tile work and warm colored stone were and are used.

In New York there was a brown stone period when a man could not show himself in society unless he lived in a brown stone house, and so streets and terraces of brown stone still shadow our spirits. New York and other cities had also their white marble period, when to live in a marble house was thought the acme of bliss, and so leprous looking erections crept out and reared their heads in the streets, and to come nearer home, a cut limestone house was considered amongst ourselves as the sign of eminent respectability. Now, however, more pleasing arrangements of material and color are being introduced, red and mottled plum colored bricks and red and warm creamy colored stones meet the eye in all the newer quarters of cities, and in combination with the green of the trees and grass, make pleasant symphonies. We do not want the exterior of our houses to be like harlequins, but neither do we want them to be like quakers or grey nuns.

In passing I would just mention the beautiful majolica or faience work of Luca della Robbin which glows from so many of the facades of the Italian churches. They were chiefly figure work of a religious nature,—holy families, virgins and child saints, etc., but so beautifully modelled and such rich colors burnt in and glazed so as to be almost imperishable. The secret of the art was so well kept by the Robbin family that it died with them and we have been unable to get the full brilliancy of all the colors, but a recussitation of this decoration in some such form would seem to be very suitable to the conditions of modern times.

For the interior decoration and embellishment of our best buildings we have many noble examples in the ancient fresco work still left to us in such buildings as the Sistine Chapel at Rome in the Loggia and Stanzes of the Vatican in the Campo Santa at Pisa, and in numerous churches and public buildings. In these the drama of human life is portrayed in all its lights and shades, whether religious, secular or classical, and I can conceive of no grander or nobler way of applying mural painting to a noble structure than by such representations, embodying if in a sacred edifice—a nation's religious beliefs and aspirations, and—if in secular buildings—a nation's history and noble deeds of her sons. In our modern work there has been far too little of this—the highest and noblest of ornamentation. We have a little of it in some of our churches and public buildings, more or less satisfactorily carried out. Many examples will occur to you all, such as in Paris in the Pantheon, in the Hemicycle of the Beaux Arts, etc. In London, the Houses of Parliament have been partially treated in the same way, where the Death of Nelson and the Victory at Waterloo are appropriately painted on the walls, and also where scenes from the stirring history of England in the time of Cromwell and the Charles's line the corridors, to keep ever before the eyes of the legislators the lessons of the past. In the Manchester town hall the interior of the walls are being decorated by those gifted geniuses, Frederick Shields and Ford Madox Brown, with subjects from the history of that city. In the Parliament Houses at Ottawa there is a picture commemorating the Confederation of the Dominion, painted by Mr. Harris of our city, a few years ago. This is, however, a framed picture. A series of such would be the most fitting decoration for our legislative halls that I can conceive of, and if instead of being pictures in frames they could be incorporated in the decoration of walls, either in fresco or other other work, they would be better still. In the Bank of Montreal I had the good fortune to be able to formulate some such scheme on a small scale.

There I endeavored to represent in a permanent form scenes in the early history of our country, such as "The Landing of Jacques Cartier at Montreal," "Champlain at the Chaudiere," "La Salle setting out for the discovery of the North West," etc. Our City Halls and Courts of Justice ought to furnish wall spaces for appropriate decorations of this kind, and there is heroism in our own history and in the present day as worthy to be immortalized and handed down to posterity as any in the days of old. There are triumphs of peace as well as of war, victories of the pen as well as of the sword, that are waiting for worthy pictorial representation in all the arts.

We come now to our 2nd and last division of our subject—Sculpture and Carving in relation to Architecture. Certain writers have fallen into the mistake of claiming too much for sculpture on our buildings, declaring that it is the "soul and voice of architecture." With these writers I cannot agree. Were all painted decoration and sculptural ornament omitted from a building, it were possible by reason of perfect proportion, magnificent mass, grace of outline, subtle combination of light and shade, beauty and refinement of mouldings, and balance of parts, to produce a building that would impress all beholders. Of this we have many examples in early ancient work. On the other hand, however, there is no doubt that appropriate sculpture and painting lends an additional charm to the work, lifting it up to a higher plane of excellence and symbolizing in a higher and more tangible degree the aspirations, hopes, faith and morals of the community. In the use of sculpture on our buildings it has always seemed to me that the purpose and object of the building to be thus ornamented should always be kept in mind.

Thus on a church, or other sacred building, the sculptured ornament should have direct reference to sacred subjects and be largely symbolical of the faith, the hopes, the history and the bright examples set before us. You all probably have seen buildings intended for sacred uses that you could not tell from a music or concert hall. If the building is a town hall, in its ornament it should have reference to civic matters and such as affect the common weal; if a court house, it should have ideas embodying law, justice and such like. If the building is a school or college or place of learning, then appropriate symbols and mottos and the names of great men distinguished in special branches of study should be inscribed upon the walls; if a picture gallery, the choice of sculpture and suitable decorations drawn from art is obvious; if a public library and reading room, then English literature is a perfect storehouse of suggestions; if a private house, domestic panels and ornaments of a homelike nature and inscriptions add greatly to the interest. It is no small part of the attraction and charm of the old houses of Edinburgh, Chester, London, etc., to spell out those legends and mottoes and texts that our ancesters loved to carve in stone over their doorways, etc. What an added charm the streets and buildings of our cities would have if this distinctiveness and appropriateness of sculptured ornament and features could only be carried out.

We have many fine examples of what I am trying to advocate, in th

*Paper read at the Third Annual Convention of the Province of Quebec Association of Architects.

splendid monuments of the past which remain to us. Foremost amongst these must be placed the grand Parathenic procession of the frieze of the Parthenons, much of which under the name of the "Elgin" marbles can be studied in the British Museum. Then comes the Giotto Tower at Florence, so ably interpreted to us by Ruskin in his "Mornings in Florence." There are 27 panels in sculptured stone round the base, forming a unique series, beginning at the Creation of Adam and going on to represent the exact sciences and the arts, all admirably conceived and worked out, and would well repay hours of study. Just across the way from the tower, a few steps brings us to the famous gates of the Baptistry by Ghiberti, that Michael Angelo said were fit to be the gates of paradise. The whole doors are divided up into panels, which are covered with bas-reliefs of Bible subjects, from the creation to the time of Solomon. In the Cathedral of Orvietto, the portals are also covered with bas-reliefs of Scripture Subjects. In the Doge's palace at Venice, the well-known "Judgment of Solomon" and the other sculptures will readily ocurr to all. Notre Dame at Paris and the Saint Chapelle have their portals rich with subject sculpture. But it is at Amiens Cathedral that we will find the most complete example of suitable ornament, magnificent in its conception and splendid in its execution. So complete is it that Ruskin has called these western portals the Bible of Amiens. The workmen got *three sous* a day for carving these immortal sculptures. We give some of our workmen $3 a day for squaring the stone. Imagine our churches glorified with such work! What a delight to examine and study them!

In modern work we have also many interesting examples of appropriate sculpture. In the Albert Memorial at South Kensington, London, you will remember that the base or podium of the monument is surrounded with sculptured figures in alto-relievo of the great masters of all ages, in art, literature, science and music, forming a charmingly interesting procession of the genius of the centuries, and at the corners are beautiful colossal groups symbolical of the four quarters of the globe. In the Natural History Museum at Kensington there are rows of sculptures of extinct animals and up the moulding of the arches monkeys are climbing in a very spirited manner; and to come down to buildings for more common-place uses, I noticed a baker and confectioner's place in Westminster with some excellent panels of terra cotta work representing the different processes through which corn passes before it becomes bread. Why should each building erected for a special use or manufacture not have some expression of its purpose in carved or sculptured form? Our streets would become a museum of art to which future generations would come and find much pleasure and profit in. As we have received noble heritages from our ancestors, so future generations will justly expect a noble heritage from us of good, beautiful and true architecture in its completest form, making use of the sister arts, painting and sculpture, to clothe great clerical truths in immortal shape.

The limit of time at my disposal will not allow of my going more deeply into the subject; and I can only hope that these few notes may lead to useful discussion, and awaken thought and attention to this phase of our beloved art—the advancement of which is so dear to all of us.

PERSONALS.

At the recent opening of the Victoria College building in Toronto, a suitable tribute was paid to the memory of the designer, the late Mr. W. G. Storm.

Particulars have arrived from Paris showing that the death of Paul Peel, the artist, was due to hemorrhage of the lungs, and that he was ill only eight days.

Mr. W. A. Langton, Registrar of the Ontario Association of Architects, has removed his office from the Merchants Bank Building to the Canada Life Building, King street west, Toronto.

We are pleased to hear that Mr. W. B. Cherry, manager of the Adamant Mfng. Co., Toronto, who has been incapacitated for some time past by a severe attack of rheumatism, is rapidly approaching convalescence.

Mr. Wm. MacClennan, an architect by profession, who attained a world-wide reputation as a Scottish dancer, died under a surgical operation in Montreal on Oct. 30th. He had resided in Montreal for three years and was held in much esteem.

Mr. A. E. Husbands has opened an office for the practice of architecture and civil engineering, at Cookshire, Que. Mr. Husbands has been appointed engineer of the proposed new water supply and sewerage systems of that town. He will be pleased to receive catalogues, etc., from supply firms.

The firm of Knox & Elliot, architects, Toronto, has been succeeded by that of Siddall & Baker, composed of Mr. J. Wilson Siddall and Mr. Frank Baker. The firm has removed to new offices in the Janes Buildings, corner of Yonge and King streets. Mr. Baker is the first Canadian student of architecture to pass the examination of the Royal Institute of British Architects.

This is a good rule for preparing an advertisement: Write it out, no matter at what length, putting in everything worth saying; next, examine it critically, with the purpose of ascertaining how many words can be stricken out without injuring the sense. Nothing need be said for ornament. Write plain and honest facts, claim nothing but what is strictly true, and be sure to claim all that is true. Consult taste rather than space in the use of display.—*Printers' Ink.*

SANITATION AND LIGHT

THE PLENUM SYSTEM OF VENTILATION AS APPLIED TO THE NEW SURGICAL BUILDINGS OF THE MONTREAL GENERAL HOSPITAL.*

By A. C. Hutchison.

The necessity of efficient ventilation in buildings where large numbers of persons are congregated together will be readily admitted, but in no class of buildings is it so essential as in hospitals, where though the occupants are few in number and the air space allowed to each person is far in excess of what can be allowed in a hall, school, church or theatre which are only occupied for a few hours at a time, there is on the other hand a constant occupation of the wards in an hospital and the necessity for a larger supply of fresh air to a person in sickness than to one in health.

The requirements of the human body are such that when in a state of health a constant supply of fresh air is needful to maintain it in that condition, and that when diseased and weakened by sickness the necessity for an abundant supply of pure air is much increased and in many cases absolutely necessary as a means of restoration to health.

Ventilation may be briefly stated as the process by which the air in closed and inhabited rooms is maintained as nearly as possible at the same standard of purity as the air surrounding the room or building, and only the processes by which this is most successfully accomplished and without causing draughts may be considered efficient.

So much has been said and written on the subject of ventilation, that it is needless for me to describe the composition of the air we breathe, and how the proportions of the gases which compose it are changed in the process of breathing and become impure. Of the various impurities which are found in the air of inhabited rooms, carbonic acid is the most common, and when it is present in the air in a proportion exceeding ten parts in ten thousand we are informed by sanitarians that the air is unfit to dwell or sleep in; the object, therefore, of any process of ventilation, is to introduce such a volume of fresh air into inhabited rooms as will keep the percentage of this gas at the minimum. Authorities on sanitation claim that to preserve the lowest standard of purity one thousand cubic feet per hour, for persons in health is required, while in the case of sick persons the supply should be from two thousand to four thousand cubic feet per hour. In countries of milder and more uniform temperature than we experience, the supply of such large quantities of fresh air to inhabited rooms is not so difficult a problem as it is with us where we have a range of from one hundred and ten, to one hundred and twenty degrees in temperature between the extreme cold of Winter and the heat of Summer, and where for nearly seven months in the year our buildings have to be artificially heated. Where large volumes of air have to be introduced into our buildings during the winter season, the difficulty is much increased by the means which we take to exclude the cold (and at the same time fresh air) by doubling our doors and windows and carefully closing every crevice by which fresh cold air might find entrance. Being thus compelled by the rigor of our winter temperature to prevent the flow of fresh air into our rooms by natural channels, it follows that if a large supply is to be introduced it must be in such a manner that it will not cause discomfort to the occupants.

The problem which presents itself when we are called upon to provide efficient ventilation for any building in the winter season is, how can a large supply of air taken from the outside of the building, at a temperature from freezing down to 20 or 25 below zero be introduced into a room that is almost hermetically sealed, in such a manner as not to cause discomfort by draughts or to lower the temperature of the room below 65 degrees.

It is evident that in solving this problem two conditions must be complied with: first, that the supply of fresh air shall be abundant, and second, that it is heated to a proper temperature. It therefore follows that ventilation and heating are so intimately connected together that we cannot consider the one without the other. The solution of these conditions has caused many methods to be devised, some simple, some complex, and all capable of being divided into two classes, which may be distinguished as Natural Ventilation and Artificial Ventilation.

Under the Natural Ventilation we may class all those methods where no special appliances are used to cause movements in the air and where such movement depends solely on natural forces such as may be obtained by the

*Paper read at the Third Annual Convention of the Province of Quebec Association of Architects.

difference in temperature between the air in the room to be ventilated and the air outside, or by draughts caused by heated flues, or by the force of the wind applied either to forcing air into or exhausting it from the place to be ventilated.

Under Artificial Ventilation we may class all the appliances which depend upon mechanical contrivances for furnishing the force required for causing movements in the air, and also the many kinds of furnaces or heaters, where such movement is caused by the rarefication of air passing over heated surfaces.

I think it will be admitted that while Natural methods of Ventilation may be tolerated for ordinary dwellings, or for other buildings where there are but few occupants, that for buildings occupied by large numbers of persons, such as schools, halls, churches, theatres, hospitals, etc., where a large supply of fresh air is a necessity, that they are utterly inadequate and not to be depended upon, and that for such buildings some artificial method of ventilation is a necessity.

During our winter season, where there is a difference between the temperature of the air in inhabited rooms and that outside of from forty to one hundred degrees, it is evident that any method of Natural Ventilation will be insufficient where the admission of fresh cold air direct from the outside into a room has to depend upon the opening of doors and windows, or upon Tobin tubes, or any other means by which it is admitted direct without heating, and I think that it will be admitted that where the extraction of vitiated air has to depend upon the draught of flues, or upon the force of the wind acting upon the ejectors or cowls, of whatever form they may be, that they are not in all cases to be relied upon.

For any building to which a large volume of fresh air has to be supplied and then extracted after it has served its purpose, it is evident that some method must be adopted that will be independent of the wind or other natural forces, and that combined with that method must be some means of heating the air to such a degree as will not cause discomfort to the occupants. The many different appliances devised for effecting this twofold object may be divided into three classes.

First. The Plenum System, by which air is forced into the room to be ventilated by the means of a fan operated by steam or other power, the air so forced being warmed by coming into contact with steam-heated pipes or other heated surfaces.

Second. The Exhaust System, by which the air of the room to be ventilated is exhausted or sucked out by the aid of a fan, and fresh air which has been previously warmed is drawn into the room.

Third. Those in which the air is warmed by passing over heated furnaces and then flowing naturally into the room.

I do not here intend to enter upon a discussion of the merits of the different methods I have mentioned as the adoption of either will depend upon the character of the building to be ventilated and the uses to which it is to be applied. It may, however, be of interest to you to explain as briefly as possible the practical application of one of these methods to a building which I was commissioned to erect during the past year, and in which the method adopted has I believe been applied for the first time in the city. The buildings to which I refer are the new Surgical Pavilions of the Montreal General Hospital. (The system of ventilation here referred to is illustrated elsewhere in this number of the CANADIAN ARCHITECT AND BUILDER). These buildings consist of a group of three distinct buildings, an amphitheatre and two pavilions connected together by corridors. The amphitheatre building is about 84 feet by 43 feet and two stories high above the basement; this building contains on the ground floor a number of waiting, reception and examination rooms, and in the second story a large operating theatre with a number of small rooms in connection therewith. Each pavilion is about 155 feet by 34 feet and two stories high above the basement, and contains besides nurses' rooms, kitchens, lavatories, etc., two large wards for 24 beds each and four small wards for 2 beds each, or a total of 112 beds in the two pavilions. The wards and rooms in these buildings that require special ventilation contain in all about 300,000 cubic feet of air, and the problem that presented itself in arranging a system of ventilation was how to provide a supply of air as pure as could be obtained outside of the building to the wards at the rate of not less than 3000 cubic feet per hour for each patient, without causing draughts, and at the same time warming the air to such a degree as would maintain the temperature in the building at not less than 65 degrees during the coldest weather. After careful consideration of the merits of the Plenum and Exhaust methods of ventilation, the former was adopted as being best adapted to perform the work required. For forcing the requisite volumes of air into the buildings a pair of fans, each about six feet in diameter by three feet wide, made by the B. F. Sturtevant Company, of Boston, were installed in the basement of the amphitheatre building and operated by a 28 horse power, high speed, automatic cut off engine, the revolutions of the fan being arranged for 210 per minute. From the fans, ducts made in brick work are carried along below the basement floor of each pavilion and amphitheatre building to vertical shafts leading to the several wards and rooms to be ventilated. In each of the large wards there are six of these vertical shafts, while in the smaller wards and rooms there is only one each; the air is in every case discharged from these shafts into the rooms close to the ceilings. As it was considered of importance that the air discharged into the large wards should be dispersed throughout the upper part of the room before it descended towards the beds, the shafts which are built in the external walls were arranged so as not to be opposite each other, by this arrangement a thorough mixing of the air is secured. The air supplied to the fans is taken through two windows, each 7' 0" x 4' 0" and to procure the air as free from dust as possible, these windows open into a court between the two pavilions where there is little danger from dust from the streets reaching them.

With the fans in operation at a speed of 210 revolutions per minute a large volume of air is forced into every room, a measurement made with an air meter showing the actual quantity to be about 1,182,000 cubic feet per hour. At this rate the air in each room would be changed about four times every hour, while the supply to each patient in the wards would be at the rate of between 4500 and 5000 cubic feet per hour. Any one who has had experience in conveying warm air through pipes or ducts will readily understand the difficulty that is often met with in sending an equal volume of air through two pipes or ducts of equal dimensions and similarly placed.

In arranging the ducts and flues it was anticipated that this difficulty would be met, and that some shafts would convey a greater volume of air into the rooms than others, even though they were of the same size and and placed in the same position in relation to the main duct. A test with the air meter proved this to be the case, and it was found that some openings gave double the volume of air supplied by others.

To regulate the flow of air in each shaft and make them as nearly as possible uniform in operation, a regulating valve was placed at the base of each vertical shaft and arranged so that the engineer could control the flow.

The fresh air as before described is supplied to each room near the ceiling, from whence it descends towards the floor and is thence carried away through gratings placed in the skirtings into ducts below the floors to the extracting shafts, which are three in number, one in each pavilion and one in the amphitheatre. These shafts have each an area of one square foot, to about each 5000 cubic feet in the building with which they are connected, and are carried up in brick work to about ten feet above the roofs. Each shaft contains a coil of steam pipes which may be used for rarefying the air and causing a draught at any time when the fans may not be in operation.

Wishing to avoid the placing of heating coils or radiators in the wards it became necessary to heat the air supplied to the fans to such a degree before it entered the wards as would keep them comfortable in the coldest weather.

To effect this object indirect steam radiators are employed, and the air is heated before it passes through the fans by a hot blast apparatus made by the B. F. Sturtevant Company. This apparatus consists of 7000 feet of 1 inch pipe arranged in a great number of sections, each section composed of two upright pipes fixed in a cast-iron base and connected together at the top by a cross pipe. The length of pipe in the sections varies, but in the longest it is not over 23 feet, so that however rapid the condensation of steam in a section when the air is rapidly passing over it, at a temperature of 20 degrees below zero, there is no danger of freezing. These heating pipes are placed directly in front of the fans, and opposite the windows by which air is admitted to the building, so that no air can find its way into the ducts until it has come in contact with the steam pipes and been heated. The manufacturers of the apparatus considered that 7000 feet of pipe arranged in this manner would be sufficient to heat all the air supplied to the wards and rooms, but as I was afraid that in seasons when the temperature remains at from 10 to 20 degrees below zero for three or four days at a time, it would not be equal to the work, I arranged a reinforcing or supplementary heating chamber in the basement, at the bottom of each vertical shaft, and in these chambers placed cast-iron radiators, over which the air could be forced to flow when it was found necessary to heat it to a greater degree than was possible with the fan alone. The radiators placed in these chambers were equal, in the whole of the buildings, to about 11000 feet of 1 inch pipe, thus giving a total heating surface, including the piping in the hot blast apparatus: of 3666 superficial feet, or equal to 17000 feet lineal of 1 inch pipe.

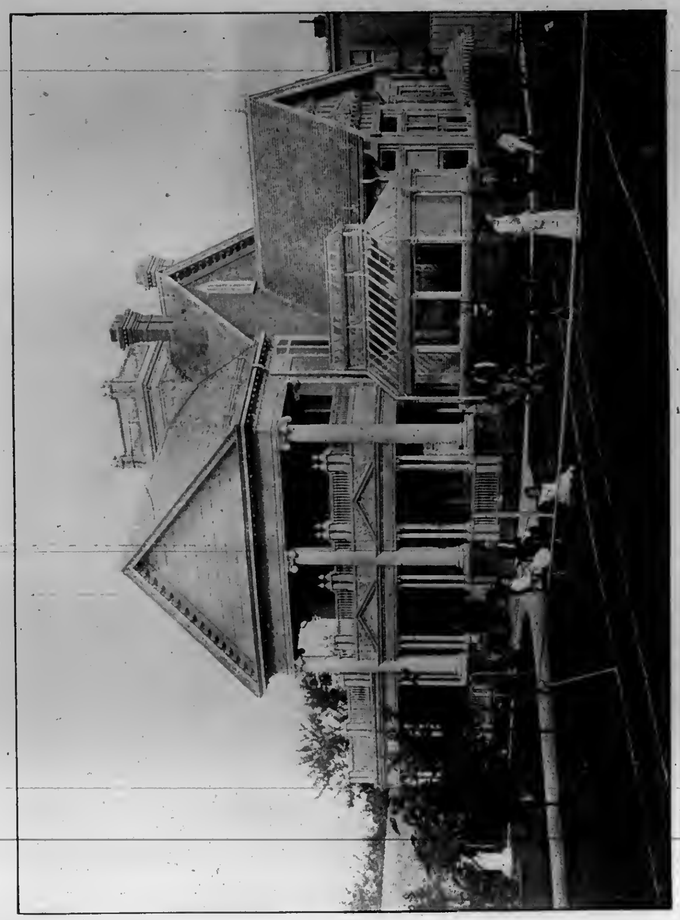
The flow of air into the wards, either direct from the fan, or after it has passed over the radiator in the reinforcing chamber, is entirely under the control of the nurse in each ward, who can regulate it by means of a valve operated in the ward. By thus having two means of heating the air, first by the hot blast apparatus, and second, by the radiators in the reinforcing chamber, it is expected that economy in the use of coal can be exercised and an equal temperature maintained in the wards during the winter months.

The Steel Clad Bath and Metal Co. of Toronto, have issued a pocket memorandum book, handsomely bound in red morocco, with the company's advertisement embossed thereon in gold.

A new building, 60x40 feet in size, has recently been erected for, and is now occupied by Messrs. R. Dennis & Son, wire and iron manufacturers, London, Ont.

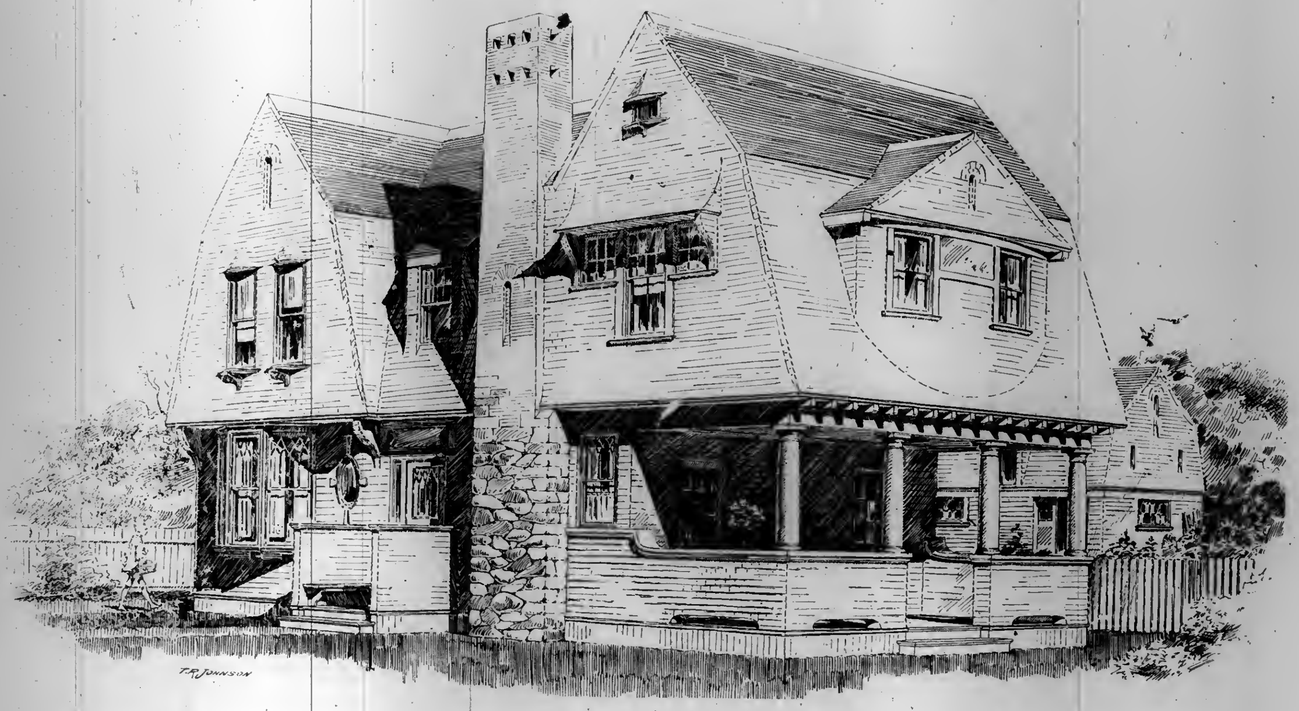
The Bostwick Metal Lath Co., of 116 St. Peter street, Montreal, have issued a pamphlet containing the testimonials of a number of Canadian and American architects, to the satisfactory character of this style of lath. A sample of the material is attached to the book.

The Standard Drain Pipe Co., of St. Johns, Que., are applying to Parliament for increase of capital from $150,000 to $500,000. This company has been in existence 8 years and has already increased to 18 times the original capacity. The building covers 46,000 square feet, with 10 large down draft kilns, some of which are 28 feet inside diameter, and hold 70 tons of pipes each. They will probably double the capacity of the factory.



RESIDENCE OF MR. J. L. MORRISON, COR. WINCHESTER AND METCALFE STREETS, TORONTO.

J. WILSON GRAY, ARCHITECT, TORONTO.

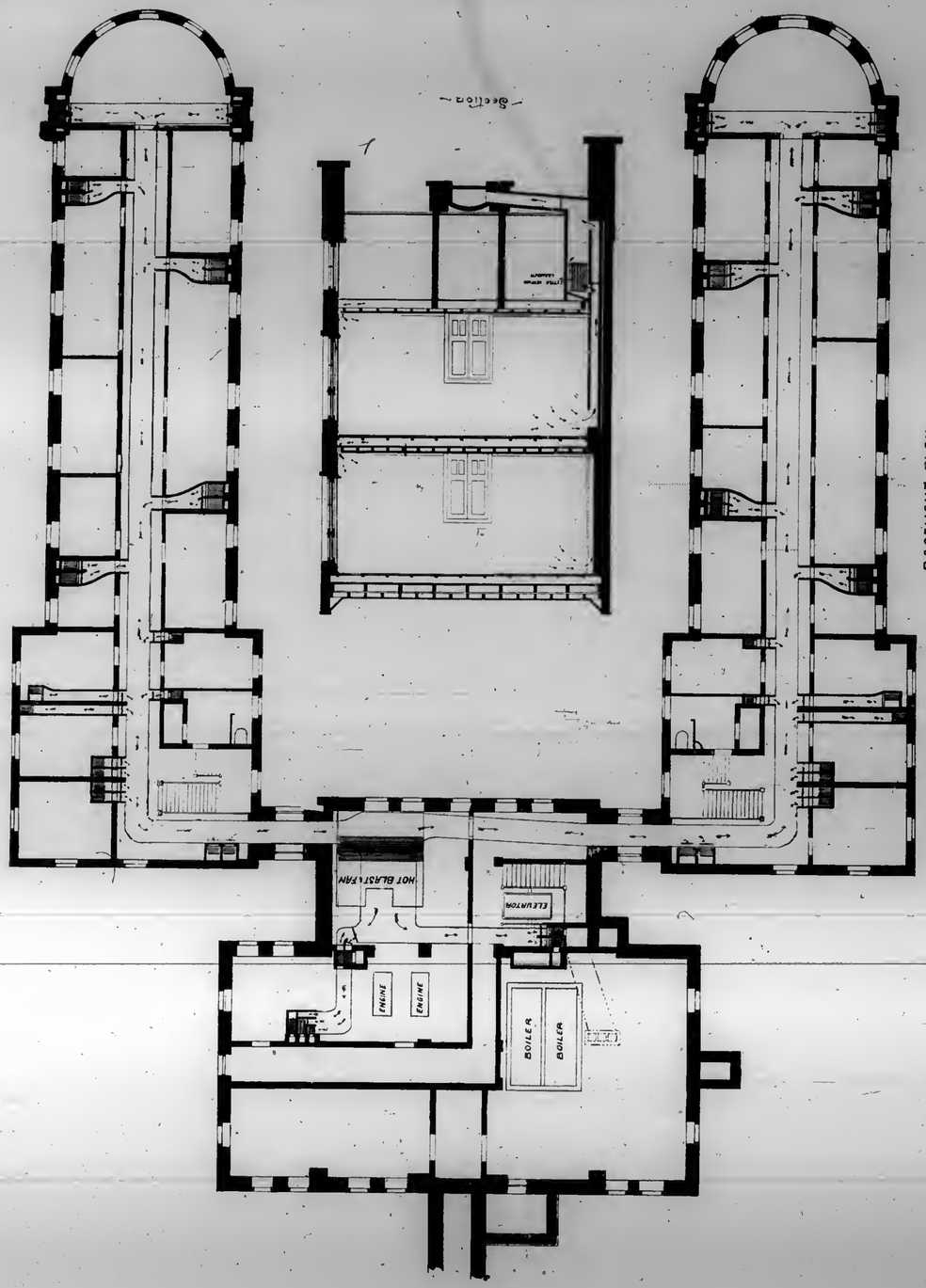


Cottage for Mr. A. F. Lobb, Toronto.

E. J. Lennox, Architect, Toronto.

Lakeshore Road Cottages

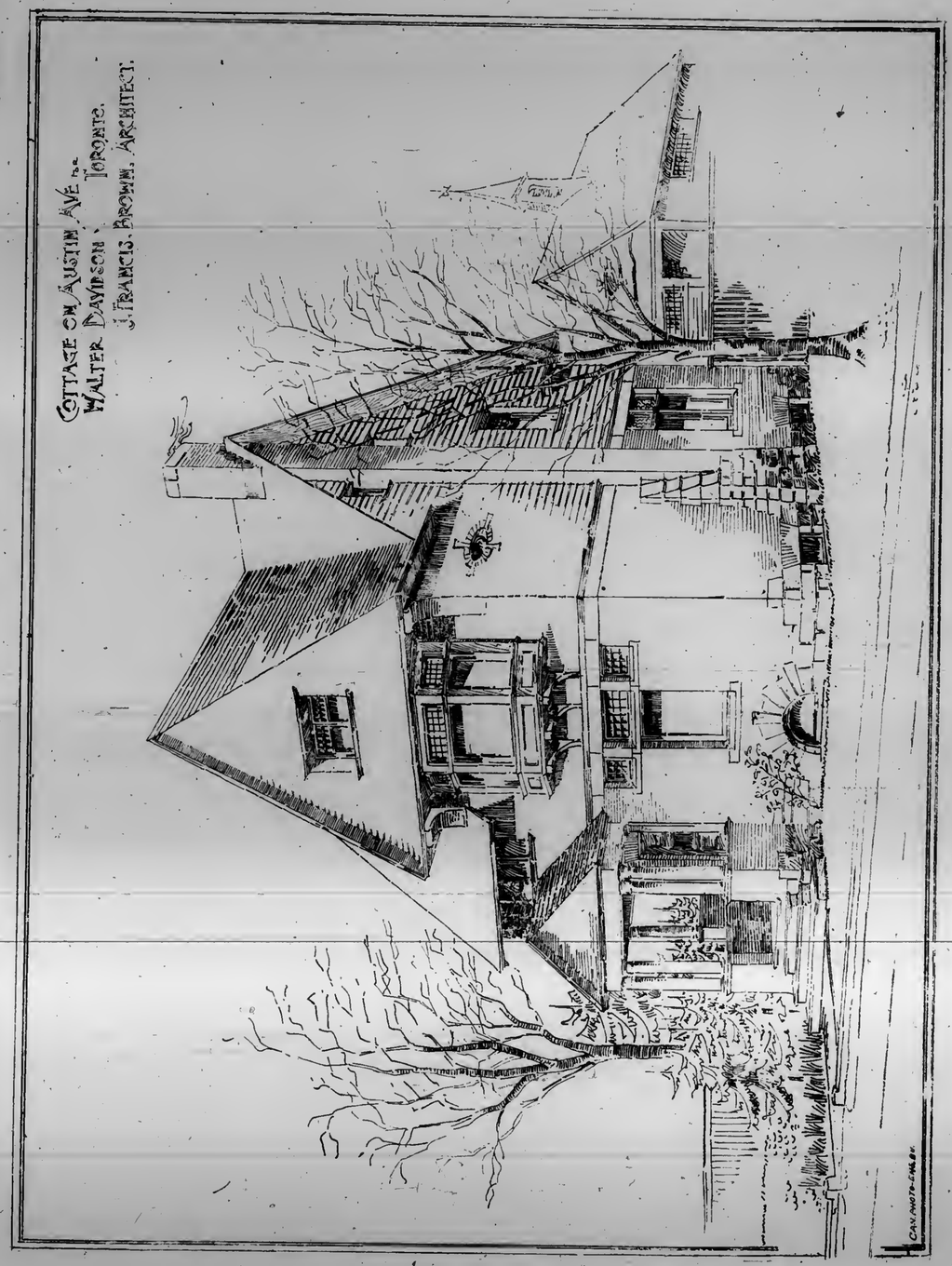
J. Francis Brown, Architect, Toronto.



BASEMENT PLAN

PLENUM SYSTEM OF VENTILATION.

ILLUSTRATING PAPER BY MR. A. C. HUTCHISON IN THIS NUMBER.



CANADIAN ARCHITECT AND BUILDER.

VOL. V.—NO. XII. TORONTO AND MONTREAL, CANADA, DECEMBER, 1892. { PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

64 TEMPLE BUILDING, - MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	S. G. CURRY, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton
TREASURER	D. B. DICK, Toronto.

COUNCIL:

WM. G. STORM	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
JOHN E. BELCHER	Peterborough.
EDMUND BURKE	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	V. ROY, Montreal.
1ST VICE-PRESIDENT	J. NELSON, Montreal.
2ND VICE-PRESIDENT	H. STAVELEY, Quebec.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
J. J. BROWNE	Montreal.
J. HAYNES	Montreal.
D. OUELLET	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. J. HILL, President.
GEO. MOIR, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JOHN ALDRIDGE.
BENJAMIN BRICK.
WM. PARK.
JAS. CRANG.
M. MURPHY.
J. LISTER NICHOLS.
WM. PEARS.

JOHN L. PHILLIPS, Secretary.

VOL. VI.

To mark the commencement of the sixth year of publication, the January number of the CANADIAN ARCHITECT AND BUILDER will be of special character. A number of kind friends have consented to assist in its production, and a satisfactory result is looked for.

Besides features of special interest, this number will show a considerable increase in size, and in the number of illustrations, while the copies to be printed will largely exceed those of ordinary editions.

During 1893 every effort will be made to maintain the steady improvement which has marked the history of this journal in the past. We invite the kind assistance of every reader for this object, while at the same time returning our thanks for favors past, and wishing each and all a Merry Christmas and a Happy New Year.

THE Council of the Ontario Association of Architects have made several attempts to procure a suitable design for an Association Seal and have at last chosen the one which we illustrate in the present number. This design which was unsigned, as were all the others submitted, is the work of Mr. Edmund Burke. The Council were greatly surprised when they discovered the author to be one of their number.

THE Registrar of the Ontario Association of Architects has sent cards to all the members requesting suggestions regarding matters of interest which should come up for consideration at the forthcoming convention in February. The members are also asked to contribute papers for the occasion. The Council is very anxious to introduce some new men and features into the next convention, and have to rely upon the members both for their help and attendance to make the meetings a success.

A SERIOUS omission in the new scaffold by-law is the failure to regulate for the use of derricks. Not only are the workmen in continual danger from the use of derricks, but the public also. Here was an opportunity to introduce into the by-laws of the city clauses by which all might be protected from the dangers of these great beams which stretch out far beyond the boardings that are supposed to protect the public. Several accidents occurred from the breaking of derricks during the past season, but we are apparently very slow to learn the lesson which such occurrences teach. The lives of hundreds of foot passengers are endangered by the raising of tons of material from the road by means of the heavy beam, supposed to be substantially built and upheld, and swinging across the sidewalks. It is alarming to contemplate what might be the extent of the calamity if a rope gave way or the beam broke, and there is sufficient precedent to make us careful.

THE cold weather compels attention to the heating apparatus. Now the landlord complains of the large amount of coal required at the boiler, while the tenants complain of the small amount of heat at the radiator. The best designed and most perfectly constructed apparatus will not heat the building unless it be attended to. Coal is put in the furnace to be burned, but when it is put on top of the bridge wall or on the dead-plate just inside the furnace door its burning will not do much good. The making of fire under a steam heating boiler requires experience and skill. The method of employing the man who will shovel the most coal for the least money is a mistaken one. It gives satis-

faction to none of those concerned, unless the coal dealer. It will pay owners of steam heating plants to employ competent men and pay them according to results. As a rule it will be found cheaper to keep a large building warm all night as well as all day, than to let it cool down at night, and a skillful fireman can arrange his fire so that for six or eight hours after he has left it the boiler will still make vapor enough to keep the radiators warm.

A MONEY by-law will be submitted to a vote of Toronto property owners on the 29th inst. for the purpose of raising $57,000 for Public School accommodation. The estimates of the School Board for building purposes in the last two years have been entirely struck out by the City Council. This action of the Council has certainly not worked out in the interests of the ratepayers, as will be seen from the fact that the Public School Board is using twenty-five rented rooms at a cost of about $6,000 per annum, or more than twice the amount of the interest on the money which the Board is asking for. In any case this condition cannot be remedied for at least a year, and if the by-law is defeated it will probably continue and grow worse for two or three years to come. We should be slow to believe that the Public School Board is so incompetent as to incur this large expense for rent without sufficient reason, and unless it can be shown that this is the case, the money to provide increased accommodation should be voted.

IN another part of this issue we publish a report of the second annual meeting of the British Columbia Institute of Architects, an association that has been in existence for about eighteen months, and which, like kindred associations, was formed for the purpose of improving the standing of the profession. At present this Institute is incorporated simply as a Literary Society, but means for its incorporation as a distinct professional association are under the consideration of the Council. The Institute has been active in the matter of the proper conduct of competitions, and we are glad to find that its efforts have met with a fair amount of success. It is gratifying to see how architects in various parts of the world are "taking up the cudgels" against the preposterous treatment that is everywhere meted out to the profession. Every new association formed for this purpose strengthens the hands of the individual architect wherever he may be situated, and we would strongly urge all architects wherever possible to lose no time in associating themselves together not merely for their own good, but for the benefit of the public, for the real result of such societies is *pro bono publico*, and affects them in a more important manner than it does the architects themselves.

ONE very striking difference exists between Montreal and Toronto as cities and in which Montreal has an immense advantage over Toronto. Toronto is so spread out and straggling that a heavy and continual expense is incurred in making and keeping up the roads, with water supply and police protection and other items altogether out of proportion. One of the results of this spreading out is that many an acre within the boundaries is left without an inhabitant, and while the suburbs still grow the city proper is at a standstill. Montreal is so compact, that an effort is now being made to attract the people to the suburbs. The policy of spreading out, as has been done at Toronto, has proved an expensive one, and is entirely due to speculators and wire pulling, the result being that the few speculators have gained at the expense of the public. It is high time Montreal spread a little, for the population is closely packed. The system of "tenements" (houses of four floors, two floors is a tenement with separate entrances) that prevails even in the best localities, disguises the fact of the overcrowding from the casual observer. But while the plan may seem to lessen taxation, rents are very high, the majority of tenement tenants paying far more for their two floors than people in Toronto pay for a "self contained" home and bit of garden. Consequently the attempts to populate the suburbs there ought to be easily carried out.

THE verdict given at the recent Toronto Assizes in the case of the Citizens Milling Co., Ashdown, Page and Webb against Defoe, was only what must have been expected, judging from similar cases before the English Courts. The building owned by the defendant, in which was stored merchandise and other property of the plaintiff, suddenly collapsed in February last, and the owner was sued for the value of the goods. The plea of the defendant was that the cause of the failure of the building was *dry rot*—unavoidable, and therefore he was not responsible. It has been held, however, in England, that the owner is responsible for the condition of his building as far as the purposes to which it is put are concerned, and that he should have ascertained by careful examination that all timbers were sound and capable of bearing the weight put upon them. In cases where the owner of a building that he wishes to use for a special purpose, has employed an architect to examine it for him, and the architect has certified that it was sound enough for that purpose, the owner has been able to recover from the architect in the event of subsequent failure. An architect is required to examine into the *hidden* parts, and it is generally a very risky thing for him to saddle himself with the responsibility of the soundness of construction unless he has been personally acquainted with the details from foundation to roof. In the present case the amount sued for is about $6,500.

Despite all that has been said and done with regard to architectural competitions the Corporation of Toronto has not yet learned that architects who have any respect for themselves will not send in plans unless a guarantee is given that the competition will be carried out in a proper manner. Suggestions for the conduct of such competitions have been drawn up in order to guide promoters, that they may be able to secure the best designs and work for the object in view. The notice given by the Markets and License Committee that they are desirous of receiving suggestions for the proposed enlargement of the Toronto Market show how absolutely at sea the Committee is. These gentlemen do not know how best to effect their purpose, and instead of employing some one as their consulting architect, they ask all architects to send whatever they like in any shape they choose, and the Committee, without any professional advice, will select the scheme that seems to them best. $1,000 of ratepayers' money is to be the award for the three best plans, which are to become the property of the Committee. This is but throwing away $1,000, for none but the very needy or youthful architects would have anything to do with such a competition. Again, this Committee may be entirely changed in a fortnight's time at the civic elections, and the new Committee may not be willing to carry out the ideas of their predecessors. Such things have happened before, and the probability is that anyone who did send in a plan would have all his trouble for nothing. Nearly seven months have been given for the preparation of schemes, and this will prove just so much lost time, for we feel confident that not one plan of any merit will be found waiting for the Committee to meet at the end of the seven months.

THE novel sight of a brigade of axe men engaged in chopping down poles erected by the Street Railway Company has lately been witnessed on the streets of Toronto. The City Engineer's action in ordering this to be done seems justifiable. The agreement which the Street Railway Company entered into with the city provides that the character of the construction and equipment of the system shall be subject to the approval of the City Engineer. The Company has lately acted as though its intention was to evade as far as possible compliance with this agreement. It has erected poles which would disgrace the streets of a backwoods village, and has accentuated their native ugliness by painting them a variety of colors. In many cases a brilliant red is the prevailing hue. There seems to be manifest in the Company's dealings with the city as well as with private corporations and individuals a disregard for the rights of others as well as its own promises. To get possession of what it wants now under promise of remedying in the future what is below the standard, seems to be the policy pursued. Whatever the other party to the contract may do, the Company appears to have always in mind the fact that "possession is nine points of the law." If the company intends to continue to own and operate the road, it is making a huge mistake by antagonizing public favor, and even if, as is asserted, its intention is to dispose of the franchise, the fact of its being at loggerheads with everybody must tend to lower the value of the privilege in the

eyes of intending purchasers. We refer to this matter because such conduct is calculated to increase the prejudice against which promoters of electric railways have had to contend, and thus to retard development.

IF we were asked to give a word of advice to the builder that should be of the greatest possible value to him we should say "Get acquainted with men in your own business, especially those who are frequently competing against you." We have in mind nothing of the nature of a "combine" or even of anything approaching an agreement that should affect prices. Such a proceeding in the building trade would be worse than useless, for if such an agreement as to prices were made, those who wanted to build would be driven to other places to get their work executed. But leaving out entirely the question of prices, there is a very decided advantage in men in the same business being well acquainted, because it destroys to a great extent unbusinesslike competition and encourages a healthy system in its place. There are other advantages, one of which may be given as an example. A man desirous of building a house invites bids from three or four builders. When the estimates are received he at once goes to Mr. Jones who is the lowest bidder and talks to him something like this: "Mr. Jones, you know very well that I would rather you should build that house for me than anyone else, because I know that you will do an honest job"—and so on, with as much of similar talk as he thinks poor Jones will stand. "Now Jones, you see you are not the lowest bidder—in fact there are two above you, but if you can see your way to take off something you shall have the job." Jones reasons that if the other builders can do the work for a lower price than his bid, *he* can, so he takes off a hundred dollars or so, with the result that he either loses on the transaction or comes pretty close to doing so. Now, had Jones been on good terms with the other builders, he could easily have found out whether he was really the lowest bidder or not, and the little "confidence game" that is as a fact carried on every day, would not have succeeded.

WE understand that the Council of the O. A. A. has decided upon holding the next annual convention in February, the opening day being the 7th inst. We have not as yet seen any programme of the meetings but we have no doubt one will be arranged that will be equally attractive to both town and country members. The last two conventions were very unfortunate as regards the weather, so much so that going about town was to be avoided as much as possible. It is at any rate to be hoped that the coming convention may be more fortunate in this respect, and if this could be foreseen, we feel sure that the Council could not include anything in their programme of greater interest and practical importance than visits of the whole body to some at least of the many large buildings that the city architects may at the time have in charge. This would be a feature that would commend itself very favorably to the country members, and at the same time an opportunity would be afforded to city members to see buildings they cannot help being interested in, but which from a variety of causes they have hitherto not visited. By making an early start, say between 8 and 9, one morning, a good many buildings might be seen, and more would be accomplished at the convention than if, as is generally the case, the meetings cannot be called to order till nearly eleven o'clock. We venture to suggest that one reason why members have proved themselves so lacking in punctuality in attending the sessions is that the country members at any rate have been trying to see as much for themselves of the city and some of the larger works as they possibly could during the hours of recess. No doubt there is a great deal of interesting matter read and discussed, but it is a question whether this should occupy all the time. Judging from the interest taken by all who met last year, in the visit to the Childrens' Hospital, visits to the Court House, new Drill Hall and some of the Banks already completed would meet with general approval.

AN extraordinary and dangerous move is being made to have the work on the Toronto Court House carried out by day labor. The public need to be put on their guard against such an innovation for they perhaps hardly understand the full importance of the move. Not merely is it an injustice to the taxpayers as affecting their pockets, but it is utterly impossible that a building of the size, quality and character of the Court House should be successfully and properly completed in the manner proposed. Day labor is all very well for works of a rough description, such as road making or drain laying, but the intricacies of a large building entail an amount of responsibility that we should imagine the architect and clerk of works would be very unwilling to shoulder. For two men, however skillful they may be, to undertake the superintendence of the details of ten or a dozen different trades and to be responsible for the work of 200 or 300 men, is out of the question. The time of the architect (and for this purpose he is employed) should be taken up with the elaboration of his scheme, not with ordering of material and the constant looking ahead to prepare for the next piece of work to be done on the building. We do not see how an architect can give his time to all the necessary works that day labor would involve. There is another matter to be considered—every year the *personnel* of the Court House Committee is changed, and who can say whether some future committee, without the experience that the existing committee has gained, would not decide that some other method should be employed. Prices, too, vary; wages may increase; a strike may be inaugurated by the men employed; these and a score of other contingencies may possibly arise, all of which would mean delay and useless expense. We have had enough trouble over the Court House, and the taxpayers are getting restive under the continual expense of litigation. The only safe and right course to pursue is to have the work tendered on in the usual manner and carried out by responsible contractors.

ILLUSTRATIONS.

STATUE OF THE LATE RT. HON. SIR JOHN A. MACDONALD, TO BE ERECTED IN HAMILTON, ONT.—MR. WADE, SCULPTOR, LONDON, ENG.

HOUSES ON SYDENHAM STREET, TORONTO.—HENRY SIMPSON, ARCHITECT.

ILLUSTRATIONS ACCOMPANYING MR. CHAS. BAILLAIRGE'S PAPER ON "ESCAPE FROM BUILDINGS IN CASE OF FIRE," IN THIS NUMBER.

NEW ISOLATION HOSPITAL, TORONTO.—HENRY SIMPSON, ARCHITECT.

Edmund Burke
Arch.

ACCEPTED DESIGN FOR OFFICIAL SEAL FOR THE ONTARIO ASSOCIATION OF ARCHITECTS.

TORONTO ARCHITECTURAL C.V.B. ORGANIZED 1889

At the first of the Club's meetings during the last month, Mr. J. Wilson Gray read a paper on the high buildings of Chicago, and the methods employed in their construction.

At the second meeting, papers on photography as applied to architecture were read by the President, Mr. A. H. Gregg, and Mr. J. J. Woolnough. These papers and the illustrations which accompanied them, will be published in a future number.

THE B. C. INSTITUTE OF ARCHITECTS.

THE above Institute, which has now been in existence about eighteen months and embraces nearly 40 members, held its second annual meeting on Friday, November 4th, 1892, at Vancouver, B. C., with Mr. C. O. Wickenden, of Vancouver, Vice-President, in the chair.

Minutes of the previous meeting having been read and adopted, the chairman read the following report of the year's work.

"In the absence of our President it devolves on me now to read to you the executive report of what has been done by our Institute during the past year. Since our last annual meeting held in Victoria on the fifth December, 1891, we have been duly incorporated, after taking legal advice as to the proper means to that effect, under "The Literary Societies Act." Of this you have had due intimation in the issue of our "By-laws and Declaration of Establishment." This course your Council considered advisable in order to give us a proper legal status.

The next action of your Council that I have to bring to your notice is one respecting competitions. Your Council felt it advisable to address the office of Land and Works of the Provincial Government respecting the terms of an impending competition for Government offices in Victoria. The result of this co-operation was the issue of the instructions doubtless seen by you all (correspondence read). Shortly before the competition designs were to be submitted, we again addressed the Commissioner of Lands and Works on the subject of adjudicators. Rumors of a possible reference of the designs to an architect of the United States induced us to take this action, and here again I have to congratulate you on the ready compliance of the Commissioner with our suggestions, two of our profession nominated by the Ontario Association of Architects having been appointed to assist the Commissioner in making his selection.

Most of you are aware that during the year a competition for designs for a new Christ Church Cathedral in Victoria, was arranged by the plans committee of that church. The conditions of this competition were considered by your Council as unsatisfactory, and several suggested alterations in the terms were made and forwarded to the secretary of that committee. These suggestions were not favorably received by them, the consequence being that very few designs were submitted from British Columbia. In consequence of the action since taken by the committee of the new Christ Church Cathedral issuing out of this competition, your Council again thought some action was necessary, and at a Council meeting held on Saturday, Oct. 15th, a sub-committee was appointed to go over the question and report. This report was passed as a resolution of the Council at a subsequent meeting held Oct. 22nd, and a copy sent the plans committee ; up to date reply has not been received from them.

These matters are referred to, to show our members to what extent matters affecting our position as architects have received our attention. Probably the most important action taken during the past year has been the attempted passage in the Local Legislature of our "Bill respecting the Profession of Architects," which, as you all know, was thrown out by the small majority of one, the time of its being voted on being late on a Saturday at the fag end of the session, with a very few members present. It is a question for your consideration whether the Act should be brought up again at the next session of Parliament or not.

Your Council at a meeting held on Saturday, Oct. 22nd, passed the following resolution having reference to By-law 6 : That in accordance with By-laws 1-6 the following gentlemen be invited to allow themselves to be nominated for election as honorary fellows : Messrs. F. C. Gamble, G. A. Keefer, H. B. Smith, W. S. Gore, Joseph Hunter, Edward Mohun. It remains with you now to adopt this report or not and if you have other nominations to make to add to the above.

I have to regret to add that one of your Council, Mr. Trimen, had resigned owing to continued ill health. At the Council meeting of October 15th, Mr. Day was elected to take his place (By-law 54)."

Upon the report being adopted, the vote was next taken for the members of Council for the ensuing year, when the following were duly elected :

President, C. Osborn Wickenden, Vancouver.

Vice-Presidents, R. Roskell Bayne, Victoria : Cornelius J. Soule, Victoria.

Hon. Treasurer, Edward Mallandaine, Sen., Victoria.

Hon. Secetary, W. Ridgway-Wilson, Victoria.

Thomas Hooper, Victoria ; John Teague, Victoria ; Alan. E. McCartney, Vancouver ; Richard P. Sharp, New Westminster ; A. Maxwell Muir, Victoria.

The gentlemen nominated above by the Council as honorary Fellows were duly elected, as were also Messrs. S. G. Curry, of Toronto, and A. T. Taylor, of Montreal, the experts appointed by the Government in the late competition.

After some further discussion on the subject of the proposed Bill respecting the profession of architects, a committee consisting of Messrs. Soule, Bayne, and Ridgway-Wilson, with power to add to the number, was appointed to consider what further steps should be taken in the matter and to report to the Council.

It was decided to hold the next annual meeting at Victoria, and the meeting adjourned.

GOVERNMENT BUILDINGS COMPETITION, VICTORIA, B. C.

Acting upon the suggestion of the British Columbia Institute of Architects the Council of the Ontario Association of Architects were requested by the Government to nominate two non-competing Architects to act as experts in conjunction with the Honorable the Chief Commissioner of Lands and Works in the Government Buildings competition. Accordingly Mr. S. G. Curry, President of the Ontario Association, and Mr. A. T. Taylor, F. R. I. B. A., R. C. A., a member of the Council of the Quebec Association of Architects, were appointed. After an exhaustive examination of the various designs these gentlemen handed in the following report, viz :—

VICTORIA, B. C., November 5th, 1892.

To the Honorable the Chief Commissioner of Lands and Works Victoria, B. C. :

SIR,—In accordance with our appointment as experts to examine and advise on the plans submitted in competition for the proposed new Government Buildings, we beg to report as follows :—

Sixty-five sets of drawings have beeen sent in by sixty-two competitors. We have arranged and carefully examined same, and have selected the following five designs to compete in the second competition, viz :

No. 19, "Brittanicus."
No. 56, "A. B. C. Architect."
No. 43, "St. George on Shield."
No. 25, "Utility and Dignity."
No. 17, "Utile Dulci."

NOTE.—These are placed alphabetically and not in order of merit.

We have selected the above as most nearly fulfilling the conditions and requirements of the competition.

We regret that we were obliged to reject several designs of great merit on the ground that the expense of carrying them out would grossly exceed the limit of cost stated in the conditions of competition.

None of the designs submitted were entirely suitable in the internal arrangements of the several departments, owing, we think, in a great measure, to the inadequacy of the information furnished to the competitors.

We would respectfully suggest that as full information as possible of the requirements as to space, and the internal working of the several departments, be furnished to the competitors in the second competition.

We are, Sir,
Your obedient servants,
S. G. CURRY,
ANDREW T. TAYLOR.

After this report had been received, the sealed envelope bearing the *nom de plume* of each was opened and the names of the successful competitors were found to be—

"Brittanicus," F. M. Garden, Chicago, U. S.
"B. C. Architect," F. M. Rattenbury, Vancouver, B. C.
"St. George on Shield," J. F. Brown, Toronto, Ont.
"Utility and Dignity," Messrs. Skillings & Corner, Boston and Seattle, U. S.
"Utile Dulci," T. C. Sorby, Victoria, B. C.

These gentlemen will be at once requested to submit a second set of designs in accordance with the terms of the competition.

The Government desire to thank the various architects who competed, and feel it is a matter for congratulation that such a large number of designs of great merit were received from which to make a selection.

W. S. GORE,
Deputy Commissioner of Lands and Works.

Lands and Works Department,
Victoria, B. C., 9th November, 1892.

OBITUARY.

Mr. Wm. Gearing, one of the best known and most highly respected builders of Toronto, died of consumption at his home in that City on the 3rd inst. Mr. Gearing was incapacitated for business for two years preceding his death. He was a native of Wattington, Oxfordshire, England, and was forty one years of age. The funeral ceremonies were very largely attended. The officers of the Toronto Builders' Exchange were present, some of them in the capacity of pall-bearers.

The product of the Ontario drain and sewer pipe factories for the tax year is valued at $360,000.

CHARACTERISTICS OF ARCHITECTURAL STYLE.

BY G. F. STALKER.

(Continued from page 56.)

About the time when Solomon was in "all his glory" (although for the temple, his palace, and other buildings erected by him he had to go outside his own kingdom for his architects and builders), the various small principalities lying towards the south-east of Europe were gradually drawing together and being cemented into one nation. There were race distinctions among those people, strongly marked and even antagonistic, and so long as they remained apart from each other, the probability is that they would have become absorbed into one of the more powerful nations to the east of them, and so have lost their individuality or have lived their allotted time in this world in a condition of mediocrity. In any case they would, in all likelihood, have left no distinctive landmarks behind them. But after many bickerings among themselves, in which (like many other great nations since that time) they played a military game of see-saw, they found that they had so many interests in common, that by degrees they became fused together into one homogeneous nation. It was well for the world in general, and for art in particular, that this great event happened. The result of the fusion of the Hellens, the Spartans, the Dorians and others, has been a source of wonderment for the world ever since its accomplishment. Rapidly, as nations move, the principalities became unified, and then they seemed to be in a hurry to make an everlasting impression on the pages of the world's history ; for, as Fergusson puts it, "all those wonders of patriotism, of poetry and art, for which Greece was famous, crowded into the short space of a century and a half, is a phenomenon the like of which the world has not seen before, and is not likely to witness again."

But, be the time of Grecian supremacy in the world long or short, this fact remains, that in Greece and that part of Asia Minor immediately under the rule of the Greeks, architecture reached its highest stage of development in ancient times ; and, in what we call classic architecture, nothing has been produced since their time, which, for beauty, for purity, or even utility, can surpass or equal the works of the Greeks. That they drew largely from Egyptian and Assyrian sources for their designs is abundantly evident, particularly in their earliest works. But in their hands everything, borrowed from whatever source, underwent a process of improvement and refinement, so that when we come to the time when they were at the zenith of their power, they had created a style of architecture distinct from anything that existed before—peculiarly Grecian, and having in it principles upon which succeeding styles were based.

The Doric order (which was derived from an Egyptian source), was that most largely used by the Greeks in their temple and monumental buildings. At first they gave to its proportions more solidity and massiveness than was found in the Egyptian columns from which it was borrowed, and that to such an extent as to border on clumsiness. But such examples are so few in number, that we may conclude that they quickly saw their error and set about correcting it. At the same time they had no hard and fast code of proportions of the various parts of any of their orders by which they worked. The arbitrary rules which are sometimes taught in schools and academies as belonging to this and that order, were drawn up by Sir William Chambers on no higher authority than his own. But in the Grecian buildings still in existence, there are no two examples in any order which are in all respects, either as to proportions or detail, exactly alike. They have a family resemblance to one another and nothing more. It is acknowledged, however, on all sides, that the Parthenon is the most perfect example of the Doric order. And this building is so inseparably linked with Greek art that one never thinks of the one without the other coming to mind. In outline every detail is of the very simplest, and at the same time the most effective form, bearing to each other such admirable proportion that the whole is absolutely faultless.

But the Greeks did not depend on the strictly architectural features of the buildings alone for their beauty, for with their exquisite detail and perfect masonry they united the sister arts of sculpture and painting. Without these, indeed, their buildings would have been somewhat bald, and certain parts of them meaningless. But these arts formed an essential part of the design, and were intended to, and did, give life and dress to what would otherwise have been very simple structures. Many of the ornaments which in some late examples were carved, were in the earliest buildings executed in color. The sculptures also were relieved by colored backgrounds, and the figures themselves were sometimes painted. It will thus be seen that a Greek temple, when first erected, required an harmonious combination of the arts of architecture, painting and sculpture, to complete the composition.

The Ionic order was less dependent upon sculpture than the Doric—that is to say, as far as the human figure was concerned. The form of the column was more attenuated and the whole entablature much compressed. The details were also more enriched by carving, and so the necessity for sculptured work was greatly lessened, or altogether dispensed with. In this order the columns are provided with moulded bases, and the chief features of the capital (as indeed, it is of the whole order), is its bold volute, which no doubt was derived from an Assyrian source. The same minuteness and elegance of detail, and the same finished masonry were used in this order as in the Doric, though it lacks that force and vigor which is so manifest in the latter.

Towards the decline of Greek art a third order, the Corinthian, became dominant, although it was never used in buildings of first importance. Its base was more elaborately moulded and its capital more richly carved than the Ionic order. Its entablature was also bolder and better suited to the introduction of sculpture.

Such are the three orders of Greek architecture which are easily distinguishable by their capitals alone. The Doric has a square cap or abacus, with a rounded moulding underneath it ; the Ionic has the volute ; and the Corinthian has the bell of the cap richly foliated. The poet Thomson in his "Ode to Liberty," says of Greek architecture :

"First unadorned
And nobly plain, the manly Doric rose ;
The Ionic then, with decent matron grace,
Her airy pillar heaved ; luxuriant last,
The rich Corinthian spread her wanton wealth.
The whole so measured true, so lessen'd off
By fine proportion that the marble pile,
Formed to repel the still or stormy waste
Of rolling ages, light as fabrics look'd
That from the magic wand aerial rise."

But besides the striking distinctions in the capitals of the three orders, it must be observed that the most characteristic feature of Greek architecture is that of horizontality. The general squareness observable in Grecian buildings gives an indication of strength and solidity ; the long unbroken lines of entablature are suggestive of repose ; while the mouldings, consisting as they do of a variety of flowing curves, soften the severity of the lines and add grace and beauty to the whole.

Though Rome was founded as early as the union of the principalities of Greece, it passed through several centuries of its existence before erecting any buildings calling for notice, or that in any way were distinctive as regards architectural style. Conquest and the accumulation of wealth seem to have been the motive power of Rome as a republic. During this time neither art nor letters received much attention or encouragement from this restless, fighting, conquering people. But after the great powers of the world had been subjugated, and made tributary to Rome—when she became the capital of Europe and mistress of the world—then during a period of comparative peace she became the lodestone that drew to herself all the learning and the art that had flourished in other countries. Art treasures in immense quantities, captured in her successful wars, were poured into her lap. Artists from Greece and Asia and Egypt flocked into the imperial city in great numbers, and then sprang up in rapid succession innumerable buildings of much larger dimensions, of more costly adornments, and for a greater variety of purpose than the world had ever known.

The claims of the business life of a busy people had to be considered, and so architecture spread its wings, and instead of being confined to temples, palaces and tombs, it took within its wide and friendly embrace buildings of every description. Baths, market-places, theatres, monuments, aqueducts, bridges, villas, gateways—anything in short that was built was by them treated architecturally. They seemed to consider that what was worth building was worth building artistically. Architecture

under the Romans was consequently more varied as regards its design, and more cosmopolitan in its application than it was in the hands of any of the nations before their time.

There is, however, less distinction between Roman architecture and Greek than there is between the latter and its antecedents. The same orders were used, but in an enriched form. The Corinthian order was certainly improved by them, and the composite order is, after all, only a modification of the Corinthian. To the Romans, however, must be accorded the credit of introducing the semi-circular arch both as a constructive and decorative feature. They were not the inventors of this form of arch, but they applied it in such a manner as to make it a characteristic feature of their style of architecture and explode the ideas that had formerly existed as to its structural soundness.

Just as the columns were enriched, so also was the entablature. Wherever carving could be applied it was done, and where color could be introduced by the use of precious stones or metals no other mode of coloring was adopted. From first to last experience was the order of the day at Rome. But in all their work there is a sort of manliness visible, and no problem of structural difficulty ever presented itself but to be overcome. Roman architecture has also this interest attached to it, that it broke away from the horizontal lines which had ruled in all previous styles, and established a point of departure which led up to the adoption of vertical lines as the leading principle in succeeding styles.

A REPLY TO MR. BOND'S LETTER.

Editor CANADIAN ARCHITECT and BUILDER.

SIR,—In reply to young Mr. Bond's communication of 22nd Oct. last, in reply to mine which you previously published, commenting on your correspondent's mis-statements, permit me to state that I, as inspector of Mr. Tuckett's building, *ought to know* when the carving was done on it, and I most emphatically deny that any was executed until long after your correspondent's spiteful notes had been forwarded to you.

Herewith I send you a tracing taken from the original drawing, and request you to submit it to the criticism of any architect to say if not only the skilled sculptor, but the merest schoolboy in architecture, would not be justified in holding it up to ridicule.

Yours, &c.,

JOHN WATSON,
Inspector of Buildings, Hamilton, Ont.

[As no useful object is likely to be attained by continuing this correspondence, we decline to allow it to proceed further.—EDITOR C. A. and B.]

"CANADIAN ARCHITECT AND BUILDER" COMPETITION FOR A CITY HOUSE.

THE CANADIAN ARCHITECT AND BUILDER invites competitive designs for a city dwelling, to cost $15,000, and to be erected on a lot 30 × 125 feet. The lot will face the narrow way, south, long way, east. The main west wall of the building must stand on the party line between the lots, and the main east wall must come upon the street line. There is to be no enclosed area for lighting.

The building is to contain three clear stories above ground, to be constructed of stone, or of stone and brick, with sloping or flat roof. No overhanging tile or shingle work will be allowed.

The entrance may be on either front, at the option of the designer.

The number and location of rooms and the purposes which they are to serve is left to the judgment of the designer.

Competitors will be required to furnish plans of basement and three upper stories, and elevations of south and east front. Perspectives may be submitted at the option of the competitors. Floor levels must be marked on the side of the elevations.

This competition is restricted to architectural students and draughtsmen in Canada.

Drawings must be made on sheets of heavy white paper or bristol board, 14 × 20 inches in size, and must be drawn sufficiently coarse to allow of their being reduced to one-half the above size. Drawings must be made in *firm, strong lines*, with *pen* and *black* ink. No color or brush work will be allowed. Each drawing must be marked with the *nom de plume* of its author, and the author's name, *nom de plume* and full address, enclosed in a sealed envelope, must accompany each drawing sent in.

Drawings must reach the office of the CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto, on or before the 4th of January, 1893. The right is reserved of publishing any drawing sent in. Drawings will be returned to their authors within a reasonable time after the competition is decided.

The first premium will be $15, and the second, $10.

The merits of the designs will be decided by a committee composed of three members of the Ontario Association of Architects, and their decision will be final.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT and BUILDER).

It has been decided to hold monthly meetings of the Montreal members of the Province of Quebec Association of Architects. On the evenings set for the meetings the members will dine together at the St. Lawrence Hall, and go direct from thence to the meeting in the Association rooms on St. James' street. The first of these meetings took place last week, on which occasion a paper on "The Functions of Truth in Art" was read by Mr. A. T. Taylor, F. R. I. B. A. The reading of the paper was followed by an interesting discussion. It is the intention also to revive the classes for students, which were attempted to be established last winter. The Montreal members of the Association have evidently set their hands to the accomplishment of practical work on behalf of the Association and the rising generation of architects. They deserve and should receive the most cordial assistance of every member of the profession.

THE FUNCTIONS OF TRUTH IN ART*

The foundation of art to be enduring must be laid in what Carlyle calls "The eternal veritie." Of these one of the greatest is Truth.

There can be no real permanent art without truth; and in all art there must be beauty, and these two are inseparably joined, for in all truth there is beauty and in the highest beauty there must be truth. If we study the great architectural epochs of the past we will find this truth recognized and given full expression to in their greatest and noblest memorials and achievements; and just in proportion as truth in construction and design was ignored so degeneracy in vigor and life set in. No nation and no individual can afford to neglect truth, whether in ethics, poetry or in art. It must be placed like a precious jewel in the breast-plate, unsullied and undimmed by compromises or subterfuges.

In painting—the most intangible of the graphic arts—the rules are somewhat less abstract and definite than in architecture and sculpture, but truth governs none the less. The great artist, to be sculptor, architect or painter, must be born; he is like the great poet, the great musician, the great prophet, he has a divine mission; profound thoughts have been whispered into his soul to deliver to his fellow men; and therefore, because we cannot always make them fit in with our preconceived ideas, we must not be too hasty in condemning them. Revelation comes to us with many voices, and thoughts in varied channels. Were these not in part sometimes incomprehensible to the average run of humanity, then would the artist not be worthy to be called "great" and become commonplace.

Nature is the fountain of art, the quarry from which art's achievements are obtained; but Nature has to be interpreted, and in the interpretations men may err. As miracles have been said to be not violations of natural law, but the action of a higher law of which at present we may be ignorant, so certain phases of art, although apparently not true to Nature as we see it, may be entirely in sympathy with the deeper truths of Nature that we ourselves may not, as yet, have discovered and appreciated. Truth on its finite side is not absolute but relative, and therefore pre-Raphaelitism, Romanticism, Impressionism and many other isms have visions of truth in them important for mankind to know.

A picture may be truer to Nature and give one the very spirit of the scene although, probably, it may be a poorer imitation of the features of the landscape and of the ordinary color, than one which may be very correct in its lineaments and chromatic scale. Turner in many of his pictures took great liberties with Nature, but he has given us such an insight into the versatility of Nature, such atmospheric effects, such luminousness, and such a revelation of possibilities, that no one that I know of has ever surpassed and few equalled.

Have we not all seen a portrait in which all the features were correctly drawn and yet the whole effect wooden and inexpressive, and have we not seen another, it may have been but a rapidly dashed off sketch, roughly done, and perhaps not very correct in drawing, yet because there had been caught the spirit of the man, some special characteristic—THE MAN, not the outer shell—we felt at once it was the truer and better of the two. Truth is not merely imitation; were this so, then photographs as being most nearly correct transcripts of Nature would be the best and would take the place of paintings. Even leaving out the question of color you expect something more in a picture than in a photograph. You all remember the well known story of Zeuxis and Parrhasino who had entered into a friendly competition to paint the best picture; Zeuxis painted a bunch of grapes which looked so natural that the birds came and pecked at them, and when he called on his rival to draw aside the curtain to show his picture the found that the curtain itself was the picture. Zeuxis confessed himself beaten,

* Paper read by Mr. A. T. Taylor, F. R. I. B. A., R. C. A., before the Montreal members of the Province of Quebec Association of Architects.

saying, "I deceived the birds, but you have deceived an artist." You also remember the story of the painting of the fly by young Giotto on the nose of a figure his master was painting, which was so lifelike, that to the delight of the pupil, his master tried to brush it away with his hand. Mere imitation, however clever, is not the highest form of art, it is a trick that can be learned, but it is the mind of man impressed on the canvas that gives it value. By some strange perversity we have rigorously demanded Truth in speech and action but allowed it sadly to go by default in art. The need of truth in art is paramount and I should like to emphasize it still more and say that art will flourish first in proportion as faithful and honest methods are employed and truthful and honest thoughts impressed on the work.

Art in all its phases should be interesting to us as architects; as I hold very strongly that an architect should be an artist as well as a constructor; but it is natural that it should be of special interest to us in its relation to architecture and the applied arts. In everyday art this question of Truth presses most closely to us. Our houses, our streets, our surroundings, are with us all the time and unconsciously influence us; and if these are not instinct with truth we shall make our own Nemesis to bring on our own punishment? I am happy to think that the crusade against shams, largely influenced by the powerful and brilliant writings of John Ruskin, has resulted in the abolition of many of the worst, but they are hard to kill, and too many are still left to us and need rooting out also. It seems to me that a fundamental rule is this: Always let a thing look what it is, and do not make it try to look like something else. Iron and steel are great friends to us, but they have often turned to be our enemies, by reason of our inability to use them rightly; and, I am sorry to say, they are responsible for much questionable work; the facility with which we can bridge wide spaces, carry heavy walls over voids, and generally disregard the disposing of walls, piers, etc., above each other, has led to the violation of some of the elementary principles of construction. We have also to thank the same material for making it possible to construct those enormous lofty buildings in which Chicago has the unenviable notoriety of taking the lead. I cannot but think that these will, before long, come to be looked upon as stupendous blunders; the utter disproportion of scale and mass to their surroundings, the fatal disturbance of harmony and proportion to the environment, to say nothing of the disturbing sense of feeling that what is visible of the slim, lower stone and brick piers, is manifestly and apparently inadequate to support the enormous superstructure without the aid of iron or steel supports behind the piers. In many modern buildings the outer walls help little in the construction, and are merely enclosures and could be removed without affecting the stability of the floors or roof. I cannot but feel there is a grave danger looming ahead for many of the skeleton framed buildings in which the iron or steel uprights are built into brick-work for fireproof purposes, and when in time rust and decay will set in without the possibility of detecting or remedying it until it makes itself known by sudden and fatal failure.

In speaking of Chicago one's thoughts involuntarily turn to the White City which has been rapidly rising in its midst for the World's Fair. The material called staff, made of plaster, jute and water, which has been employed for most of the exterior, has proved such a pliable and adaptive material for temporary work that there is a great danger that it will be adopted for more permanent structures, and just as we are congratulating ourselves that we have got rid of "compo" and stuccoed fronts, which so long held horrid sway, to the utter degradation of all true art, we will be threatened with a return of the old pernicious and objectionable material, only perhaps a little better in quality. We have to guard against the lack of truth in construction and in outward finish. If we can only afford to build a common brick house let us try to bring out the utmost capabilities of the material in simplicity, and not cover it with plaster and line it to look like costly stone, until the miserable subterfuge is evident when the plaster begins to fall off. If a plaster finish is desired, then let it be treated as plaster, and stamp patterns upon it or leave it rough cast and honest, but do not try to make it look like stone when it is not.

Motives of economy and narrowness of view on the part of clients have been to blame I am afraid for the extensive use of galvanized iron in cornices and such like—so detrimental to the dignity and truthfulness of a building in the long run, and it is for each of us to consider seriously how far it is right for us to pander to this. It is a phase of architecture largely peculiar to Canada, and hardly one that we would care to proudly hand down to posterity as our contribution to a noble national style of architecture. If we cannot afford doors of hardwood, let us have them of pine, honestly varnished or painted, but do not let us grain and paint them to imitate oak or mahogany or maple. A thousand times better to have a plain thing that is honest and truthful than an elaborate thing that is a lie. No true art can exist where such things prevail, and we must remorselessly root them out. Until quite recently the grained roof of Milan Cathedral was painted with imitation tracery work to look like perforated stone, and deceived many people. Within the last two or three years, however, this deceit has happily been painted out, and it is the intention to decorate it with frescoes of sculptured subjects in an honest genuine manner.

At Abbotsford, Sir Walter Scott had his paintings fixed to the walls and frames painted round them with sham mouldings and ornament, shaded to imitate relief work, and this is a very common form of deceit. You will see it even in churches, where surely, if anywhere, truth should be absolute in its sway. There may still be seen entrance halls and staircases of some houses, the halls hung with papers to imitate marbles of all colors and kinds—Siena, dove, purbeck; generally, part of it is coming off and revealing the paperyness of the sham, and there may also be seen papers to imitate different kinds of wood and which I regret to say may even be bought in the market to-day. Surely in this age of pretty wall papers and artistic designs such poverty of invention, to say nothing of the deceit, is indefensible. It is not so long ago since it was a common thing to break up a blank wall by putting in sham windows and painting on the sashbars and glass, and I have even seen fancy blinds painted on. And such was the rage forty or fifty years ago for uniformity, that if a house required a wing on one side, a similar wing had to be put up on the other, even although it was only a thin sham wall with nothing behind it. Some of you may have seen imitation colored glass made of paper which was intended to be pasted on to the ordinary glass of a window to make people think it was stained glass. These may be thought trivial details, but I hold no details to be trivial, and although we may not bow down to falsehood in that form, it is so hydra headed that other heads of deceit will arise in other forms to gain approbation.

Truth demands that in all design the nature and character of the materials to be used should be considered, so that the inherent quality of each should be brought out in the design. Let what we have be simple or expensive, but let it be at least what it pretends to be, and if at the same time it is good in design, then we can safely take pleasure in it with a good conscience. Nothing is too trivial for truth to hold sway. It should permeate down to the smallest detail. A great writer has put this admirably, yet not too strongly. He says: "Nobody wants ornaments in this world, but everybody wants integrity. All the fair devices that ever were fancied are not worth a lie; leave your walls as bare as a planed board, or build them of baked mud and chopped straw if need be, but do not roughcast them with falsehood." Very subtle forms of falsehood are creeping in under the guise of artistic effect. In the States especially you will see new houses built to look old, with the stones purposely chipped and broken and made to look weather-beaten, so as to give to a new house the effect which has only been put daintily and lovingly on by the finger of Time on an old one, after perhaps a century or two of caressing. It has affected modern draughtsmanship also, for new houses and buildings are delineated as if they were ruins crumbling into decay, and fictitious aids are freely sought after to enhance effect.

If honesty and truth could but pervade the execution as well as the design of our architectural and engineering works how many accidents and lives might have been spared. Every week, I would almost say every day, accidents happen from dishonest and faulty workmanship—vessels lost at sea, trains wrecked, bridges giving way, houses falling. But this faulty work is not confined to modern times; recently, the ancient central tower of Peterborough Cathedral showed signs of failure, and it was found necessary to take it down and rebuild it. In the process of demolition it was found to the amazement of everyone that the piers supporting the towers were only composed of a skin of good masonry and that the inside was filled in with rubbish. Surely the jerry builder has been an institution in all ages! Examples could be multiplied indefinitely, but enough has been said to make my meaning clear, I think. Entire honesty and thoroughness in everything is what is wanted, not only in what will be seen but also in what may not be seen. It is an old saying, "The Gods see everywhere."

I would close by quoting a sentence from an address delivered by Gounod at the Academie des Beaux Arts in Paris a few years ago. He says: "Art reposes in Truth. Wherever Truth is ignored and violated there begins or is accomplished the work of disintegration or death. Serve Truth. Truth alone gives stability and liberty. Serve her generously, valiantly, nobly. Yield yourselves to her. She is so divinely grateful that she will pay you a hundredfold the battles fought for her."

THE R. C. A.

AT a meeting of the council of the Royal Canadian Academy recently held in Toronto, the following committee was appointed to select pictures from the exhibition to be held in Montreal in February, and if deemed advisable to select works of art by Canadian arists generally, to send to the Canadian fine art exhibition at the World's Columbian Exposition, Chicago, which will be opened May 1st, 1893, viz. :—Mr. Robert Harris and Wm. Brymner, Montreal, and Mr. Homer Watson, Doon. Mr. Robert Harris was chosen to hang the pictures selected. Resolutions of sympathy were passed to the widows of the lately deceased members, W. G. Storm, architect, and Paul Peel, the artist.

It is the intention of the academy to make as good an exhibit of Canadian art at Chicago, as can be got together. The Dominion government has agreed to pay the expenses of the exhibition.

TORONTO ARTS STUDENTS' LEAGUE.

A very successful exhibition of recent work of the members was given from the 5th to the 10th inst., in the League rooms, Imperial Bank building. The exhibit spoke volumes for the industry of the members and likewise displayed a marked improvement in skill. A further reference to this exhibition and to the work of the League will appear in our New Year number.

ODDS AND ENDS.

In erecting office buildings and other similar large structures the most difficult problem in general is that of adequate light, without considerable sacrifice of space. By using here and there thick pieces of glass, set in light iron frames, for floors, some of the difficulty is removed, but there are always some rooms that depend upon reflected light. The office room in which this item is written has large windows, but blank walls only a few feet from them so that very little light comes into the room direct from the sky. It was originally intended to cover the walls referred to with white glazed tiles, but this was not done because of the high cost. It does not seem to have struck the architect or owner that almost the same result might be obtained by giving the walls a liberal coat of whitewash about once a year. The expense would be comparatively small, while the reflection of light from the white surface almost equal to that obtained from glazed tiles. Another means for reflecting light in dark rooms that is extensively used in office buildings in England is the mirror reflector. This consists of a mirror plate, finely corrugated on the surface and set in a strong wooden frame. It is hung on the outside of the window, the top being inclined at a proper angle to throw light into the room. As a rule the reflector is supported at the bottom on pivots, held in place by means of iron brackets secured to the window frame, while the top is supported by iron chains. The surface of the plate being corrugated, the light thrown into the room is well diffused. The writer has seen cases repeatedly where rooms in which it was necessary to burn gas all day were rendered light enough for all office purposes by means of these reflectors placed at each window, the reflectors being assisted by the walls and ceilings of the room, which were papered with very light satin wall paper.

* * *

To properly specify for the finish of hard-wood floors sometimes puzzles architects. The writer has seen several coats of raw linseed oil called for, when to use such would produce very unsatisfactory surfaces. One of the best ways to finish floors of this kind is to first give a coat of hot linseed oil, liberally mixed with dryer, then rub in paste filler and clean off in the usual way, taking care to leave the surface free from excess filler as far as possible. Now apply a coat of light shellac, sandpaper lightly all over, and putty up the holes and defects with a putty carefully colored to match the wood; then apply two or even three more coats of shellac and lightly sand paper between each, and finish by rubbing to a dull polish with crude oil and powdered pumice stone. An oak floor finished in this way will last longer than a finish by any other method, and very much longer than when finished with wax. Some painters would be inclined to omit the hot oil before applying the paste filler, but it pays well to use it, as it forms an excellent foundation and gives a durability to the floor as a whole.

* * *

Canada is fortunate in having upon its statute books a law regulating the sale of white lead which practically insures that pure lead shall be used when specified. The fact should not be lost sight of, however, that something more than purity is required in white lead; whiteness and fineness are very important qualities, and it is well known that there is almost as much difference between the various brands of pure lead as there is between chalk and cheese. The color of white lead may readily be tested by placing different samples side by side, when the whitest sample will be readily distinguished. It is not a bad plan to have a sample of zinc also; the zinc being a much purer white than even the whitest white lead ordinarily sold, gives a sort of standard and indicates at a glance how yellow the commercial white lead is. To test the fineness of white lead is not a difficult matter: Thin it with turpentine and spread on glass, brushing out as smoothly as possible, using a separate sheet of glass for each sample, and taking care to thin equally. This can be done by weighing the sample of lead and measuring the quantity of turpentine used in each case. When the glass is painted and is quite dry a comparison between the samples will show the relative fineness at a glance, while if the finger be drawn across the surface, the difference in fineness will be further perceptible. This glass test will tell something about the whiteness also.

There are few things more annoying in connection with store fronts than the condensation of moisture on the glass that so frequently takes place. Not only does the water run down and spoil the goods placed in the window, but it obscures the view and renders the window to all intents and purposes useless. There have been various means for curing the trouble patented, but none of them has met with very great success. No store front should be built without an open grating at the top to permit of a free ventilation, when this is provided there will not, as a rule, be much accumulated moisture. In case of existing store fronts where it is desired to provide means for ventilation, a piece of glass should be cut away and a revolving brass ventilator inserted, or a strip of glass may be cut away from the top of the window and two or three strips of glass held at the ends in a metal frame and arranged to lap may be inserted so as to form a glass shutter that can be open or shut at will.

ESCAPE FROM BUILDINGS IN CASE OF FIRE.*

By Chas. Baillairge.

Having been invited by your Secretary, Mr. Hutchison, to read a paper on some subject connected with the profession, I do not think I can hit on one more utilitarian and really important than that of "Evasion in Case of Fire."

For the last 30 or 40 years we have been endeavoring to erect "fire proof" structures, and great strides have been made towards the solution of the problem. Repeatedly has it been asserted that such and such a building was or might be considered absolutely fire-proof; and as often has each and everyone of them come to grief, generally with much loss of life, whenever taken in hand by the devouring element. As recently as last year did I see a list of some 28 theatres and places of amusement destroyed by fire in different parts of the world in a single month; and one can hardly, on any day of the year, take up a newspaper without the recital of some frightful accident, some holocaust due to the destruction by fire of a manufactory, a college or a convent, theatre, hotel, asylum and the like.

The motto used to be, "All brick and iron," or "Nothing but brick and iron," but that error has been exploded by the repeated failure of structures so built, where it is found that cast iron columns snap like glass when, after becoming heated by the combustion of the furniture and stores within the building, a jet of water from a fire engine happens to strike them; while wrought iron columns, joists and girders also fail, by warping and distortion; and it is now incontestibly admitted on all hands that cast and wrought iron columns, beams, girders, etc., can only be used and relied on to stand in case of fire where they are enclosed in brickwork, or thoroughly enveloped on every side with terra cotta or some other refractory substance of the kind; and hence the philosophy nowadays of erecting buildings composed of a skeleton frame work of wrought iron or steel encased in brick work—the iron affording the stability required while the brick work forms the protection against destruction by fire.

It may be considered practically impossible to render buildings of all kinds absolutely fire-proof, or to the extent of preventing at least their partial destruction. We cannot, for the sake of an eventuality which may never occur, render ourselves uncomfortable and miserable for a whole lifetime by resigning ourselves to tread on cold stone, cement, tile or other forms of incombustible flooring. We cannot make up our minds to the life-long handling of cold and heavy iron sashes, shutters, blinds and doors. Floors in our dwelling houses and our schools, and in the bedrooms of hotels, etc., must still for health and comfort continue to be made of wood. You cannot have your little ones trot around in their bare feet even on so cold a floor as oak, merely for the sake of its slow burning qualities. And, independently of the effort and fatigue of handling iron doors and casements, look at the cost of them as compared with wood—the first cost and and then the subsequent one of repairs; for buildings must in future settle and subside unequally, and what will cost you a cent to chip and shave a wooden sash or door to make it fit, would cost a dollar if it were iron; to say nothing of the fact that the iron sash, the folding casement more especially, could hardly be made so close a fit against the entrance of cold air, and, therefore, not so comfortable.

The treads of stairs, if not the carriages, must in dwelling and tenement houses and whenever carpets cannot be afforded, continue to be made of some such non-conducting soft wood as pine or hemlock, spruce or balsam, where you can use your bare feet without the danger of taking cold as when walking over oil cloth. Our tables, desks and chairs must continue to be made of wood, for who can submit to constantly touch or come in contact with metallic surfaces without untold annoyance, discomfort and ill humor. And so must our couches, our sideboards or buffets and our bedsteads be made of wood, were it only for the fact that a wooden bedstead can be bought for $2.00, while an iron one costs five times the amount. Nor would any adequate advantage be obtained in the use of iron chairs, if they could be made as cheap as wood; for, as no one could use such, so to say, freezing or heat abstracting seats, they must be suitably upholstered or cushioned. So would couches have to be if they also were of metal.

Now, since all buildings used for residential purposes, as dwelling and tenement houses, convents, schools and colleges, hotels and places of public resort and amusement must, therefore, have wooden floors, wooden

* Paper read at the Third Annual Convention of the Province of Quebec Association of Architects.

doors and sashes, wooden furniture, and, as in the case of hotels, etc., thickly upholstered furniture, curtains, portieres, carpets, mattings and the like, it follows that, even if in other respects fireproof, that is, if the building be indestructible by virtue of its iron joists and concrete floorings, its brick partition walls and iron roofing, still does it and must it contain a large amount of combustible and smoke producing material, and the gases more than enough when ascending from one single lower floor or story to stifle all the inmates of the floor above. The smoke and heated gases from below will immediately ascend through every stairway, through every elevator or sliding cupboard, through ventilating and hot air or hot water flues, or recesses in the walls. They will follow up along and through the holes made and left by plumbers around soil and sink pipes, electric and other wiring, and they must be counted on as surely as the fact that they cannot be excluded, eliminated or got rid of.

It follows that as no one can face such smoke and heated air or gases for more than a few seconds at a time, without the risk of choking, the way out of the burning building must be immediate. To have to grope through a long and maybe winding corridor to reach a fire escape at the end of it is inadmissible, impracticable. No one can stand the smoke for a sufficient length of time to do so. The fire escape must be at hand. It must be everywhere, with nothing more to do to reach it than to step over your window sill on to an adjoining balcony, or, in the case of a person occupying a front room in a hotel, cross the corridor into and through the rear room opposite and through the window thereof on to the said balcony leading to the fire escape stairway. There is no other possible certainty of escape than by the means I propose. Portable fire escapes may be and have been efficient in cases of private residences, or buildings where there are only half a dozen or a dozen people to be saved, the brigade having time to mount the ladder and make as many trips up and down as there are human beings to remove before the fire gets sufficient headway to render escape impossible by that means—but many impediments exist nowadays to the free use of the fireman's ladder, such as lines of wire and cables for telegraphing, telephoning, electric lighting, and electric transit, and oftentimes the ladder cannot reach the higher upper floors or stories.

Elevators cannot be relied on for evasion in case of fire, as, though the car and its surroundings be thoroughly fireproof and the fire or flames cannot travel through them from one floor to another, they act as chimney flues, the smoke and heated air rising through them to the exclusion of any possibility of escape in that direction. The iron stairways stipulated in the Boston and New York fire acts are no better than the elevators just alluded to, except that until invaded by smoke and hot air from a fire below, a larger number of inmates might pass out in much less time, than by the comparatively slower elevator process, due to the necessary intermittency of its trips up and down.

Fire escape ladders attached to outer walls are now to be found in very many instances, and it is unfortunate that we attach too much importance to their existence and seem to think that provided buildings have such ladders all is right and safe. Now, this is in most cases quite the contrary. Such ladders are no doubt of some use to able-bodied men and women, but of what use, let me ask you, gentlemen, is such a ladder to a child, to a young and delicate female, to an old man or woman, to an infirm person, even if it could be easily reached from any part of the building, which it never is and never can be, since, as before stated, no man, woman or child can before being stifled reach such a ladder through a long and winding corridor. Again, there are those who, though otherwise able to take care of themselves, become dizzy and helpless the moment they look down from any height, as from the upper floors of a building, and to whom the ladder would also prove useless. For a factory, no doubt, a ladder may answer, as the inmates are all able-bodied persons; but what about an asylum for the old and infirm, what about a convent, a college, with dormitories generally in the attic or upper floors, the other stories being used as class rooms, etc.; what is to be done in the case of a hotel with bedrooms in the upper flats and not extending below the third.

I think I may be allowed to say in my own name and in the name of the whole profession that nothing but a regular and commodious stairway can be considered safe under the circumstances, and this stairway must have no direct communication with any part of the building from which escape is to be had. This is imperative, and a *sine qua non* of the absolute safety of the proposed system: for, as already stated, if the stairway to be used as a fire escape does communicate with the building or apartments to be subserved, and if any one of these apartments be on fire, the ascending column of smoke and heated gases will effectually prevent escape in that direction. The communication must be indirect, that is, it must be from the building to an outer landing and from the latter to the stairway, thus preventing the possibility of the existence of any current through the shaft capable of drawing the smoke and heated air into it.

Now, the proprietor of the hotel, if it be one, will not (you may take your oath on it) for the sake of an eventuality which may never occur, deprive himself of a single foot of otherwise available space within the walls of the buildings; and if the stairs were built within the building, and taking up, as they would and must do, the space of an ordinary upper floor bedroom, that is one room on each flat or 5 to 6 rooms in the total height, the scheme would be objected to and no proprietor might be found to carry it out. And not only must no otherwise available space be devoted to the purpose or sacrificed as it would be said to be, to a doubtful eventuality; but neither would the manager of the establishment allow of any of his arrangements or requirements being sacrificed in the premises. None of the communications from one apartment to the other on the ground or any other of the floors of the edifice must be in any way impeded.

In the case of all buildings with interior courts for light and air the proposed fire escape stairway must, as shown on the accompanying sketches, be erected in the rear of the building, where it can be done inexpensively of 12" or even 8" brickwork, instead of towards the front where it would have to be made an architectural feature of the building and, therefore, ten times more costly than where proposed, as in such case the galleries would also have to be made architectural features of the design and so much more costly on that account. The stairway being in the rear, and as, to render escape effective and complete, the front or open must be reached, then must a corridor be made right through and through the building, and this corridor must be fireproof to be of any real use; and to be fireproof it must be like the stairs themselves, cut off from all possible communication with the remainder of the building, or in other words there must be no other door or opening into it or leading from it than the doorway from the foot of the stairs towards the rear and the door at the front or the outer end of it. This corridor should be situated at ground floor level, the level at which the inmates must escape into the adjoining street. But this would cut off communication between those portions of the building on either side of the corridor. No other solution, therefore, presents itself than that of elevating the corridor to a height sufficient to pass under it.

Now, we all know what a mezzanine is, or an *entre sol* as they call it in France. This mezzanine or dwarf story has a most important function to perform by being taken in or left out to suit. For instance, say the clear height of the first or main story of the building, whatever it may be, is 18 or even 17 feet. This may be divided into a 9 or 10 ft. and a 7 ft. story with an allowance of one foot or less in height for the floor between the two, and while the entrance hall or vestibule, stores, dining, meeting and other large and important rooms on said first floor would be made of the full height of the story, or 18 feet, other rooms for secondary purposes and of smaller dimensions would only be made say 10 ft. high with a 7 ft. mezzanine above them, to be devoted to servants' bedrooms and other domestic purposes with convenient stairs for access to them here and there. Through this mezzanine or *entre sol* would the fireproof corridors therefore pass, as shown in section, and thus the proposed system of fire escape becomes complete, certain and effective, without the possibility of giving rise to one single complaint on the part of the proprietor, tenant, occupant or manager of the establishment; for an inspection of the plan and section will show that from every story of the building above the 1st from which escape can be had direct into the street, flight will be simultaneous and, so to say, instantaneous, every occupant of a rear room stepping out direct over his low window sill into a narrow iron gallery (of open lattice work, not to interfere with the light below) communicating with the stairway, while each occupier of a front room has merely to cross the corridor and pass through the room opposite his own to get access to the gallery staircase. There can be no jamming of the occupants of one floor by those of another, for since the exit from the room is simultaneous on each flat the occupants thereof will be simultaneously or at the same time descending their respective flights of stairs.

It only remains to say that in the case of a church or place of worship, a music hall, a theatre or circus, with more than a single tier of boxes or galleries, the fire escape galleries or balconies must of course be towards the street or open, in which case they would be made ornamental features in the design, as in the new theatre at Antwerp in Flanders where to each of the tiers of boxes there is an outer gallery or a balcony continuous around the building and 25 exit doors to each story with stairs descending from the fifth tier to the fourth, from fourth to third and third to second, whence the last flight of stairs or that to reach ground level is temporarily suspended to preclude entrance to the buildings and released in case of fire by merely pressing the foot upon a spring.

Now, gentlemen, you will be naturally curious as to the cost, that is, the additional cost of carrying out the scheme, and to leave no room for doubt in the premises I annex an estimate thereof, founded on a closely detailed calculation of all the quantities, where on cubing the building at only 10 cents a foot we get say $160,000 for a hotel 200 feet by 100 feet and 100 feet in height or five stories, exclusive of basement and attics or mansard story (7 floors in all). The fire escape, including, as already set forth, iron galleries around each of the two inner courts, one to each story above the first or main floor, with two stairways, one to each court and corresponding fire proof corridors and stairs to street level, comes to $6,546 or very nearly 4 1/10 per cent. of cost of building. In the case of a similar building used for manufacturing purposes and composed of large apartments and where the furniture and upholstering being a minimum and the smoke from an incipient fire below much less in quantity and less intense, and therefore less hurry required in vacating the premises, the length of gallery to each floor might be reduced by half, which would reduce the additional cost of carrying out the system to something less than 3 per cent. of the cost of the structure.

ESTIMATED ADDITIONAL COST OF FIRE ESCAPE FOR ANY BUILDING CARRYING OUT THE SYSTEM.

Taking the building to be 200x100 ft. or 20,000 ft. area with deduction of two open courts of 40x50, we get net area of 16,000 ft., which into 160 ft. high, gives 1,600,000 ft. cube at 10cts—$160,000.00.

FIRE ESCAPE.

Girth of courts, 180 ft. x 2 = 360 ft. x tiers = 1800 ft. lin. iron balcony 2½ feet wide (see detailed estimate of ft. lin.) at $1.85	$3,330.00
Add cost of enclosure walls to stairs (see detailed est.) $800 x 2	1,600.00
Add cost iron stairs (see also detailed estimate) $315.00 x 2	630.00
Add cost of fire proof corridors through the building from rear to front (see detailed estimate on sheets of diagrams, $493.00 x 2	986.00
	$6,546.00

not quite 4 1 10 ₀ or cost of building.

LEGAL DECISIONS.

IN the case of Rosebrough v. Eastwood, recently tried in the Western Division Court, Toronto, the defendant, who was the owner of a house for the erection of which the plaintiff had been given the contract, was ordered to pay $43, the full contract price, for work which had been rejected by the architects and replaced by another contractor.

MCKITTRICK V. PERRY:—This was an appeal by the defendant from the judgment of Judge Morson, judge of the county of York, given in favour of the plaintiffs in an action brought in that court and tried befor the judge without a jury. The suit was entered to recover the price of a furnace sold to the defendant for the purpose of heating his dwelling; the defence being that the furnace did not heat the house, and there was also pressed a counter claim for damages by reason of the defective heating. Judgment was given by the junior county judge for the full amount claimed by the plaintiffs, with costs, and the counter-claim dismissed with costs. Appeal allowed; the plaintiff's action dismissed with costs; judgment entered in favour of the defendant for $50 damages and the plaintiffs permitted to remove the furnace.

A case of considerable interest to architects and builders was recently decided in the county court at Winnipeg. In October last Mr. C. H. Wheeler, architect, sued Mrs. Joseph Wolf for commission in connection with the construction of her residence on Kennedy street. His original claim was $241 and his suit was for a balance of $161. Mrs. Wolf counterclaimed for $1,000 damages on the ground that the stone foundation had not been built 18 inches above the sidewalk and $100 further on account of defective work in the cellar. Evidence was submitted that the foundation was actually higher than the specifications called for. A number of witnesses testified that any damage caused to the cellar arose from the non-completion of the sewer on Kennedy street and the impossibility of getting rid of the water rising from the ground. The contract also provided that the cellar should not be completed until the sewer connection was made. Another point raised by the defence was as to the amount of commission to which the architect was entitled, the defendant and her husband contending that he had agreed to do the entire work for 2½ per cent. Professional evidence was given that 5 per cent. was the usual commission and the plaintiff and his son gave evidence that the defendant agreed to pay that amount. The jury gave a verdict for the plaintiff on both items of the counterclaim and for the full amount sued upon, less $13.50. A large number of witnesses was called on the part of the plaintiff, including several builders and contractors, and the case lasted a portion of two days.

The case of Pendarves v. Monro, reported in the current number of the Law Reports, should be noted, though it does not lay down a new legal principle, but simply emphasizes and exemplifies one which has been for some time in existence. Article 41 of Roscoe's "Digest of the Law of Light" states that "when a right is claimed in respect of windows in a new building coincident, wholly or in part, with windows in an old building, the owner thereof must show clearly that the new windows are coincident with and contain the area of those which have acquired the right light." This principle was enunciated by, among other cases, that of Fowler v. Walker, and it is this principle which Pendarves v. Monro emphasizes. The identity of the old and new windows was not proved. "By reason of the omission," said Mr Justice North in his judgment, "to keep any plan, there is no evidence which satisfies me that any part of an old window can be identified with any part of an existing window." In the work from which an extract has been given, the author states in the note to article 41, that when a building is to be pulled down, a plan showing the position of ancient lights should be made and kept with the title deeds. The place in regard to which the dispute in this last case arose was in Sardinia-place, Lincoln's Innfields, and the old houses were pulled down in 1872: therefore, being buildings in the center of London, it was eminently disirable that plans should have been kept. The occupier of the building from 1869 to 1872 made an affidavit giving particulars of the old windows, and stating that he believed that the new windows "cover in whole or part the ancient lights." But, as we have seen, this was not enough,—the evidence was too vague. The practical result, therefore, is that without a plan it is almost impossible to establish a right to light in respect of windows in a new building which have not themselves acquired a right, but are alleged to have such a right in respect of old windows in a demolished building, with which they are alleged to be identical.—*The Builder.*

MANUFACTURES AND MATERIALS

BRICKMAKING AND BRICKBUILDING IN NOVA SCOTIA.

The extensive forests in this country, causing comparative cheapness of wood as a building material, has tended much to retard the general use of bricks in the construction of buildings, public as well as private. Outside of the capital city and a few of the larger towns, it is rare to find a brick dwelling; the few which may be seen are crude in appearance and entirely devoid of any ornamentation. The idea that a brick building can be made handsome in appearance, without the use of face or repress brick and stone trimmings, has yet to be developed.

Face brick commands a high price, and stone trimmings are expensive, and beyond the reach of the ordinary builder. A prejudice also exists against brick amongst many, on the ground that a building constructed of this material is liable to be damp. This is owing to the hitherto defective mode of building, no air space being left in the outer walls. However, of late years, this factor is recognized, and almost any one now understands that a brick building can be rendered more comfortable for winter or summer use than one built of wood. Again, there are in the rural districts of the province very few skilled masons and no regular bricklayers. What we have are fairly good all round men; they will build a rubble foundation, lay a brick wall, or lath and plaster in a plain, unpretentions manner. It is quite easy, on the other hand, to find a carpenter skilful enough to build you a wooden house in the very latest improved modern style, and just as easy to obtain the manufactured lumber from the many sawmills, planing and moulding mills and sash factories to be found in any ordinary sized town. The tourist from your country, who, anxious to escape the siroccos of your heated cities, and lured by the many press notices this year of our country, to spend their vacation with us, have seen in our rural districts many dwellings which attest the skill and æsthetic taste of the worker in wood and the excellence of the painter's art.

Brickmaking in this country is only in its infancy. You can count the brick-yards on your ten fingers, and yet the country is full of the material for making red brick of the finest description. With two or three exceptions the operation of brickmaking is conducted by hand. The clay is mixed in an old-style pug mill turned by a horse, the bricks are struck by hand, laid on the ground to dry,—it it rains to be washed away,—hence the common brick are roughly made, as a rule, and utterly incapable of making a finished wall. The exceptions, where steam is the motive power, and brick machines used to strike the brick, are in this county, with one other yard I understand in Pictou County started this summer.

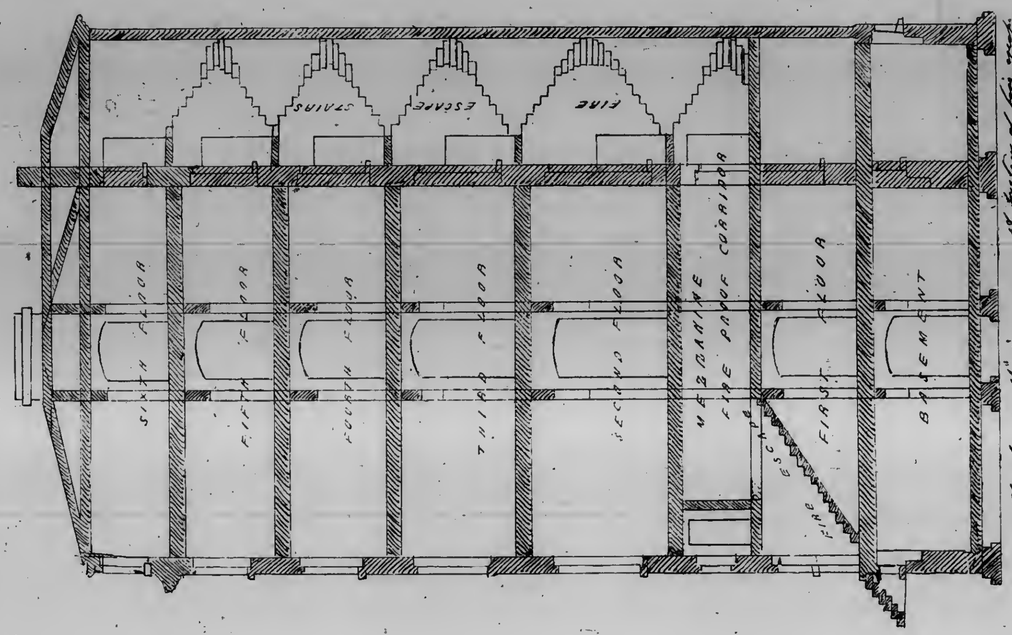
The brick made by the International Brick & Tile Company, whose works are situated here, are moulded automatically in one of Creager's machines, driven by a forty horse-power engine. This company makes only common brick, but their brick have such smooth faces and square edges that they are being used for some purposes instead of face brick. The clay on the property of this company is of a superior quality, entirely free from grit, and is taken direct from the bank to the pug-mill. When moulded, the brick are dumped on pallet boards and placed in racks to dry, this being the only yard in the province in which the bricks are dried in this way. In all the yards the bricks are burned in the old style of kiln. Wood is now used as fuel, and at present it is kind of cheap, but the time will come when coal must take its place. There is not a "Eudaly," "Hoffman" or "Perfect" kiln in the country. Time and again I have urged the management of the company with which I have the honor to be connected to investigate the merits of the new and modern mode of burning, as compared with the old and, in my view, expensive, wasteful and antiquated methods, but without success. However, as everything comes to him who waits I yet hope to see a modern kiln as part of our plant. No ornamental brick is made in the country, and as for terra cotta it is unknown. Pressed brick is made in some of the yards, but they are manufactured by hand machines of antiquated construction. I should like much to see a Raymond or some other of the repress machines with which your manufacturers produce the beautifully moulded forms of brick and terra-cotta shown in the catalogues I have seen, and embellishing your fine and artistic brick edifices. Speed the day when ignorance and folly shall give place to the beautiful and edifying, as well as useful, in the construction of our residences and public buildings. Then may we hope to see brick predominating in our rural towns and settlements as the material of which to construct our dwellings, and such dwellings as shall combine art with utility, and which will not require constant repairs and the application of paint every now and then to keep up appearances.

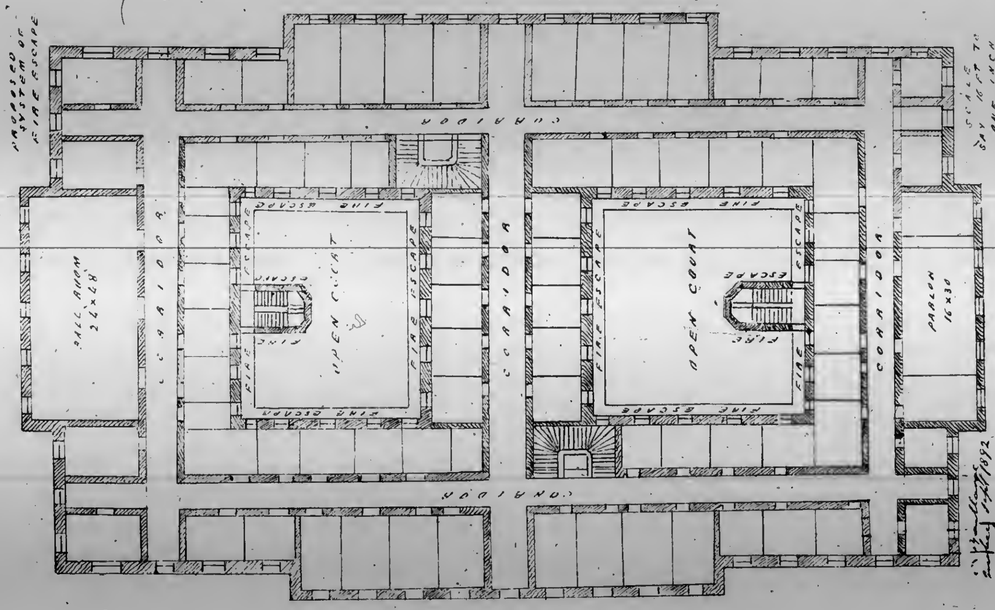
To return, the Annapolis Valley, or "Evangeline's land," as it is now poetically known, contains vast deposits of argillaceous clay which becomes when burnt of different shades of red, from a bright toned terra-cotta to a deep cherry; just beside these deposits of clay are often found beds of sand sharp and fine, most of which can be used without screening. Moulding sand mixed with iron pyrites can also be obtained for experimenting in coloring, but usually with our clay it is not necessary. I have lately met with a description of kaolin which if properly treated, can be made into buff brick or terra cotta. It awaits only enterprise and capital to produce the manufactured article. We have the raw material, and the market will soon create itself. Our red clay, also, is suitable for drain tiles; being free from grit or stone, it can be easily worked through the tile machine. The market for this class of goods in a few years will be practically unlimited, as under-

STATUE OF THE LATE RT. HON. SIR JOHN A. MACDONALD,
TO BE ERECTED IN HAMILTON, ONT.
MR. WADE, Sculptor, London, Eng.

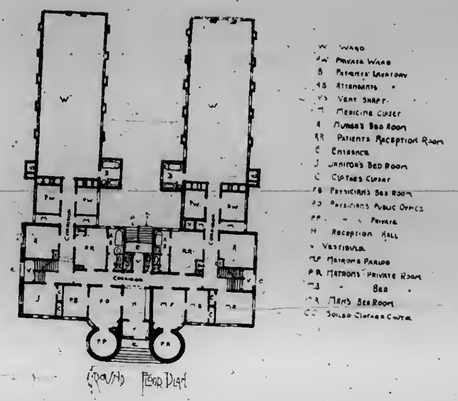
HOUSES ON SYDENHAM STREET, TORONTO.
HENRY SIMPSON, ARCHITECT.

A. Allward, Del.





ILLUSTRATIONS ACCOMPANYING MR. CHARLES BAILLAIRGE'S PAPER ON "ESCAPE FROM BUILDINGS IN CASE OF FIRE," IN THIS NUMBER.



NEW ISOLATION HOSPITAL, TORONTO.

HENRY SIMPSON, ARCHITECT.

(17)
530
1936

CANADIAN

ARCHITECT AND BUILDER

VOL. VI.

93940
30/9/06

1893:

C. H. MORTIMER, PUBLISHER,

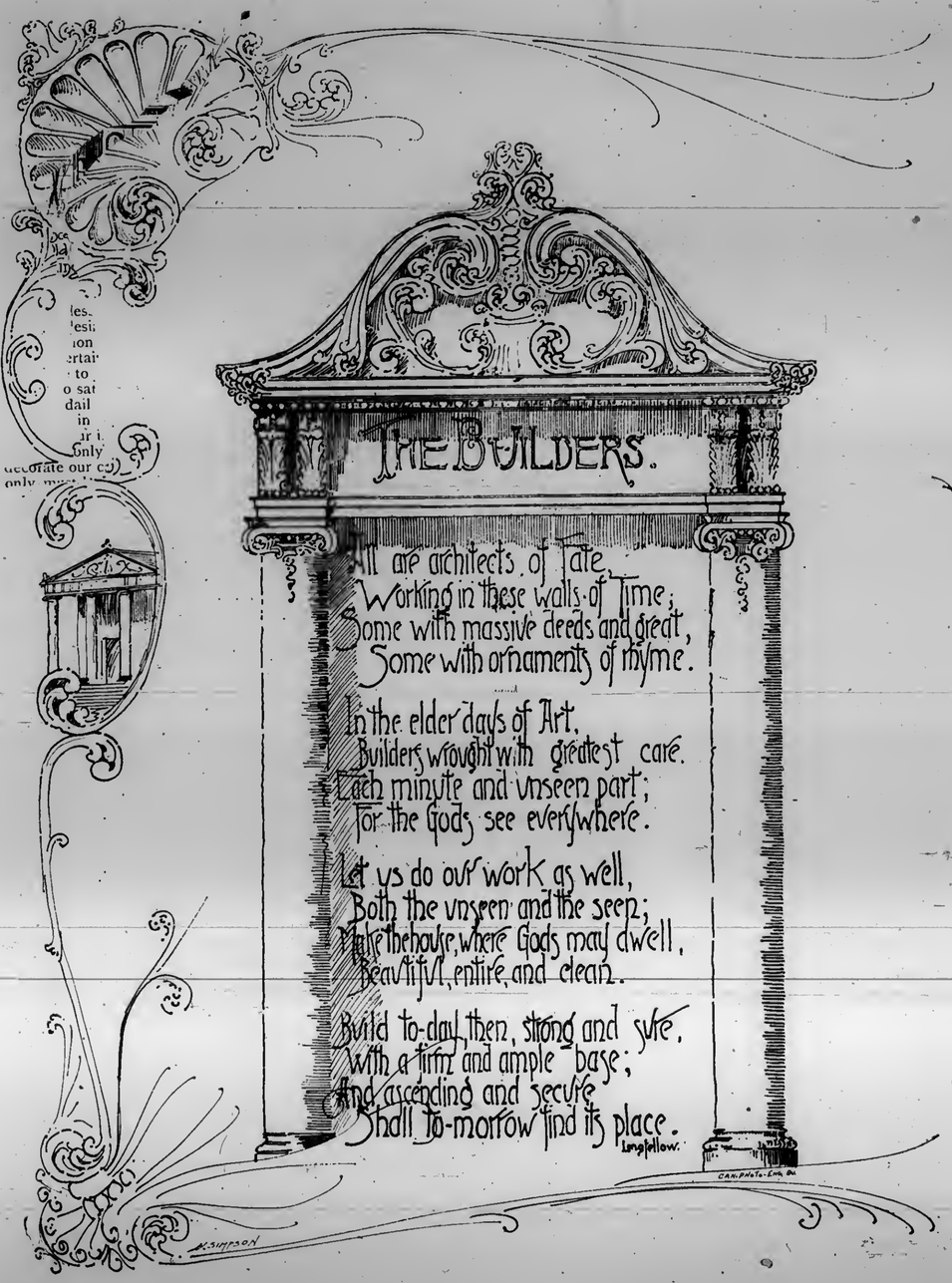
TORONTO—CANADA.

INDEX.

	Page.
Advertisements, value of	56
Advertising, Art of Successful	129
American Architectural Methods from the standpoint of a Canadian	8
Architecture in Hamilton	3
Architecture in National History, place of	40
Architecture, notes on Quebec	10
Architecture, some arts allied to	89
Architectural Design, appropriation of original ideas in	44
Architectural Disguises	67
Architectural Style, characteristics of	9
Architects, Technical Requirements of	95
Art Maxims	57
Architects' Supplies, Duty on	53
American Institute of Architects	63
Architectural Ideas, Evolution of in an Ontario town	84
Architectural Students, Education of	84
Architectural Club in Toronto	92
Art, Manufactured and Real	119
Architect's Opinion of the Canadian Architect and Builder	100
Arts and Crafts	103
Bell Telephone Co., Exclusive Privileges to	64
Beams, Scarfed	59
Bricks, Canadian Pressed, in the United States	74
Bricks, Efflorescence on	45, 66
Bricks, method of making hard	120
Bricks, Laying, in hot mortar	No. x-ix
Brick-Making, Ruskin on	77
Board of Trade Building, Montreal, Opening of	100
Builder, Functions of a	76
Building Operations, volume of in Toronto	34
Building Operations, shrinkage in, in Toronto	63
Building Materials, Extent of production of, in Canada	99
Business Building, Extent of, in Toronto	44
Business Premises in Montreal, needed improvement of	64
Builders' Associations, reading of papers at	121
Building Conditions in Toronto	100, 122
Canadian Builders, Organization of	2, 5, 35
Canadian Contractor's Hand-Book	77
Canadian Society of Civil Engineers	35
Canadian Society of Civil Engineers, Convention	121
Carpentry, Joints in	39
Cement, Duty on	61
Cement, How to Use	129
Cement, use of foreign in the Soulanges Canal	121
Cements, Native versus Foreign	100
Chicago Water Supply	54
Contracting, Importance of attending to details in	34
Concrete, Strength of	70
Contract, What is a	69
Contemporary Architecture	125
Competition for New York City Hall	121
Contracts, boodling in connection with	122
Contradiction, a	57
Color, Contrasts of in Nature	77
Continental Union	33
Comparison, a favorable	97
Competitions	57, 85
Competitions, in favor of	86
Competition, C. A. & B. for a city house	7
Competition, C. A. & B.	114
Copyright of Plans	57
Copper, Process of Tempering	99
Correspondence	7, 17, 35, 49, 57, 66, 74, 77, 87, 93, 94, 101, 128
Correspondence, Hamilton,	7, 87, 115
" London,	74, 87, 115
" Montreal,	17, 74, 87, 94, 115, 124
" Ottawa,	124
" Winnipeg,	124
Col. Auchmuty, Death of	83
Commercial Depression	84, 91
Criticism, a	77
Crematory, proposed erection of	91
Cyclones in Canada, effect of, on buildings	83
Decoration and Furniture	70, 77, 89, 96
Derricks, Breaking down of	43, 91
Decoration of Legislative Chamber, Toronto	35
Decorative Art, French	38
Decoration, Floral	70
Dishonest Contractors, ingenuity of	73
Doors, Construction of Hardwood	59
Doors, Entrance	5
Door Bells, Electric, Efficiency of	53
Doorways	70
Doric Order, the	94
Drawings, to make positive copies of	93
Elevator Shafts and Fittings	53
Education, Technical, value of to Artizans in Building Trades	126
Fire-proof Building in New York, some observations on	36
Fire-proof Paint	36
Fire Losses in Montreal	44
Floors in Public Buildings, safe resistance of	54
Fire-proof Floors, reinforcement of concrete beams in	114
Georgian Bay Canal Scheme	92
Glass, English Stained, for Canada	93
Glass, Substitute for	No. 8-ix
Government Buildings, Victoria, B.C.	33, 48, 54, 65
Government Buildings, Designing of	34
Government Contracts, regulation regarding	54
Government Contracts, Dishonesty in connection with	73
Government Census Bulletin	99
Hardware, American brands on Canadian goods	33
Hardware, Spurious	114
Health Officers, Association of Executive	78
Heating Apparatus, Effectiveness of	89
Heating, Combination	79
Height of Hospitals	43
House Moving	69
Hydraulic Testing Machine, the largest	63
Incandescent Electric Lighting, Reduction in price of	43
Insanitary Conditions in Montreal	60
Iron, Ornamental Treatment of	87
Iron, Fire-proof Construction	34
International Congress of Architects	54
Irresponsible Contractors	55
Ignorance Concerning Wood, paper on, by Mr. Saley	92
Joists and Rafters, Handy Tables of dimensions	88
Kalsomining, Electric Machine for	67
Labor, Italian versus Irish	84
Legal Decisions	16, II-xii, 35, 57, 75, 85, 96, X-ix, 129
Lime, Canadian, for the American Market	123
Lifting up a massive business block	90
Lime and Cement	61
Limestone, Magnesian	No. VIII
Ladders, Ability of Architects to climb	91
Lumber, increased price of, in Canada	44
Manufactures and Materials	50, 61, 71, 80, 93, VIII-x, X-x
Machinery, Value of, in Joiners' Shops	44
Mechanics' Lien Act, Amendments to	15, 55, 58
Metal Work, Designs in	66
Moulding, Bored	17
Montreal, Founding of	33
Monument to Governor Simcoe	54
Mouldings, methods for storing	118
Nails, Cut versus Wire	56
National Association of Builders, Affiliation of Canadian builders with	44
Notes by a Canadian Architectural Student in London	4
Non-resident Contractors, unfair treatment of	15, 54
New York Herald Building Competition	63
Oddfellows' Hall, Weston, Accident to	34
O. A. A., advantages of membership in	44
O. A. A. Convention	22, 123
O. A. A.	11, 16, 39, 47, 56, 64, 65, 77
Oxford County Buildings	91
Passenger Elevator	91
Painters' Measurements	97
Parliament Buildings of Ontario, new	47
Paperhanging, Paste for	81
Paving Brick	45
Paving on track allowances, Toronto	65
Pen Drawing, some notes on	68
Personal	11, 32, 41, 47, 57, 66, 77, 89, 93, 117, X-ix, 125
Pembroke Water Works	125
Photography for Architects	12
Pine, Tests of White	59
Pipes, Earthen, at foundation of walls	60
Plans, Customs Duty on	34
Plumbing By-laws of Montreal, new	78
Plumber's Profits	64, 77
Province of Quebec Association of Architects	86, 92, 100, 104
Publications	7, 35, 60, 77, 89, No. IX-x, 120, 127
Presbyterian Church Competition	73
Plumbing Fixtures, Disconnecting	120
Plumbing Practice, Recent	102
Quarry, Kent Freestone	71
Questions and Answers	42, 49, 57, 66, 75, 86, 94, 101, 113, 123
Queen's Avenue, Toronto, Improvement of	34
Quantity Surveyor, opening for, in Toronto	63
Radiators, Direct and Indirect	89
Ready-made Houses, Manufacture of, in Canada	33, 84
Roofs, Tin	90
R. I. B. A., Address of President of	2
Residences, Cost of in Toronto	43
Road Improvement	122, 123
Roof and Roof Covering	125
Roofs, Combination Lead and Felt	117
Sandstone, the Potsdam Red, Co.	14
Sanitary Building Requirements in towns and cities	55
Shavings,	14, No. I-xi, 41, 51, 62, 128
Shingles, Quality of	98
Slates, Number of, in any number of squares	97
Slates, Quality of Roofing	71
Some Experiences of a Student in Venice	6
Stones, Canadian Building	10
Stones, Tests of	18, 33, 48
Stones, Treating for Construction	82
Stones under a microscope	93
Students, Object Lessons for	15
St. Johns, Newfoundland, Employment for Canadian Architects and Builders in	63
St. Lawrence Market, Improvement Competition	
Sanitation, Heat and Light	60, 78, 89, 120
Speculative Building, Restriction on	92
School Buildings, American	116
Tenders, Irregular	64
Tendering for Work	44, 49
Terra Cotta, its use and abuse	50
Timber, Durability of	No. VIII-ix
Toronto Builders' Exchange	16, 42, 75, 83
Toronto Architectural Club	12, 49, 54
Toronto City and County Buildings	15, 34, 43, 53, 63
Toronto Public Library	34
Toronto Street Railway, efficient management of, in winter	44
Toronto Building By-law, changes in	122
Toronto Technical School	55, 99, 113, 122
Trade Relations, Development of with Australia	122
Toronto Water Front, improvement of	73, 92, 101
Toronto Art Students' League	102
Toronto Public School Board Contracts	100
Trade Notes	X-ix, 117
Treads and Risers, a table for	118
Useful Hints	17, No. II-ix, No. III-x, 52., No. 90, V-ix & x, 70, 72, No. VI-ix & x, 80, 98, 103, 120, 126, 127, 130, No. XII-ix
Uniform Form of Proposal	130
Union Methods in New York	83
Upper Canada College Grounds, old	112
Vaulting	46
Ventilation of Cellars	128
Vibration caused to buildings by trolley cars	33
Victoria Institute of Architects, Competitions of	43
Warming Houses, French Method	97
Wills, Late John A.	75
Windows, Bay and Oriel	17
Windows, Leaded	96
Wind Pressure	127
Wall Paper, Selection of	128
Wrought Iron Work	128
World's Fair, Exhibit of Canadian Engineering at	33
World's Fair, Strike of Carpenters at	45
World's Fair, Notes from the	102
Water Supply and Sewage Disposal in Toronto	53
Water Pipes, Electrolysis of	74
Work and Wages, Past and Present Rate of, in the Building Trades	84
Walnut, Cultivation of, in Canada	99
Winnipeg, Building Operations in	99

ILLUSTRATIONS.

	No.
Bank of Hamilton, Wingham, Ont.	VII
Bank of Montreal, Hamilton, Ont.	I
Bank of Montreal, Montreal, Que.	I
Baronial Mansion, Design for	VI
Builders' Exchange, Officers of	III
Cathedral, Christ Church, Oxford	VIII
Cathedral, St. Mary's, Halifax, N. S.	I
Carved Panels	IX
Carved Stone Mantel	V
Chapel, Bethel, Toronto	IV
Church, Broadview Ave, Congregational	Page 48
Church, St. Joseph's, Ottawa	X
Church, Cook's, Toronto	IV
Church, Design for Village	VI
Church, Erskine, Montreal	IX
Church, Methodist, Quebec, Que.	I
Church, St. Barnabas, St. Catharines	V
Church, St. Johns, Episcopal, Competitive Design	VIII
Concert Hall and College of Music, Design for	II
Cottage, Design for Town	I
Cottage, Design for	II
Elgin Block, Toronto	I
Fireproof Building in New York	III
Freehold Loan Building, Toronto, Entrance	XI
Government Buildings, Victoria, B. C., Accepted Design	V
Government Buildings, Victoria, Competitive Designs	VI, VII
House, Brick, Designs for	IV, V
House, City, C. A. & B. Competition	I, II
House, Design for small	VI
House, small Town, Details for	X
House, St. George Street, Toronto	IX
Hotel, Queen's, Montreal, Que.	VIII
House, small Town, Design for	IX
Mortuary and Conservatory at Mount Pleasant Cemetery, Toronto	XII
Post Office, Halifax, N. S.	X
Road and Club House, Hamilton Jockey Club	III
Residence, Summer, for A. W. Ogilvie	X
Residence for C. W. Leonard, London, Ont.	XI
Residence, Lowther Avenue, Toronto	XII
Residences, pair semi-detached, Toronto	XII
Service Pantry, C. A. & B. Competition	VIII.
Shops and Offices, Chapel Lane, Bradford, Eng.	III
Sleeping Coach, Interior	IV
St. Basil's Novitiate, Toronto	II
Stable, Design for small	XII
Westminster Presbyterian Church, Toronto	XI



NEW YEAR NUMBER - PRICE, 35 CENTS.

CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—NO. I. TORONTO AND MONTREAL, CANADA, JANUARY, 1893. PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD SATURDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
64 TEMPLE BUILDING, - MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 15th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	S. G. CURRY, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	F. J. RASTRICK, Hamilton
TREASURER	D. B. DICK, Toronto.

COUNCIL:

WM. G. STORM	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
JOHN E. BELCHER	Peterborough.
EDMUND BURKE	Toronto.

REGISTRAR AND LIBRARIAN:
W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	V. ROY, Montreal.
1ST VICE-PRESIDENT	J. NELSON, Montreal.
2ND VICE-PRESIDENT	H. STAVELEY, Quebec.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
J. J. BROWNE	Montreal.
J. HAYNES	Montreal.
D. OUELLET	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. J. HILL, President.	WM. PARK.
GEO. MOIR, 1st Vice-President.	JAS. CRANG.
GEO. OAKLEY, 2nd Vice-President.	M. MURPHY.
DAVID WILLIAMS, Treasurer.	J. LISTER NICHOLS.
JOHN ALDRIDGE.	WM. PEARS.
BENJAMIN BRICK.	

JOHN L. PHILLIPS, Secretary.

VOL. VI.

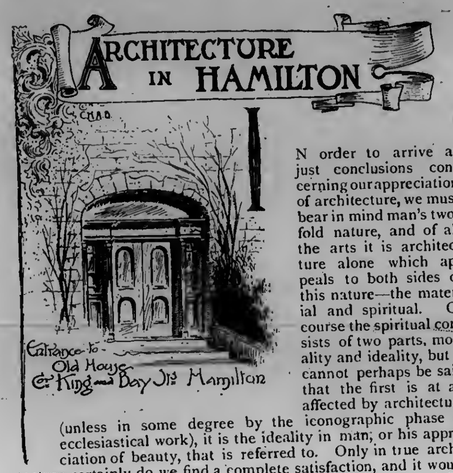
FIVE years ago the CANADIAN ARCHITECT AND BUILDER was launched on the journalistic sea as the representative of the architectural, engineering and building interests of this country. The present New Year Number is intended to mark its safe passage through the shoals which at the outset usually endanger and often wreck the lives of ventures of this character. A comparison of this with the initial number, will suffice to indicate the progress which has been made. While it is a matter of gratification that many of the crudities which marked the earlier numbers have disappeared, we are conscious that perfection is yet far distant, and the realization of this fact will prompt to constant endeavor in the direction of the ideal.

Our sincere thanks are extended to every person who has assisted us to achieve the present standard, and we hope for a continuance of their aid in the future. Especially would we acknowledge the assistance given us in the production of the present number. To Messrs. Darling, Sproatt and Pearson we are indebted for the design for front page of cover, to Mr. Henry Simpson for frontispiece, and to the authors of the special articles on numerous subjects appearing in this issue. Nor would we omit mention of the manufacturing and supply firms, whose enterprise and liberality are abundantly manifest, and who are deserving of reward at the hands of architects and builders, who are extensive users of the materials which they offer.

We trust that to all connected with the building interests 1893 may fulfil the present indications of a prosperous year.

THE address of the President of the R. I. B. A. at the opening session for 1892-3, covers four closely printed pages of *The Builder*, and deals with a variety of subjects, including Draughtsmanship, Architects' Education, Examinations, Qualification of Fellows, The Institute's Publications, Capital and Labor, The Chicago Exhibition, Preservation of Ancient Buildings, The Education of the Public Taste. It would be instructive to receive once a year from the Presidents of our Provincial Arcitectural Associations a similarly comprehensive review of questions relating to the architectural and building interests of this country.

IT is with pleasure that we call attention to the letter in another column of Mr. John L. Phillips, Secretary of the Toronto Builders' Exchange, advocating the formation of a Provincial or National Association of Builders founded on lines similar to the National Association of the United States. Our correspondent enumerates some of the reasons which should serve to call into existence such an organization. There are many others which might be mentioned. Canadian builders are far behind in the matter of organization their brethren in the United States and the Australian Colonies. They are also behind all other branches of trade and industry of equal importance. Lastly they are behind, very much behind, the labor organizations, one of which, representing the International Stonecutters' Union, has been deliberating in Toronto during the past few days. Why should not the employers meet in like manner and discuss questions affecting their interests? The success which has attended the organization of the Toronto Builders' Exchange should prove an encouragement for the extension of the idea in accordance with our correspondent's suggestions, in order that questions of general as well as local interest, including the important subject of legislation affecting the building trades, might receive proper consideration. We hope to see the subject thoroughly discussed and early action taken. The ARCHITECT AND BUILDER will willingly place its columns at the disposal of those who may desire to express their views on the subject, and will otherwise assist in every way possible the carrying out of the idea.



IN order to arrive at just conclusions concerning our appreciation of architecture, we must bear in mind man's twofold nature, and of all the arts it is architecture alone which appeals to both sides of this nature—the material and spiritual. Of course the spiritual consists of two parts, morality and ideality, but it cannot perhaps be said that the first is at all affected by architecture (unless in some degree by the iconographic phase of ecclesiastical work), it is the ideality in man, or his appreciation of beauty, that is referred to. Only in true architecture certainly do we find a complete satisfaction, and it would seem safe to judge architecture by the degree in which it satisfies or fails to satisfy these requirements of our nature.

As in daily life we have first to give our attention to material wants, so in architecture, and if these are fully met and we build in truth, our inner nature will also find some response. Beyond this, it is only a matter of how much and in what manner we decorate our construction. For a building to be truthful, it not only must be built of materials which honestly proclaim what they are and which are used in a logical manner, but it should also suggest its purpose, and the exterior express its interior arrangements.

This point can be well illustrated by reference to the new Bank of Hamilton; here the lighting of the large banking room is accomplished by two rows of windows disposed in such a way as to strongly suggest two internal stories. Of course it was done to carry out the motive which had been adopted, but it is not truthful and one of the first principles of architecture is violated. In other respects this building is rather successful; the general conception of it is good, the detail is refined, and the carving shows signs of life and is well designed. Unfortunately though, the building is in the wrong place. The site is one of the finest in the city, and should have held a building of more imposing character. For this reason adverse criticisms have been passed on it, which would have been uncalled for had the building been elsewhere.

The Bank of Montreal may be cited as the best type of public building in the city. Although there is nothing very striking in its conception, the effect of the whole is good; its purpose is well expressed, and the interior truthfully portrayed; the detail both of mouldings and ornament is refined and well studied and thoroughly in keeping with the style—a phase of Florentine Rennaisance. This is a point which is worth laying some stress upon. The building is in perfect harmony throughout—not, as is sometimes the case, with features of part being in one style, those elsewhere in another, then probably the mouldings in a third, and the carving a mixture of several styles not included in any of the rest. This is the way in which a great quantity of our modern work is designed. Not only this, but the detail is coarse and unstudied. The general aim seems to be to design detail in such a way that one can see every part of it almost half a mile away; this is of course a great mistake, sometimes amounting to positive vulgarity.

An example of coarse detail on a public building may be seen on the new post office. The old post office building, on the other hand, has some very nice detail and is quite successful in many respects—in fact, it is well worth studying.

The Canada Life Building is also a good example both of design and execution. It is carried out in brown stone, and is a very commendable piece of cut stone work.

St. Paul's Presbyterian Church is a building that Hamilton may well be proud of. It looks well from any point of view and is pleasing whether seen from a distance or closely inspected. It is built entirely of stone, including the high and graceful spire. This is the only stone spire in Ontario.

As far as domestic architecture is concerned, Hamilton has both good and bad. There is something quite charming about most of the old homesteads where the true feeling of a *home* is well expressed. They have an air of repose and refinement about them in striking contrast to much of the new work, which literally bristles with towers and turrets, calling loudly to every passerby to behold what wealth and power its owner must have. A tower is altogether out of place on a *home*; there is no reason for it but that of ostentation, and it certainly detracts from the essential idea of such a building.

There is a nice old house on the corner of King and Bay streets; although very simple it is quite pleasing with its colonial doorway, good detail and careful disposition of the openings.

Another interesting building is a quaint old place on John street, now used by Messrs. Gurney & Co. as a storehouse. The design, which has a strong Flemish feeling, is to be commended as being harmonious throughout; the proportion of the whole and its parts is satisfactory, and the motive is well followed. The exterior is hardly expressive of its present use, but when it was erected this of course was different.

Hamilton should have good architecture, for it is very picturesque, and gives the designer a better setting for his work than is usual in cities. Fortunately it has also a good architectural foundation, and it only remains for the future work to follow this up on progressive lines without violating the essential principles of good design.

C. H. ACTON BOND.

ILLUSTRATIONS.

BANK OF MONTREAL, HAMILTON, ONT.

This building was originally erected for the Bank of Commerce from the designs of Mr. Hay, architect, Toronto. It was afterwards purchased and has since been occupied by the Bank of Montreal. The street fronts are constructed of Ohio stone, and the remainder of Hamilton stone.

ST. MARY'S CATHEDRAL, HALIFAX, NOVA SCOTIA.

St. Mary's Cathedral is regarded as being the finest sacred building in Halifax. The architect was a Mr. McCarthy, of New York. The entire front and the spire is built of dressed granite. The sides are not in keeping with the front of the structure, but are built of ironstone with freestone facings. It is a matter of regret that a structure upon which so much money has been spent should be finished in this manner. If the whole building had been completed in a style to correspond with the front, and erected in a square by itself instead of allowing other buildings to hide a part, it would have shown to much better advantage.

BANK OF MONTREAL, MONTREAL.

The present main building was erected in 1846-47 from designs by Mr. John Wells, architect. It originally had a sloping roof and a dome. At a subsequent date the dome was removed, an attic story built and a flat roof put on. The beautiful piece of carving appearing on the facade was executed for the purpose in Italy. In 1885-86 extensive alterations were made from the designs and under the directions of Messrs. Taylor, Gordon & Bousfeld, architects. The banking room was enlarged to more than twice its original area, and entirely new fittings of marble and bronze put in; the whole interior was decorated with frescoes of subjects taken from the early history of Canada.

A new grand oak stair case was also added in front of the Savings Bank to give access to the head office. This facade was ornamented by bas reliefs in stone of subjects symbolical of Commerce, Navigation, Mechanics and Agriculture, executed by Holbrook & Mollington, carvers, Toronto.

METHODIST CHURCH, QUEBEC.

Of Quebec's twenty-five churches, only five are of Gothic design; of these, the one shewn in our view is the largest and in many respects the handsomest. It is built of grey lime-stone, from Deschambault, about forty miles from Quebec, on the C. P. R. line, fine hammer dressed, with tooled mouldings and some very good carving. Until within three or four years the apex of the east gable finished with a pinnacle similar to those yet remaining. Having become impaired by the action of the weather, the trustees, to save future expense, decided to remove it. This action, taken contrary to professional advice, has detracted from the appearance of the edifice. The church can seat comfortably a little over 1000 persons. A gallery extends around the whole interior, the part at the west end being occupied by the choir and organ. Immediately in front and somewhat below the level of this gallery is the platform and pulpit, while underneath the gallery is the vestry and other parlors.

Being built on sloping ground, a lofty basement entered from a street at the west end, is obtained, in which the Sunday School and various organizations in connection with the church find roomy, well lit accommodation.

The late Mr. Edward Staveley, architect, designed and superintended the erection of this church in the year 1848. Although 45 years have since rolled by, carrying away with them all the trustees of that time, as well as the architect, the mason, contractor and painter, and in all likelihood all the workmen who raised the building, the senior member of the firm who carried out the contract for carpenter and joiners' work still survives in the person of Mr. Simon Peters, who is as ready to-day as he was 45 years ago to take contracts of any amount.

The original cost of this church was about $40,000.

DESIGN FOR A TOWN COTTAGE TO COST FROM $1500 TO $2000.

"ELGIN BLOCK," YONGE STREET, TORONTO, ONT.,—DICK & WICKSON, ARCHITECTS.

CANADIAN ARCHITECT AND BUILDER COMPETITION FOR A CITY HOUSE—DESIGN BY "NEW YEAR" (MR. WALTER F. SIDDALL, TORONTO,) AWARDED FIRST POSITION.

NOTES BY A CANADIAN ARCHITECTURAL STUDENT IN LONDON.

THE benefits to be obtained from travel are so obvious to every one that it would be idle to elaborate what may be assumed to be a well established opinion. To study with what success architects have in the past succeeded in meeting the wants of their time under different conditions, and, it may be, with other materials—to note, too, their failures, and learn if possible how to avoid such in one's work—this must surely be as profitable a subject of study as any young architect could well betake himself to.

Coming from a country all whose institutions as well as buildings are comparatively new, to one where age lends dignity to its habits and customs no less than to its structures, one cannot help being deeply impressed, and perhaps somewhat awed. It is not always easy to discover whence the charm of many of these old buildings is derived. It would seem that Nature herself takes up an architect's work where he leaves it, and by a touch of color here and there, removes the harshness and crudeness of the original work, softens the hardness of outline, and in a hundred ways assimilates the building to its surroundings, till after the lapse of ages, it becomes impossible to tell whether the building or its surroundings conduce most to the charm of the view. At any rate one can hardly look with anything but reverence at the structures which have come down to us bearing the marks of many generations. There is, however, plenty on which to exercise one's critical faculties in the work being carried out in modern England. Here, at all events, an American feels himself on level ground, and is usually not slack to join issue with his English brethren of the T square. It is not my intention, however, in these notes to criticize or make comparisons of the work of English and American architects, but rather to note what has most interested me in the architectural world on this side of the Atlantic.

London would seem to be fast becoming the great centre of architectural and artistic work, as it undoubtedly is of literary work. Most American architectural students who cross the ocean for purposes of study seem to go to Paris. This would appear to be the general belief as regards the past, but more attention is now being given to English work, though it may not be quite safe to say that the tide has turned. Colonials probably have more sympathy with English work—certainly those from the antipodes have, if one may judge from the number of Australian students one meets in town.

Coming to London for the first time one is greatly impressed with its vastness, and this feeling is one that grows, for it is only after a year or two's residence that one begins really to appreciate what the simple word "London" means. It has, however, been spoilt in the making. How sadly disappointing is it to find a total absence of grandeur, composition or grouping. And this is the more annoying because after the great fire there was both the opportunity and the Man. It will be almost impossible now to give to it that unity as a whole which it might have had, had the authorities accepted and carried out Sir Christopher Wren's plan for its reconstruction.

Westminster Abbey is of course the building demanding first notice. Its interior is probably the most beautiful in England; fortunately it has not been scraped (an operation that gives to many English cathedrals an appearance of comparative newness), and consequently has all the effect of hoary age to help out the beautiful architectural detail. The manner of lighting from above is one of its great charms; the interior is always more or less shrouded in darkness, causing an effect of gloomy mysticism and grandeur. The unusually high nave roof of course greatly contributes to this, as well as the wonderfully artistic London atmosphere. The effect, to be understood, must be seen on some glorious summer's afternoon. The statues erected as memorials, in some instances seem to injure the architectural effect. Yet it may be that the Abbey itself derives an added grace by comparison with their hideousness. The north transept has been recently restored, and and seems to be a work of exceeding merit.

It would be impossible in this short note to do justice to all the old churches about town, but one cannot do less than mention the Tower, with its beautiful Norman Chapel; the Church of St. Saviour near London bridge, being restored under Sir Arthur Blomfield; St. Bartholomew, Smithfield, also under restoration by Mr. Aston Webb. This latter church is a perfect mine of Norman detail. Hidden away as it is near the great meat market, and completely shut out from view among slums, it is only recently that the majority in the architectural world knew of this jewel.

An exception to the criticism as to laying out streets and buildings for effect must be made to what may be called Parliament Square. The view of the Houses of Parliament and Westminster Abbey caught as you enter the square from the embankment or from Westminster Bridge, seen about sunset, is literally a dream in stone.

St. Paul's Cathedral, too, from whatever point it is viewed, is a building which by its great mass and powerful dome cannot fail to attract the most casual of sightseers. The durable Portland stone from which it is built has in places weathered to an astonishing whiteness, whilst other parts are almost black from soot; all of which tend to heighten its artistic effect. The dome poised aloft above all surrounding buildings, is seen from almost everywhere and becomes the centre of many a majestic view.

Old London is fast disappearing: there is still, however, much of the domestic work of the 17th and 18th centuries left standing, but it has to be sought for in out-of-the-way places. It is specially interesting from its relation to the colonial work of America, the slight difference in detail arising from the use of stone for out-door features in the English work, resulting in the mouldings being rather coarser. Time has lent them a dignity which their simplicity and directness of construction helps out, the whole forming a strong contrast to the fussy modern detail of work rising up around it. In and about the temple is to be found a curious network of courts and alleys containing many examples of this class of work Richly moulded and canopied doorways (mostly of brick moulded and cut to as exact an outline as if executed in stone); cornices of elaborate detail and considerable projection, sometimes in cut brick-work but oftenest in wood, meet one at every turn, whilst scraps of wrought-iron tempt the sketcher's pencil.

Mention must be made, however brief, of the mine of sketchable subjects to be found in the almost priceless collection in the British museum, not to mention south Kensington with its collections of art work of every description gathered from everywhere.

Whichever way one's individual tastes may turn, one cannot but be struck with the energy displayed by British architects of the day in adapting the architecture of the past to their present needs, and in solving what may perhaps be ultimately recognized as the beginning of a new style. The work of some of the leading men cannot be called either Classic or Gothic. Traditional architecture is nowhere the rule except among a few of the old school,—the leaders have made the plunge, and the youngsters gasp and flounder after as best they can. To an eye trained to American practice, most of the new work here seems lacking in strength and especially in breadth. Too much detail and too little constructive architecture seems to be the rule. The value of plain wall surface scarcely seems to be appreciated properly. The English architects seem to be very fearful of destroying the scale of a building by use of large openings and of large features generally, and rightly so to some extent, but it is carried to too great an extreme. Everything in its proper order, but seeing some of the buildings here makes one think that the designer has mistaken his calling, not architecture but furniture should have been his destination. So one would at least think, judging from the recent competitions and the mass of work seen in the streets. Fortunately there are some men who are the opposite of this, and whose work seems all the more pleasing by contrast.

Terra-cotta is greatly used, and no doubt largely responsible for the extreme richness of the work now being done, and perhaps the smallness of many of the buildings causes the architect, though frequently in vain, to give importance to his building by enriching it. The great number of windows required in this dark climate to light a building effectively have to be considered as affecting its simplicity, by cutting up the wall surface.

Terra-cotta and brick are used with surprising skill. Elaborate cornices, architraves of windows, sills and many other features, are not only executed in terra-cotta, but also in cut brickwork. Some of the terra cotta here is of a light pink, but most usually of a warm yellow tint, and has a slightly glazed surface. It does not always weather well, however, notwithstanding the boast of its permanence. It is frequently cut for ashlar work in rectangular blocks, and is not entirely free from having a hard machine look about it. The blocks being hollow have to be filled in with some material, and there is some danger when this is not very carefully done, of the terra-cotta splintering if heavily loaded.

Moulded and carved brickwork is executed with a specially made brick known as "rubbers" set in putty mortar, with a very fine joint. Mouldings are formed by rubbing them to the required section, the carving is then executed after the work has set; the whole is finished as sharp and true as if executed in stone. These bricks, though soft and not capable of standing great weights, seem to weather well. Examples are to be found nearly two hundred years old in London. One cannot but praise the quality of the masonry in the best buildings. Walls are thoroughly well bonded and built either with cement or in hydraulic lime mortar. It may be interesting to know that the Victoria tower of the Imperial Institute, some 260 feet high to top of masonry, while of stone on the face, is backed up with brick, built, of course, in cement. With the exception of Portland stone, there seems to be no stone used in London which is pleasing in effect when used in large masses; this, of course, adds greatly to the difficulties of the architect in getting a pleasing effect. The most effective buildings seem to be those where a combination of brick and stone is used as in New Scotland Yard.

Some of the carving seen on one or two recently erected buildings is good beyond all praise. This result is no doubt due to the fact that sculptors of the front rank have been secured, and have not thought it beneath their dignity to engage in this class of work.

In examining the details of modern English practice, one notices many peculiar features. Casement windows are very much used, and the greatest care is taken in jointing them so as to exclude the weather. Then again, there is a tendency to divide the heads of windows into small squares. Lead lights too are much used, glazed with clear glass. In the best work many of the joiners' mouldings are worked on the solid instead of being stuck. In brickwork the bond is always either English or Flemish; American bond is not even known. Fire-proof construction is common, and is usually of concrete filled in between girders, sometimes with a flat soffit, at others arched. Very light concrete is used, the aggregate being Portland cement and coke breeze. The ironwork seems to be very indifferent and is usually handed over to fireproofing firms who not only supply the material but also the drawings. There is little or no attempt on the part of the architect to plan the construction of the walls to meet the best special requirements of fire-proof construction, girders being often allowed to come over openings and rest on chimney breasts, or, indeed, very much wherever they happen to come. It is to be feared that this sort of thing happens in the work of even the foremost men as well as among the general rank and file.

In conclusion, it may not be amiss to point out that the advantages of two or even three years spent in London are of great value to the young architect who has already mastered the routine of office work. To be able to come in close contact with old work and study the development of the best modern work; to see different methods of construction, planning and preparing drawings; to be able to attend the architectural classes of the Royal Academy and the Architectural Association, and to test one's knowledge by subjecting oneself to examination by the Royal Institute of British Architects, are only small portions of a list that might be continued indefinitely.

THE ENTRANCE DOOR.*

It was suggested some time ago that a general effort by every member of our Guild should be made to give additional interest and profit to the winter meetings, and that this end would be helped on by some little preparation given subjects likely to elicit interested discussion. The subject mentioned by Mr. Langton is in pursuance of an idea that it would be of profit to, say, commencing with the doorway, proceed as it were to dissect a house, and from the old and the new, as we are able to recall them, discover faults to be avoided and excellencies to be revived or perpetuated. So as, no doubt, to leave the more vital parts of the house for a more competent analyst, I have been asked to enter the threshold by introducing for discussion "The Entrance Door." That pertaining to a dwelling house of moderate size is I think a subject large enough for one evening, and is one we are all most frequently interested in.

Considered as to its purposes, what are the requirements necessary to make the entrance answer all demands of utility and ornament?—for as to the latter all ages seem agreed in this, that whatever of art or adornment pertained to the house, it is on the doorways we find its concentrate expression, and the good sense of this wants no argument, as beauty wastes not its sweetness here unseen, and here bad ornament is a sin with aggravation.

The door of a dwelling house, its purpose in all cases being pretty much the same—to welcome the coming, speed the parting guest—why should they not, I venture to suggest, be all of a size? A good stout door, say 4 ft. × 7 ft., securely hinged, shutting truly into its rabbat, with solid lock and furniture, is an agreeable thing to handle, which very few double doors can be made. But, you say, how can wealth display itself by so meagre a portal? Yet, are there not examples of French, of Florentine and other Italian doorways, smaller than this, that by treatment of arch, jamb and lintel, and perhaps carved or mosaic spandril, are made infinitely more attractive than the double doors of America? The question I raise is, that except for buildings put to public uses, where it is necessary to give exit to throngs of people, is the insecure, unsubstantial looking, two-leaf door ever necessary or desirable? Should not the house that seeks to display some grandeur of proportions in its entrance, have space enough to give some hospitable shelter to the visitor at its doors and under recess, arched or otherwise, frame a door of our normal size by such studied devices of art as would render interesting the delay between the "knock and it is opened unto you"?

The size of landing of the front door is a matter of proportion, and although the nervous groping for the step caused by too small a landing is to be avoided, yet the landing can easily be made to look too large unless combined with other piazza. For elevation of door above the ground line I would make a golden mean about 3 ft. 6 in.—neither liking the necessities of the American high basement, nor being able to feel the charm of the English method, which likes to saunter into the house over one or two stone steps. Whatever the size of the entrance door, it should be deeply recessed, being different from a window, in which the reveal is more valuable inside. The door looks repellant which is near the outside of the wall, and for which no extraneous porch head or pediment will atone. The universal panel jamb of our colonial is a recognition of this, and is a feature that with the better understanding of a free, refined, classic detail now prevalent, might be revived, redeeming at least the terrace house from the commonplace.

As to the architectural treatment of the door opening, to give due prominence to this, the main feature of the house, all depends on the acquired knowledge of detail of the architect and his skill in adapting and applying to make suitable to modern requirements. Even around Toronto there are numbers of examples of the English combination of pillar or pilaster and entablature, fan and side lights worked out with considerable refinement. For instance, the drawings of the old Canada Company's entrance, recently shown in the CANADIAN ARCHITECT AND BUILDER, compares well with the similar specimens of Old Colonial the *American Architect* is so fond of reviving for instruction and reproof. So now that the bustling progress of the last twenty years (in which the doorways have had too little study of either architect or joiner) has had praise, it is likely we will all endeavor to do more studied work on this feature of the house. As to the most desirable position for the entrance to the house, although there are no doubt many fine houses with the doors in the centre of the front, it seems to me to commit one to a somewhat unvarying type of plan, where the hall is apt to be dark and only a means of getting to the rooms. Entrances on the corner or on the side, on the other hand, give the architect an opportunity to make of the hall a delightful loitering place, with enticing vistas into the rooms.

I seem to be about the end of my ideas on the entrance door, having got into the inner hall, forgetting that indispensable feature in our climate, the vestibule. This should be large enough to render progress between doors easy and natutal, but anything excessive in the size of vestibule is downright loss to the house, its purpose being merely analogous to a double window, for in any way to attempt to furnish the vestibule results in more convenience to the hall thief than to the occupants of the house.

*Paper read before the Toronto Architectural Guild, by Mr. John Gemmell.

ORGANIZATION OF CANADIAN BUILDERS.

TORONTO, Jan. 7, 1893.

Editor CANADIAN ARCHITECT and BUILDER.

SIR,—In accordance with the suggestion made by you some time ago, I beg to submit the following ideas that have occurred to me, with the earnest hope that a greater interest may be thereby incited among sister associations, which may result in the amalgamation of the various Builders' Associations throughout the country.

You are aware that the different exchanges and associations in the United States have united into a National Association, and that a convention is held every year in one of the leading cities for the purpose of discussing matters of interest to the trade, and of concerting measures to improve existing conditions. Through the courtesy of Mr. H. Sayward, of Boston, Secretary of the National Association, I am in possession of much valuable information regarding the progress of the Association. Among the results achieved thus far may be mentioned: 1st, the establishment of the "Uniform Contract"; 2nd, a fully defined method of apprenticeship; 3rd, a general plan for the joint settlement of disputes or differences between employers and workmen.

One very desirable result is being attained, in that workmen are becoming impressed with the fact that their employers are considering the questions that they have for so long a time been trying to solve; and they are thus becoming better disposed for a peaceful settlement of disputed points.

I may say that the Toronto Builders' Exchange is endeavoring to secure an amendment to the present Lien Law, which is acknowledged to be practically inoperate, so far as giving any security to the builder or supply merchant is concerned. Is it not reasonable to believe that such action would carry greater weight, and be more likely to succeed when proceeding from a Provincial or National Association?

I understand that the exchanges and associations in Australia and New Zealand have formed a Federal Association, with a very perfect organization, and judging from a report of their last annual conference, held in Brisbane last October, they have reason to congratulate themselves upon their success. It appears to me, that if our friends in the antipodes (who are separated from each other, in many cases, by long water stretches) can still meet, and hold such enthusiastic meetings, there surely is no reason why, in Ontario at least, where every facility for intercommunication exists, that a National or Provincial Association should not be at once formed.

I am sure that the Builders' Exchange of Toronto will heartily co-operate with other Associations to this end, and I think the assistance of the CANADIAN ARCHITECT AND BUILDER may safely be counted upon. I would suggest (with your permission) that the views of other Associations on this matter be expressed in your valuable journal. Allow me to state that any communications on this subject addressed to the undersigned would be received with much pleasure.

Yours truly,

JOHN L. PHILLIPS,
Sec'y Toronto Builders' Exchange.

SOME EXPERIENCES OF A STUDENT IN VENICE.

THE traveller abroad will save much time, trouble and money, if he will plan his tour and acquire information about it before starting. The experiences of a returned student of architecture ought for this reason to be interesting to those at home whose tour is yet before them. Though I was myself ill prepared for what I had to do, and my tour was, I am afraid, by no means a model always of the best thing done in the best manner, yet I think intending travellers of the same kind as myself may extract from a narrative of some of my experiences in Venice, which I visited first and where I stayed the longest, hints and information which may be not unuseful to them when they are preparing to go abroad.

While I was meditating my tour I gradually became aware that to mention my purpose to an old traveller was to be charged in reply with a list of practical hints about hotels, pensions, conveyances, etc. I found this rather dull conversation when my tour was more remote, but as it neared accomplishment, began to perceive its interest; and when, upon the eve of my departure from England, a sculptor recommended me to go to the Casa Kirsch in Venice, as a place frequented by artists and English, I made a careful note of it (as I would recommend the student to do with all such hints) and a few days afterwards found myself there.

On the first morning after my arrival as I was having my café, or first meal, in the Salle à Manger—not having yet learned to take it in my bedroom or in bed in the Continental manner—a young man, who had been transacting business there with a vendor of antiquities, apologized to me in the American tongue for interrupting my breakfast. We had a little conversation, for which I am still grateful to him. I was just then realizing my position of desolation in a strange land, and clung instinctively to a white man, particularly when I found that we had met before and that he was of my own profession. But it came out soon that he was on his wedding tour, and I perceived that he was cut off from me forever. He was, however, good enough to seek me out that evening to give me a piece of advice which I pass on as of the greatest value. It seems that the English and American schools of art furnish their students with medals or tickets of some kind, which, by the liberality of the Italian Government, are convertible into tickets of admission to public museums and galleries of art throughout Italy. A certificate from one of our provincial associations of architects would no doubt be enough to effect this for Canadian students now. I had nothing to recommend me, but my friend came to advise me to apply to the British Consul for recommendation, as a student, to these privileges. This I subsequently did, and found it of the greatest service to me throughout my tour. It is not only picture galleries and museums proper that are thus opened to the student, but all the ancient buildings, such as the Ducal Palace at Venice, the Monastery of San Marco at Florence, and others, which are preserved as monuments of antiquity, and kept in charge by the Government. If one visited them as a sight-seer only, once for all, the charge of a franc which is usually made for admission would not be so great a consideration, but a student needs to make many visits. If one puts himself in charge of Ruskin, who so frequently explains one object of study by reference to another, it is desirable to feel free to step for a few minutes only into the building which contains the object referred to. I think also that there are restrictions as to sketching, to which persons other than the holders of these government "promessi" are subject.

My American friend had only time to give me this information when his wife appeared on the scene and carried him off to get what she called "our sunset"—as if the world belonged to them. He was in the act of warning me that a solitary tour would be very lonely work, when he was snatched from me. I watched them going off in their gondola, into the sunset, seated side by side in happy companionship and conversation, and the night of solitude settled down upon me. With the taste of English still in my mouth, I felt the full force of the Englishman's sneer at the Continent as being inhabited entirely by foreigners. Here I was in the midst of them with nothing to meet the emergency but a certain amount of French vocabulary without any power of putting it together. This brings me to my third point, which is the importance of knowing French, or French and Italian, but French by preference, for it is of great use in Italy, whereas Italian is of no use in France. I was driven to speak in French after a time, for the supply of English guests at the Casa Kirsch soon failed, and for the remainder of my two months' stay in Venice I lived with foreigners of the most remote kind—a Pole and a Greek, who spoke all the languages of Europe except English. For a time there was a German also, with a scar across his face. During his stay the conversation was carried on sometimes in German, sometimes in French; or when a frequent visitor, a young Italian official with a long rat tailed cigar and a habit of gurgling airs from the opera in his throat, was present, the language veered to Italian. But I alone was able to speak English. When the German left us the conversation settled down to French. The Pole—a noble old man—was a poet not without fame (I have seen mention of him in an English review), and a beautiful talker. The Greek, a "philolog," was engaged in editing a text of Aristophanes from a manuscript in the library of Saint Mark. They had great conversations, from which I was excluded until I began to get the ring of it. I succeeded first with the Greek, who was very like a smart young American. He managed not only to make me understand him after a time but, what was more to the credit of his intelligence, seemed to understand me. The Pole found more difficulty. I am afraid, now that I come to think of it, that I can hardly have been an addition to the pleasure of conversation. I remember one day addressing a remark to the old gentleman which left him still visibly in the dark. Something called him from the room at that moment. I asked the Greek if he thought I had been understood. He replied, "When one is learning a language there are days when everything goes marvellously; words seem to come of their own accord; other days nothing goes, and one cannot make one's self understood. To-day is one of those days."

I had prepared myself rather hastily for the opportunities of Venice, and found myself not well prepared. I had read the shortened form of "The Stones of Venice," from which I had carried away the erroneous idea that Venice was builded of many coloured marbles. I had also read Howell's incomparable "Venetian Life," and was somewhat prepared to find Venice, after all, a city composed chiefly of dry land; but I was ignorant not only of the history of Italy but, in any proper way, of the history of architecture. I was puzzled to know where to begin my studies. It is all very well for Street, in his "Brick and Marble Architecture in Italy"—a subsequent acquaintance, I am sorry to say, he would have been invaluable as a travelling companion—to regard the monuments of the architectural centuries as a tailor on his travels might the foreign fashions. Street did work of the same kind; he even built vaulted churches. I do not say but that it was a pity that he should have devoted himself so much more to the practices of style than to the principles of beauty. At any rate his method of procedure was not that which would have occurred to me, I think, even if I had been more learned in the history of architecture. I had in my mind continually the very different conditions of Canadian architecture, and sought rather to study the reasons of the ancient designers than their results alone. With the idea of systematizing my attack on buildings by dividing all buildings into the same parts, and so viewing them in an orderly manner, to which conclusion I was driven by the *embarras de richesse* in which I found myself, I went to the library of S. Mark in the Ducal Palace to study in the first volume of the Stones of Venice, Ruskin's admirable analysis of buildings into their parts. When one has begun that wonderful book, it is impossible to leave its study incomplete.

In S. Mark's library no fire was allowed, and it was bitterly cold. The Greek, who spent about six hours a day there, complained of it too. But these southern continentals can stand far more in the way of cold than we soft dwellers in a more inhospitable clime. I have seen Italians sit for hours on a marble step in the icy shade which in a short time chilled me to the bone. Fire not being allowed in the library, much less was light, so that all study carried on there had to be done in the precious daylight. It was, therefore, a great comfort and advantage to me when the distinguished young Italian engineer who was superintending the restorations of the Ducal Palace, who both speaks and writes English and had himself a venerated copy of the Stones of Venice in his office, discovered me reading in the library and offered to introduce me to a better place. This was the library Querini Stampalia on the Campo Santa Maria Formosa which is warmed with delightful warmth and open until eleven at night. There is not only an excellent library, but the leading papers and journals of Europe lie on the tables, so that one can resume connection with the world if he cares to. I do not know whether the certificate of studentship I received from the consul would have obtained for me admission to this library without further reference. No doubt a student could procure from the consul what introduction is necessary. As far as I recollect, I came and went after my introduction without further question or scrutiny from anyone.

My troubles were at an end as far as study was concerned. With Ruskin as a guide and an opportunity of studying him so comfortably, I was not only happy, but I think profitably employed. Reading in the evening and making notes for study in the daytime, I circumnavigated the Stones of Venice in the course of my stay, verifying every principal allusion in the text to Venetian architecture.

Though founding my operations upon the Stones of Venice, I, of course, went outside of its limits also as objects came in my way. It was too cold usually for long sketching. A Canadian thinks of Italy as a mild southern place, but when such unwinterlike work as sitting out of doors to sketch is in question, though the thermometer does not feel the cold much, the draughtsman does. In a sheltered position in the sun it was warm enough—indeed on fine days delightful. But it is seldom that one gets a chance of sketching in the sun. Streets are narrow in Italy and get but little sun in the course of the day, for it is shade that is the principal requisite there. Courtyards and cloisters are little better, and the churches are veritable wells. The museums and galleries in which one sometimes finds material for sketching, and which in any case contain matter for the study of every art student, have at the most a brazier here and there, where one can warm one's fingers now and then, and which I suppose must reduce the chill of the air somewhat. But there was nothing of the sort at Venice. The old women who haunt the churches are usually supplied with a *scaldino*—a crockery pot with a handle like a basket, which contains charcoal with coals placed on the top, so that the fire eats slowly through the charcoal, giving warmth for hours. With one of these under her apron at her prayers, or still more effectually disposed for warmth when she stands up, the old women manage to carry out their religious exercises without dying from exposure to cold. Later on in my career in Italy I met a young English architect who wore an Italian cloak and carried a *scaldino* under it. I think there are many occasions when such an arrangement would be feasible and conducive to more careful sketching than I felt inclined to do, with the cold gradually creeping up my extremities and penetrating my vitals. I sometimes did careful sketching under these circumstances, but not as a rule. I always felt a little doubtful of the usefulness of spending much time in drawings for the sake of rendering them well. A drawing should have no more work on it than is required for the subsequent information of the draughtsman. How much work will meet this demand is a point which the object studied ought to decide. I always felt that I was employing my time best when I made my drawings rough, with the essential points only delineated, and notes and comments written on the edges. I carried a pocket sketch book—long and limber and about four inches wide—which was always ready for notes, and in the course of a morning's walk would fill several pages. Many things which one would otherwise sketch are done to perfection in the Stones of Venice (of which I had a large copy at home). Often also a suitable photograph takes the place of an elaborate sketch, leaving only notes to be made. Indeed, at Venice and elsewhere I adopted the plan of calling at the best photographer's early in my visit and inspecting his stock as a sort of illustrated companion to the guide book, that I might judge better of what was before me and what his photographs could do for me. At intervals, I looked in again after the day's work and selected photographs of what I had studied.

One soon acquires facility in grasping the points of a building, guided by the family resemblance that runs through the styles, and I am inclined to think that the practice of making note drawings rather than picturesque ones, is conducive to this facility.

Field glasses are a great addition to one's enjoyment and often of service, and a portable sketching stool also. I always carried both with me. One cannot work well standing, and chance seats besides being damp or cold, are usually round the corner. If I had thought of the need earlier, I should have brought a stool from England which would fold up in the form of a stick. I have no doubt they are fearfully uncomfortable, but so much easier to carry than my camp stool, which, when I come to think of it, was not a seat of luxury either. I did not always take it with me, as I might have done a walking cane stool, which would not have been out of place even on a ramble of exploration, but it always came with me when I went to study a definite object—even into picture galleries, where the fixed seats are not necessarily in the best position for attentive study of the picture. Light marching order consisted of the pocket sketch book and field glasses, and, of course, a rule and tape. Heavy marching order added the stool and a leather bag, containing a small board, sheets of paper and other materials and instruments. I could not always tell what I should use, and sometimes used everything, including the field glasses for remote details. I remember making a drawing through the field glasses, which took me two afternoons. I had a bad time with the boys on that occasion. They are always a great nuisance, and grown up people also. One has only to sit down to sketch to have a crowd around him in a moment. One would think that in Italy they are inured to seeing people sketch, but they are still more inured to loafing. On this occasion I was so unfortunate as to have selected an object over the very entrance of a school. The boys came out in floods, at what seemed to me very irregular and unreasonable hours, and surrounded me closely, several deep, and with calls in their heads to a man. It was a little warmer with so much animal life round me, and I needed it on one of these days. I had dropped my hat down the steps of St. Mark's, which lead to the crypt under the chancel. When I went to get it I found it in water. (Poor St. Mark, he is down in that moist sepulchre.) As the hat in its wet state was colder than none, I took it off. My sympathy, under the circumstances, was with the boys, for the spectacle of a man seated on a stool in the middle of the way, with opera glasses continuously elevated, notwithstanding that he was drawing, and with no hat, a red nose and a drop at the end of it, was a sight that to any intelligent boy's mind would require immediate investigation.

These are some of the toils of sketching, but there is still much to be done at night in turning shorthand sketches into drawings; finishing up and putting in order for future use; in reading books that will throw light on the present field of work or on one to come; and in writing the diary which is such a burden abroad and such a priceless possession at home.

Under these circumstances, it is questionable whether, with all its discomforts, solitude is not a state of advantage. I had a friend in Venice, an Austrian whom I had met in New York. I had his address and went to call early in my stay, but found him out of town. Subsequent visits at intervals always brought from his housekeeper the same answer, unintelligible except for words which I knew to signify "other town." Finally, just before my departure, I thought I would have a last shot at him, and found him arrived. He took me out in his *sandalo*—the Venetian equivalent to a dog-cart. Venice suddenly became a new place. Titled persons of different countries were pointed out to me, some of whom I had observed before, but they had not appealed to my unprejudiced mind as noble. We took off our hats to two young ladies whose name my companion murmured to me as we approached. I had had a good deal to do with an ancestor of their's in my meditations among the tombs. He was a Doge of the fifteenth century. It seemed preposterous to find two such pretty young ladies still above ground, and alluded to in simple fashion as "the M——'s". I hardly know why, but this more than anything seemed to shake the foundations of my life. Afterwards, when I found myself meeting English and American artists at dinner and talking English talk at the English Club it all seemed a matter of course, but I was glad I had had my fling in solitude with Ruskin.

HAMILTON CORRESPONDENCE.

HAMILTON, Jan. 5th, 1893.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—As you do not care to continue this discussion in your editorial pages, kindly insert the enclosed statement in your advertising columns and charge me at ordinary rates. I send this as there are proofs to back my previous statements which should be made known.

I am, yours faithfully,

C. H. ACTON BOND.

[In view of the course which one of the parties to the above controversy, whose name, however, has hitherto not appeared, has seen fit to pursue, we feel called upon in our own defence to make an explanation which will place the position of affairs in its proper light before our readers. The first letter, published under the *nom de plume* of "Doric," in reply to Mr. Bond's criticism, and which purported to have been written by some friend of the sculptor whose work had been called in question, was in reality sent to us with a request for its publication by the sculptor himself, Mr. Frederick Turner. A portion of this letter was of such a personal character that it was withheld from publication. Mr. Bond next reasserted the correctness of his statements over his own signature. Following this, on the opposite side of the controversy, came a letter from Mr. Watson, the City Building Inspector, which began with the following remarkable statement: "In reply to young (Mr.) Bond's communication of the 22nd of October last, *in reply to mine which you previously published*." Here it will be observed Mr. Watson distinctly claims to be the author of the letter signed "Doric," which, as above stated, was written by Mr. Turner. It rests with Mr. Watson to explain and the reader to judge what induced him to make a statement so directly contrary to the fact. Seeing that on one side the controversy was being unfairly conducted, we announced that it must close. A few days after the publication of this decision a letter reached us from Mr. Bond, in which he stated that he had proof of the correctness of his statements, and as his veracity had been challenged he thought we should allow him the privilege of substantiating his position. While recognizing the force of this appeal, we replied that we felt bound to stand by our decision, publicly announced, not to allow the controversy to proceed further, and the only way in which further publication could be secured would be by advertisement, to be paid for at the usual rates. After having informed Mr. Bond to the above effect, we received a personal letter from Mr. Turner, in which he charged Mr. Bond with having used his position as a correspondent of this journal to vent his spite and injure his (Mr. Turner's) reputation as a sculptor. He also forwarded to us a tracing from Mr. Bond's drawing, lettered "Motive for carving, to be executed in bold relief," the ridiculing of which he claims induced Mr. Bond to make a "spiteful" attack upon his work. In this letter he said, "it will be only fair to your old subscriber and advertiser that the impartial criticism (of the sketch) he (Mr. Bond) asks for should be given by you, showing as it must the animus that prompted his attack on myself." We replied that we must decline to be in any way personally drawn into the controversy, that being in a position to judge impartially, and from personal conversations with Mr. Bond on the subject, we had reason to believe that his criticism was not prompted by personal feeling, and that regarding the value and appropriateness of the suggestion contained in Mr. Bond's sketch for the carver, an architect who is a member of the R. I. B. A., on examination of the tracing said, that presuming the sculptor to be familiar with the various orders of architecture, he considered the sketch sufficient by way of suggestion. This letter was written in the most friendly spirit with the hope of inducing Mr. Turner to rightly view the situation. We regret that this desirable end was not achieved, as the following brief epistle, received a day or two later, will show: "Dear Sir,—Be good enough to discontinue my subscription to the ARCHITECT AND BUILDER and also my advertisement in your paper at expiration of contract." We are always glad to be of service to our subscribers and advertisers, but not in the direction which Mr. Turner seems to desire.—EDITOR C. A. & B.]

Halifax expended last year over half a million dollars on new buildings. About 125 dwellings have been erected at an average cost of $3,000 each.

The total value of the buildings for which permits were taken out in the city of Toronto in 1892 was $3,021,755, of which $1,200,000 was for the new city buildings; $1,166,000 for brick dwellings; $326,000 for stores; $257,000 for factories and warehouses, and the remainder for churches, schools and miscellaneous buildings.

The Brick Manufacturers' Section of the Toronto Builders' Exchange, at their annual meeting elected the following officers: J. Pears, president; W. Best, vice president; J. Price, treasurer; J. L. Phillips, secretary; representative on general board of directors, W. Pears; executive committee, W. Booth, H. Phillips and R. Simpson; auditors, A. Fox and F. Wakefield.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION FOR A CITY HOUSE.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—In compliance with your request we have examined the competition plans for "a city house," and herewith present our report.

We have given first place to the one under the *nom de plume* of "New Year," and the second place to "Etudiant." We beg to say in connection with this decision that the author of the first prize design would do well to give more attention to the rendering of his drawings. We regret having to criticize rather severely the top story of the second prize design, it being very inferior to the rest of the work. It is very bad judgment to break back the wall of the entire story for the purpose of getting up the two paltry gables; the roof construction is also bad; the planning is very good; the rendering is well done and would reproduce easily; the pier at the east side of drawing room bay is too light.

Several of the competitors, viz.: "Utile Dulci," and 'Palmer Perniex," violated the requirements of the competition by making buildings with two stories and an attic instead of *three clear stories*.

In the design submitted by "Chauer" the plan of the entrance has been sacrificed to the exterior. The drawing room lacks shape, being too symmetrical and formal to have good effect; the light well at west side would be absolutely useless, being barely two feet wide, and with the wall of another building built on the line the lavatories, back stairs and bath room, would be practically dark. A billiard room only 11'0" wide would be useless. The design is much too expensive for the appropriation. The drawings were not on the right sized paper. The draughtsmanship is quite clever and the drawings are very ship-shape.

"Utile Dulci" has sent in a well drawn set of plans and very well designed elevations, though not complying with the conditions. The plan is somewhat defective. Neither the reception room nor parlor is large enough to make a good room. Two main entrances to the one hall are not good; the mere fact of having one at the side does not make it in any way beneficial. A guest coming in one door and being let out the other would be liable to considerable confusion. Nothing is gained by cutting off the corners of the dining room. The kitchen door is too directly opposite the door to main hall. The back staircase and the first floor passage are dark.

The plan submitted by "Palmer Perniex" is good, though both staircases would be very dark. The esat elevation would be quite effective, but does not conform to the conditions.

The general lay-out of the house designed by "Incog" is rather good, but most of the rooms are much too small for a house of that character, the kitchen and bath room particularly so. The connection between kitchen and dining room is too direct and the doors too close together. Nothing has been gained and much lost by receding the pantry wall to give a north light to the dining room. The simple style of the elevations might be made to look very well, but to carry it out properly more study would be required.

There is one set sent in without a motto by a painstaking competitor, but the amount of work spent on his drawings could be much more judiciously applied. We would suggest that the author of it should study some good examples of rendering, and he would also do well to devote considerable time to practising printing, it being of great advantage to be able to print well and rapidly.

Yours very truly,

FRANK DARLING,
JOHN GEMMELL,
A. FRANK WICKSON.

[The names of the successful competitors are: "New Year," Mr. Walter F. Siddall, student with Messrs. Siddall & Baker, Toronto; "Etudiant," Mr. J. Eugene Payette, 3 Quesnel St., Montreal.—EDITOR C. A. and B.]

PUBLICATIONS.

One of the most attractive calendars of the year comes to us with the compliments of the Toronto Radiator Co.

The National Builder Publishing Co., Chicago, has just issued the third edition of the American Glossary of Architectural Terms, illustrated by Geo. O. Garnsey. Price $2.00.

A very interesting and useful treatise entitled "Wire; its Manufacture, Antiquity and Relation to Modern Uses," has just been issued by the B. Greening Wire Co., of Hamilton, Ont. The same company has also issued a handsome calendar on the back of which is a table of the size, length and strength of wire.

There has just been published by Wm. T. Comstock, New York, a valuable book of 116 pages entitled "Practical Paper-hanging," a hand-book of paper-hanging and other materials, by Arthur Seymour Jennings. Price $2, postage free.

"Architectural Rendering in Sepia," by Frank Forrest Frederick, Professor of Industrial Art and Design, University Illinois. Illustrated by full page plates, reproduced from water colors by the photogravure process, together with descriptive text. The rendering of architectural perspectives in color is now coming largely into use, and the publication of a practical work on the subject will be appreciated by architects and draughtsmen who wish to obtain those results of light and shade that cannot be produced in a line drawing without a large amount of extra labor. Bound in cloth. Price, $3.00. Wm. Comstock, Publisher, 23 Warren St., New York.

AMERICAN ARCHITECTURAL METHODS FROM THE STANDPOINT OF A CANADIAN.

By J. C. B. Horwood.

DOMINANT influences in architecture in all countries have, as a rule, spread from their largely populated and wealthy centres, and what is done in these may be taken as an index of the work of the nation. In the United States it will be found that this rule applies in the cases of New York, Boston and Chicago, the former being, perhaps, a mean between the two latter.

In no country or city, however, is work carried on under exactly the same system; and I venture to say that here in the United States their office methods are as varied as is the external character of their buildings; and while it is without dispute that there is work to be found here as bad, in fact worse, than in any other country, these remarks must be taken to apply to the better class of offices and the higher grade of work.

The methods pursued in these large cities are in a very great degree (though not wholly so) a system which has become necessary to meet the demands of such wealthy and fast living communities. No principals of a firm having a large practice can devote such a proportionate amount of their time upon each building as can be done in smaller cities, where the practice of the architect is much more limited, where more time is naturally given to the erection of their structures, and where the drawings are made by the ordinary office staff.

In these extensive communities there are always to be found a considerable number of migratory draughtsmen seeking experience to add to their store of knowledge; and it is comparatively easy to employ, at times, a sufficient number of these to assist in pushing to a hasty completion those extensive buildings which require such a large amount of labor concentrated upon them. (It is very amusing when seeking for a position to be frequently asked by one's interrogator whether he is a good man or not—a capable one—and should the applicant happen to possess some modesty in regard to speaking of his capabilities—recognized by us as a commendable trait—he must always avoid making a remark which might at all be transposed to mean that he was in some degree doubtful of his ability. Should he be so unwise as to thus commit himself, he would receive no further hearing.) Out of these professional nomads the more experienced are retained to become permanent assistants to take charge of the office work of any building under the occasional direction of the office supervisor.

In making the drawings of a large city building the following is somewhat of the general mode pursued:

After the architect has decided upon the plan roughly drawn to scale (perhaps upon paper ruled in squares an eighth of an inch each way) it is given to a competent man—the one usually who will have the work under his care should the building be erected—to lay it out to, say, an eighth scale. While this is being proceeded with the architect may be occupied in working out in a similar rough manner the elevations which he had in his mind while blocking out the plans, to hand over to his assistant as he did the latter; for in those lofty buildings, the plans of the several floors above the street level being practically the same, because the points of support must necessarily be continuous from foundation to roof, it is not therefore very often necessary to work out both plan and elevation simultaneously. To find the thickness of the walls it is but necessary to turn to the building law, as these dimensions are there regulated by the height of the wall. While these drawings are in progress the "practical man" or "engineer" is called upon to look into such matters as the sizes of columns, piers, girders, and any special constructional problems which may need to be solved in carrying out the proposed scheme, as well as to the position of boilers, engines, and the many apparatus which have become the necessary adjuncts of such buildings. When these preliminary drawings are nearing completion, a perspective of it is often outlined, (perspectives are sometimes worked out upon an ordinary piece of paper and afterwards transferred to the sheet selected for the finished drawing) and if there is not a draughtsman on the staff whose chief duty is to finish this class of drawing, it is sent out to one of the many well known men whose special line is to do this sort of work. Of late the colored drawing is coming very much in vogue, as can be noticed particularly in the exhibitions which are being constantly held; the chief reason evidently being that color is found to possess more points of attraction to the eye of the client than the drawing rendered in pen and ink. Should the erection of the building be decided upon, a similar mode of operation is again resorted to, and the weights of floors, walls and piers, are now carefully calculated to obtain the dimensions of the latter, and to make a proper plan of the foundations; girders, beams, and columns are accurately figured, and every point of detail, both in plan and elevation is most thoroughly worked out to large scales by the chief draughtsman, assisted by his less experienced associates, while the former is always working under the direction of his chiefs.

In order to facilitate the completion of a set of plans it is the general practice after the principal floor or elevation has been outlined on stou paper, to work the others from these on transparent paper or tracing cloth, all changes and rough studies of the various parts being made upon simila material—a practice well worth adopting. When all are completed, the juniors trace them in ink for the various processes of reproduction. Severa sets are obtained, and afterwards colored if the print is black and white. I have never yet seen a set of plans inked in and colored on paper for contract drawings as is our custom.

In New York the large ironwork firms do a great deal of their own detailing for constructional ironwork from general scale drawings given to them by the architect, which details are submitted for approval or correction to him before proceeding to carry out the work.

It happens that under this office system young men are kept almost continually at such work as their shrewd overseer perceives they have the most aptitude for, so that they may be of the most pecuniary advantage to their employer. Thus one may be kept altogether working on sketch plans or perhaps tracing the work of better men, or figuring up the weights of walls, piers, columns, etc., or working out the strains in beams and trusses; others may be chiefly occupied in making drawings for foundations after other men have made the plans of the floors above and the elevations have been decided upon; while still others may be confined to general details, or may work wholly on inside finish. So the work is divided for each to carry his branch to the highest point in the shortest possible time through working entirely at one sort of work, and so producing the architectural specialist so often found in the more populous American cities. Hence it is not difficult to find numbers of men who are exceedingly good on some branch of work, while on others they are as dull as the first year student of our Canadian offices; their ability on the one hand being in strange contrast to their dullness on the other. In illustration of this I may say, that I have met draughtsmen quite expert on working out the plans of tenement or apartment houses, and receiving a considerable remuneration for their services, who seemed to know scarcely anything about making a full size drawing, and who would be as much out of their sphere in making the drawings of a house in an open lot as they would be at the large detail. But the man who has been wise enough to show himself very apt upon such branches of work as he desires to pursue to his own advantage, and has thereby in spite of restrictions succeeded in obtaining a wide experience by his going to and fro, is one that is always in demand when there is any important work in progress. While the ordinary office education of young men is therefore of considerably more limited scope than I think is the case in Canada, yet this is being obviated in some measure by the excellent opportunities afforded by the architectural schools, which give their pupils a general all-round training previous to their being brought in contact with the restrictions of this system of office routine. I once heard one of the professors of the foremost American architectural college say that no better training in proportion and refinement can be had for the eye, in addition to the study of the "orders" than a good drilling in drawing from the cast; and this is becoming more than ever a prominent part of the course of instruction which a pupil receives at these places. A good education will not accomplish much if there is not a great deal in a young man, yet when there is, tuition will bring it to its greatest possibilities, and the result of this is seen to-day quite plainly by the work of the best trained men exerting a very great influence all over the country upon the work of their less fortunate confrères.

One decided advantage which accrues to a draughtsman in these large offices is the frequent occurrence of detail drawing of good and elaborate work, and I cannot help but think that if we Canadians spent more time in training ourselves in ornamental work in order to have it, as it were, more at our finger ends, notwithstanding the somewhat limited expenditure of our clients, we would find it easier to occasionally introduce it in our work than when we neglect our education in this respect, and consequently too often pass the matter over by concluding that it is altogether because we have not the money to spend upon it. Yet let us ever remember that as the enrichment of a piece of detail work brings it more prominently before us than if left plain, there is therefore the greater need of the whole work being good.

These remarks are not intended to imply that a piece of work well studied in relation to voids and surfaces does not very often look infinitely better than many a highly ornamented building not so studied. As a matter of fact there is a red brick printing house on Lafayette place, New York, which certainly belongs to the former class, and everything has been so thoroughly studied and made appropriate to its position, that it has become to the writer one of the most instructive buildings he has ever seen.

I was greatly surprised to find such an amount of rivalry existing here between professional men. The principle upon which business is apparently carried on is the "sponge" principle—absorb all you are able and refrain from giving to others all you possibly can—in the race to climb above your fellow and score a point ahead of him. It is this spirit which no doubt led them while formerly restricted at home, to ransack every country for ideas and suggestions to modernize and produce from them something beyond the attainments of their professional competitors. Even their own journals, which Canadians prize so much—too much I think at the expense of others—are scarcely ever looked at for suggestions when a problem is under consideration; in fact no instance of this has ever come under my notice in the better class of offices. The idea seems to be to get the home productions to know what you will have to avoid and surpass, while on the other hand illustrated books, and elaborate plates of European buildings from practically the time of the ancient Greeks are eagerly purchased in the rush for old ideas to be transformed and made new.

In reference to this matter of foreign illustrations, I have seen one of those exceedingly simple, and at the same time, exquisitely tasty French domestic buildings of the twelfth or thirteenth century—which would unfortunately be put aside by some of us as too unsuited for modern work—serve as the keynote for the design of a block of modern houses which would be a credit to any city in the world. In this respect it would be well that we were more like the Americans, in that instead of so often reproducing the works of others, we more often adopted the modes of procedure which have enabled them to produce such excellent results.

When we consider the architecture of the two countries and find that the difference between them is so very slight, we will be forced to admit that in some respects we are very fortunate, but in others quite the reverse. The former, because it is good for a people to enjoy the benefits which have come to its neighbor through their enterprise and industry, the latter on account of the natural inclination of the less self-reliant one of more limited means to rest too much upon the attainments of the larger and more progressive, rather than to seek from them suggestions to facilitate their own self-development. I am persuaded that this is a failing of ours, though there may be considerable cause for it, for being comparatively limited in our wealth and at the same time contiguous to one of the richest countries in the world, and being within easy reach of their principal cities, we have accustomed ourselves, till it has become a habit difficult to break, to go no further than these in our researches for material to awaken new architectural thoughts and inspirations within us when a world lies before us. The American was never similarly situated, and not being able to look for suggestions to his immediate neighbors, he was forced to go abroad in search of them. Not being entrammelled with the prejudices and jealousies which European countries are necessarily heir to, he was comparatively free to seek from all of them those hints and ideas which became to him an incentive to produce through their aid something distinctively his own; and it is chiefly to this fortunate position in which the lot of the American people has been cast, that I attribute their success, rather than to any inherent superiority over their northern neighbor or the foremost nations of Europe. Should we still persist in not being wise enough to follow their example in respect of gathering information from all countries, my fond hope is, that by some means, if not through a rigid commercial policy, they (the Americans) may at last succeed in forcing us to awake to the fact that besides living in America we live in the world. May not our Provincial Associations which have already done such valuable work, go still further by turning the mind of the rising generation under their care in this direction, and good shall certainly result from it both to themselves and their students, and hence to the country at large. One of the most noted writers of the day has made the assertions, "There is no art among a shepherd people if it remains at peace," and "There is no great art possible to a nation but that which is based upon battle." In this late age, if this be true, we would not wish to purchase art, no matter how desirable she may be, at so great a price. Upon close examination of these statements it will be seen that it was not exactly war that produced art, but as war was essentially the ancient means through which one nation after another sought and succeeded in asserting its superiority over its neighbor, it therefore afforded the opportunity for the development of mind, character, and individuality which would otherwise have remained dormant and unexpressed, as in the case of the contented shepherd in the presence of his well-favored flock upon the grassy slopes of his native land.

But the methods of mankind are changing, and that contention and rivalry which has long since become second nature to most of us is now being gradually transferred from the more repulsive occupation of killing each other, to the more peaceful, and at the same time more profitable—the industrial and commercial. Should these eventually become *the* means, or some of them, through which national rivalry may be carried on to an almost unlimited extent, may we not expect to see similar results from peoples so exercising themselves as was developed by the methods now happily becoming things of the past? Is it not worthy of note that the American nation which is being recognized on all hands as making the greatest progress in architecture and exhibiting characteristics in its work said by those who know best to be elements of a new style, that they should be par excellence the people who are seeking, by constant and most strenuous efforts in the industrial and commercial spheres, to climb above all other national competitors? Turning at once to ourselves (for it is more profitable to speak of our failings than to dwell on our excellencies, though they be many) what a strange contrast we behold. How often we see in our daily papers the assertion that still more intercourse with the United States—some even going so far as to say complete subjugation to them—is the panacea for all our ills; and some business men have been very much disposed of late to place a premium on American architects by engaging their services when any work of importance is under consideration. What wonder then is it, that if some of our fellow countrymen exhibit such an unfortunate bias of mind in this direction, that many of our important buildings should express the same?

We need to be weaned from all such habits of thought, and to awake to a consciousness of our positinn as a nation, and our value to, as well as our dependence upon, the other countries of the world. I am fully convinced that never till that is accomplished within us, and it has become a habit of our mind to think thus broadly, can we have work which will possess a distinctively national mode of expression, and which shall thereby be of such a character that other peoples will study it with profit as they have studied American architecture.

CHARACTERISTICS OF ARCHITECTURAL STYLE.

By G. F. Stalker.

(*Continued from page 120.*)

In the preceding papers on this subject it has been shown that the chief characteristic of what is commonly known as ancient architecture was horizontality; although some architectural forms which became the dominant features of subsequent styles were not unknown to the ancients. The pointed arch, for example, was used by the Assyrians and the Greeks (the joint being horizontal instead of radiating as in Gothic times) and the semi-circular arch was a very marked feature of Roman work. But it was not until the fourth century of our era that a transition took place that led to the gradual, though ultimately complete, abandonment of classical forms, both as regards design and construction. Strange to say, that, whereas architecture is the outgrowth of man's necessity to erect for himself a suitable place of shelter and abode, religion has always been the chief factor of its development. Among ancient examples, indeed, there are few remains that are not either wholly or to some extent ecclesiastical edifices. Of palaces even there are few remains, and of defensive works fewer still; while, until we come to the Roman period, we have no examples whatever of civil architecture. And if more attention has been given in medieval and modern times to the treatment of our domestic and civil buildings, it is none the less true that the greatest amount of talent has been bestowed and the largest amount of money lavished upon our cathedrals and churches. So much has this been the case, throughout the whole history of architecture that the features which have dominated in the ecclesiastical buildings of any age, have been transferred, in a modified degree, to all other buildings of that time. But, it is only fair to say that, so far as can be judged from the few domestic remains of the ancients, there has been much greater diversity of design in the treatment of buildings of a non-religious character since the days of the Romans than there was anterior to them. The same feeling, however, that influenced the nations of antiquity to produce their mighty and glorious temples, was the motive power in the early Christian centuries that brought about the transition from the Roman to the Romanesque in western, and the Byzantine in eastern Europe, and that led ultimately to the Pointed Style becoming par excellence the Christian style of architecture.

Until the fourth century it was not safe for a man to be known to be a Christian. The new religion had to be propagated in secret. Caves, tombs, catacombs, anywhere away from the haunts of men were the places selected for the meetings of the early Christians. And it was only after Rome had tried ten times "to extirpate the vipers" that the Emperor Constantine embraced Christianity, and not only gave freedom to the Christians to worship according to the new faith, but extended to them the protection of the very power that had formerly oppressed them. Coming out of their hiding places, and without the means to erect suitable buildings for themselves, they made use of such as were already in existence. And, though these buildings had been erected for a very different purpose than for places of worship, they were found so admirably suitable in this emergency, that, with slight modifications, they became the type of the cathedrals and churches from that day to this. The Roman Basilica was originally intended to serve for a variety of purposes. It was a business exchange or mart, a court of justice, a fashionable promenade, and a general meeting place for all and sundry. In plan it was oblong, and generally divided into three spaces by two rows of columns running longitudinally, the central space being wider than the other two. The entrances were at one end of the building, and at the other end was the judges' tribunal. It was in these buildings that the first public assemblies of Christians took place, and it will be at once apparent to everyone that the plan of the Basilica, having been found so convenient and suitable, rooted itself in their minds so firmly, that, in the main, it was adopted as the plan for the churches which were subsequently erected.

But though there has been practically no change in the general features of the plan, except what is due to more or less elaboration in aisles, apses or other arrangements, the design and construction were from the first subjected to modifications, and a departure from the original having been made, the gap was gradually widened until an entire separation was effected, and a new style invented. The initial tendency of the transitional work was towards the elongation of the vertical lines. And herein lies the most striking characteristic difference between the styles of architecture before the fourth century, and those which have come into existence since that time. The columns were attenuated so that the relation of diameter to height was entirely severed, although for a time the details of capitals and bases underwent little or no change. Then the desire to obtain height necessitated the abandonment of flat ceilings, and vaulting was substituted. The Roman entablature, which, in the earlier Romanesque buildings, had been carried square across the capitals of the columns, disappeared in the later work; and the semi-circular arch, though with classical details, took its place.

While this was proceeding in western Europe, Constantine, having removed his seat of government to Byzantine, was busily endeavoring to make his new capital surpass the old one in magnificence. He erected many buildings for a variety of purposes, in the execution of which artists from all parts of the world, but especially from Greece, were engaged. The essential features of Byzantine architecture did not differ materially from the Romanesque, but in detail and decoration there was greater refinement and variety. But that for which the architects of eastern Europe were chiefly distinguished was their invention and use of the cupola or dome. This was not only a striking departure from the practice of their western brethren but a most valuable and imposing addition to their buildings, both externally and internally. It opened up almost endless possibilities, and it has been taken advantage of and developed throughout the succeeding centuries.

Justinian was even a greater builder than Constantine, whom he succeeded; but with the exception of clothing his buildings with greater elaboration of detail, and more costly materials, and an almost Asiatic gorgeousness, he did not carry the salient points of the Byzantine style of architecture any further than his predecessor.

Rome had by this time been overrun by the Goths from the north of Europe, and had suffered the fate which generally goes hand in hand with conquest, in having most of its movenble art treasures removed, and many that would otherwise have remained to this day, destroyed. But the savage invaders were in time brought under the influence of Christianity, and out of the general chaos a purer, more perfect, and more distinct style of architecture than any that had existed since the last days of the Romans, grew up and spread over nearly the whole of Europe.

For a time the semi-circular arch was continued, but the mouldings and other details by which it was enriched had clean cut the connection with classical precedents. In some respects the massiveness and solidity of the buildings of this time remind us of the work of Egypt and early Greece. It seemed as if the builders had returned to the first principles, and, for lack of more scientific knowledge of construction, were determined to make their building safe by an abundant use of material. But apart from this there is a sturdiness and force apparent everywhere in the general design. This is hardly to be wondered at when we consider the character of the Northmen or Normans who took the lead in this new phase of architecture. They were a hardy fighting race, and probably associated with all their buildings the idea of defence in addition to that for which it was erected. The plan of the Basilica, which has been referred to, had been slightly modified by the Romanesque and Byzantine builders. They had given greater prominence to the place of the judge, so that it became the apse of their churches; and they had taken down the side walls for a certain distance from the apse and extended their buildings in a lateral direction therefrom, and so formed the transepts. It was at the intersection of the transepts and nave that the Byzantine architects constructed their domes. At the same points on the plan the Normans carried up a square tower. It was not an uncommon adjunct to a basilica to emphasize the entrance end of the building by the erection of towers. These were also incorporated into Norman work. But though, in a general sense, the plan remained unchanged, the whole character and detail of the buildings were simpler and bolder than the classical original, and more homogeneity of growth from one part of the building to another.

But the tendency towards verticality soon led to the change from the semi-circular to the pointed arch, and this then became the characteristic feature of the style. As is well known the name "Gothic" as applied to architecture was at first a name of opprobium, and the style is better described by the name "Pointed Architecture" than by any other. Various designations are applied to this style, but as they refer more to dates, and localities, and reigns of monarchs, than to any inherent difference in the style itself, it is unnecessary to refer to them here. The one great characteristic which runs through the whole work in this style is verticality. The columns are in most instances of immense height as compared with their diameter and of a great variety of kinds: circular, square, octagonal, clustered, and so on. Neither was there any rule for striking the arcs which formed the arch, it was enough that it was pointed.

With the change to the general adoption of the pointed arch, however, came also much greater refinement of detail and elegance of construction. The vaulted roofs with their innumerable intersecting ribs were worked out with the greatest skill and mathematical precision; and the decoration was chaste, simple and effective. The somewhat squat looking towers of the Norman period gave place to most graceful towers and spires rising to immense heights, and the openings, which at first had been small, giving a somewhat dismal light to the interior of the buildings, were gradually enlarged, until it may be said that the entire space between the buttresses was occupied by windows.

With the invention of painted glass a great leap was taken in the matter of ecclesiastical decoration, and, if the kind of glass that is used in a building is sometimes considered a matter of little importance, it had a mighty influence on the development of the Pointed Style in the middle ages. Some writers have gone so far as to say that, next to the necessity that may have existed for having churches, the buildings were designed as frames to receive painted glass windows; and in those days, when the masses were wholly uneducated, they served an excellent purpose, in addition to the great charm they added to the entire composition. The mural decorations of the ancients, though executed in the costliest materials, are altogether eclipsed by the glass paintings of the twelfth and thirteenth centuries. But in addition to their intrinsic beauty they were highly educational, in so far as the wonderful story of Christianity was made the very medium through which the light was admitted to their church buildings.

With regard to the buildings of a non-religious character that belong to the Pointed Style, it is hardly necessary to speak at any length. As has already been suggested, there are more examples of this class of structure, treated with greater variety and appropriateness for their manifold purposes, belonging to this style of architecture, than to any other known to us. But the leading characteristics of the style are apparent in a greater or lesser degree in them all. The purposes for which such buildings were erected suggested such treatment at the hands of architects as was necessary. At the same time it must be said of them, that the religious feeling was always more powerful in drawing out the noblest thoughts in artists in this, as in all other lines, and so we find the highest points of excellence in architecture attained by the ecclesiastical edifices, the buildings for other purposes being in every case secondary to them.

After the fifteenth century the spirit of architecture seems to have taken wings and fled. For though there have been many and great buildings erected since that time there has not been anything that can be properly designated as a new style of architecture. And in these papers nothing has been said of Indian, Chinese or Mexican architecture, for the simple reason that the styles of those countries, however beautiful in themselves, do not directly affect us.

Correction.—In last paper of above series, page 120 of Canadian Architect and Builder, 9th line from close of article, for "From first to last experience," &c., read "From first to last extravagance was the order of the day at Rome."

NOTES ON QUEBEC ARCHITECTURE.

NOT only the form of primitive buildings, but also the materials employed, it has been said, were affected by the climate and surrounding circumstances. Such must have been the case with our predecessors in this ancient city some seventy or eighty years ago, as it is evident they respected not a little the rigors of the climate when they universally adopted the steep pitched roof, carefully avoiding parapets, projecting cornices, gablets, or in fact any ornamental or constructive hindrance to the free passage of snow from the roof to the street below. To the tyrannical demands of climate they sacrificed everything but the strictly needful, their great aim being to make their roofs water tight beyond a doubt, and the house in general to be easily warmed. By thick walls, small door and window openings, low ceilings, and "double windows" set flush with the outer face of the walls, they sought to accomplish the latter end, and in so doing yielded to the imperative demands of climate, and proved that, as in the far past, so then, architecture had to bow to the influence of climate. Less now, however, than then, is this influence felt, for in those days the box stove in the hall with a plentiful supply of good hardwood had to do duty for the whole house, and although it was a cheery sight to see the bright glow of the fire and listen to its cheerful roar as the noise of ice-cracks without sounded loud and often, yet the far away corners, and the rooms not in daily use, were far from possessing the genial and pleasant temperature of the modern house heated by a "Daisy," a "Gurney," or other equally good hot water boiler, and its circulating pipes or radiators.

Then in the use of rubble masonry we are reminded of the proximity of the Beauport and Chateau Riches quarries, and the regiment of masons residing in those parishes, combining with their trade the avocation of farmers. Material close at hand, and labor to be had cheap by employing the farmer-mason had its effect, and in many of the old time plain (to a fault), but yet comfortable old homes of Quebec, a striking proof is obtained as to the truth of the statement that architecture is greatly influenced by climate and surrounding circumstances. Such houses as are now alluded to are to be found in St. Louis, St. Ursule, D'Auteil, Couillard and other streets within the city walls. The wooden Doric or Ionic pilaster on either side of the entrance door, with its entablature, frequently ornamented, was the usual embellishment indulged in; the irregularities of the rubble masonry forming the walls is generally found transformed into rectangular blocks by the use of raised mortar joints, and the whole surface then painted.

In many of the houses of this period may be found some rather elaborate wainscotting in pine, but unfortunately always painted, the framing generally moulded on the edge, the panels having chamfered edges and the centres sometimes raised; curved heads or quarter round corners to panels frequently occur; small dentils in the cornices were also very general. The houses erected about this time in the Lower Town, and being the residences of the merchants of that time, frequently had vaulted basements of very substantial construction; many of them still exist, and form excellent wine vaults.

Succeeding the foregoing type of house, a more modern class of building followed, the steep roof and flush double windows being still retained, but with fine-cut ashlar front and larger openings, metal roof instead of the old-time wood shingle, loftier stories and higher basements, a distinct change was made. Symmetrical these houses certainly were, but so much so as to stamp them as being cold and tasteless. A few honorable exceptions are to be noted on St. Denis St. Cape, where some of the former merchants of Quebec have built homes for themselves in a more ornate and more costly style.

Within the last fifteen years the taste for modern houses has greatly developed, so that now in all directions residences of good design are to be met with, combining therewith most of what is generally known as "modern conveniences." In not a few instances elegant residences have been erected on the Grande Allee and other fashionable streets. Nowadays all the comforts of hot-water heating, electric lighting, and sanitary plumbing of handsome make, with the elegancies of hardwood finish, tiling, stained glass work, etc., etc., are generally looked for. The effect of all this is, that the old house of 70 or 80 years ago is looked upon with but little favor. Yet in these latter we find that regard paid to climatic demands which it behooves the builder of the present day to meditate upon, and it would be well for him to evolve therefrom a style of building which, while retaining all desirable points in connection with the requirements of climate, might with tasteful handling incorporate the good points of modern building, and out of the whole produce a type of architecture, "Quebec" in character.

These notes must not pass unmentioned the wonderful difference between Quebec's business premises as they are now and as they were 50 years ago. Then our wholesalers occupied, generally speaking, either former dwelling houses or stores built of timber on the various Lower Town wharves—low, dingy structures they were for the most part—that is, the wharf stores—besides being twisted and distorted by the settling of their foundations. A few still remain, serving to emphasize the great progress made in this direction when they are compared with the warehouses of the Thibaudeaus, the Hamels, and notably with that recently erected by Hon. P. Garneau, and that erected by Mr. Paquet—the last named handsomely ornamented by polished granite shafts in all its six stories.

In churches and public buildings too, one may observe a great advance in taste and in conception of the fitness of things generally, so that it is safe to affirm that within the next fifteen or twenty years there will be still more marked improvement, and a still greater effort to introduce modern ideas and features into our buildings, which may be done or ought to be done, without flying in the face of the conditions of our climate. In one direction a marked improvement may easily be brought about—do away with the outer winter sash and substitute therefor an inner sash, which will answer the purpose just as well, and leave the jambs free for architectural treatment, and to be seen the whole year round. As it is, for six months of the year the double window conceals, or at all events greatly detracts from, the ornamentation of our windows by being placed in front of the same.

While admonished by the peculiarities of our climate not to indulge in those pleasing effects of roof treatment which in practice result in leaking roofs and damaged walls, with endless repair bills, yet neither is it necessary that the eaves line should be entirely unbroken and without architectural effect, giving a "squat" and unfinished appearance to the building. By always keeping in view the need of liberal space for the moving off of ice and the avoidance of snow catchers, and by taking needful precautions to prevent the freezing of water at the eaves by deafening inside or by making a double roof, the architect who has had experience in this climate should be able to solve the problem of meeting the exigencies of the latter, whilst he produces a design not entirely devoid of picturesqueness.

The Quebec architect should build, not because this or that style is fashionable, but with proper regard for the requirements of climate and surrounding circumstances, produce such a style of building as will without question assert itself to be of a type suitable to the climate and other conditions of the locality in which it stands. This, the old buildings of Quebec did; let us not despise them, but so improve them and embellish them and adapt them to modern notions, that in the new production we shall have, if not a national, at least a local style of architecture.

CANADIAN BUILDING STONES.

THE variety, value and extent of building stones in Canada, appear to be but imperfectly known. With the view of adding to the existing information on the subject we print below particulars regarding some of the principal quarries.

THE OWEN SOUND STONE CO.

Until within a comparatively few years the demand for stone in Ontario has not been very great, caused to a certain extent by the very small proportion of good stone which has as yet been revealed in the Province. The freestone used in all large buildings of our towns and cities was brought from a distance of hundreds, sometimes thousands of miles, and at such a great expense as to almost utterly preclude the use of freestone in any other than small quantities or on works of the most expensive nature. This undesirable state of things has at last ceased to exist. In the township of Mono, county of Dufferin, some three miles north of the town of Orangeville, the Owen Sound Stone Company acquired a tract of land about three years ago on which there is a deposit of as good sandstone as is obtainable anywhere. This quarry they have been developing and putting into shape since then. They now have one of the best equipped freestone quarries in America with unsurpassed facilities for the handling, shipping and transportation of their stone.

The sandstone deposit is 16 feet thick, from which blocks of any size up to the capacity of machinery for handling can be taken. Overlying the sandstone there are some four feet of well bedded blue limestone in beds of six inches to two feet thick, and well adapted for footings and heavy foundations and heavy masonry of all kinds. The sandstone is a grey or olive shade, bleaching on exposure to a magnificent white, which experience has shown does not discolor, as do a great many of our high-priced imported stones. This stone also hardens by exposure, there are no flaws or drives, it is easily worked, and is, in fact, a nearly perfect sandstone. Experts pronounce it equal in every respect and superior in a great many ways to the very best freestones hitherto in the market. The quarry can furnish almost anything in the line of stone suitable for heavy and light work of every grade. It has a present working face of between 500 and 600 feet, which is being gradually extended. Eight derricks, two planers, one set saws, all run by steam, are employed. The company intend putting in channelers next season.

During the past season they have been busily engaged in building a line of railway to the quarry. The line which is now finished is according to the main line standard and four miles in length. Starting from the C. P. R. station at Orangeville, it parallels the main line for a short distance and then curves off towards the quarry. Some heavy work had to be done in the shape of heavy filling, rock and swamp grading, and there is one immense cut at the quarry end of the line. Adding to this two large trestle bridges and several small pile bridges one has some conception of the magnitude of such an undertaking in the hands of a private company. The construction of this line involved the expenditure of some $35,000, but the quality of the stone and the certain prospect of a very large and lucrative business prompted the company to take this means of placing the product of the quarry on the market. The track now runs along the whole front of the quarry and all stone is loaded directly on to the cars. Two sidings have been provided for extra accommodation and a piling ground for the storage of surplus stone of different kinds is served by two extra derricks. The company have recently bought several acres of quarry land in addition to their original purchase, and intend this winter erecting a large boarding house and cottages for the proper housing of their employees.

Though business has been comparatively dull for the last year this stone has been gradually but surely establishing itself and proving to practical men that the long felt want of a first-class native sandstone is at last supplied, and the Owen Sound Stone Company feel assured that the more dealers and the general public become acquainted with the stone the less foreign stone will be used in the Province. This company has also grey limestone quarries at Owen Sound and a quarry near Inglewood on the Credit Valley branch of the C. P. R. For the last five years the Owen Sound Company has been engaged in building as well as selling stone. For several years they had from 300 to 600 men employed in excavating and building railway work in different parts of Ontario. Amongst other works which they undertook and completed in a satisfactory manner were the Sherbourne street and Rosedale bridges in the city of Toronto, the masonry for the Belt Line Railway, the large bridge over the Thames at London, some two miles of bridging and culverts comprising all the foundation and dimension masonry for the C. P. R. Company's extension across the Don flats, the immense shops at Toronto Junction and some thirty or forty bridges and culverts on the Credit Valley, Ontario & Toronto G. & B., all for the C. P. R. The great bulk of the stone used in these works was taken from their great limestone quarries at Owen Sound, which has no superior anywhere for this class of work.

THE LONGFORD QUARRY AND LIME CO.

The Quarries of this Company are situated on the shores of Lake St. Johns, in the township of Rama, County of Ontario, and the Company's address is Longford Mills, Ont. The formation of limestone from these quarries is very fine, the beds of each layer of rock being exceedingly level and but very few dries or cracks appearing in them. The color is of steel grey when first taken out of the quarry; after being exposed for some time it becomes lighter in color, and its general appearance is then almost like marble glistening with glass. The thickness of the different layers of the strata runs from 5½ inches to 16 inches, but the finest layers work splendidly to 12 and 14 inches, while the 5½ inch bed cuts into window sills and heads.

The facility for shipping is all that could be desired, a switch off the main line of the G. T. Ry. (Northern Division) enters the quarry and large and convenient derricks are placed so that a large quantity may be loaded every day.

The company have been fortunate in tendering for many large contracts for their stone, and refer the building trade with satisfaction to the following structures which have been supplied by them; The palatial residence of Mr. S. H. Janes at North Toronto, the foundation for a large part of the New Victoria University, the Freehold Loan Building, the New Drill Shed, the New Court House, the Confederation Life Building, the new Athletic Club building, the center pier of the King Street Subway, all in the City of Toronto. They also furnished a large quantity of foundation stone for the Edison works and Peter Hamilton's large warerooms at Peterboro', Ont., also a large quantity for decorating around windows and doors of St. Joseph's R. C. Church in the township of Douro, and have just completed shipment of the decorative pillars and fence around the Customs buildings in Peterboro', which adds very much to the general appearance of that handsome structure. The magnificent new post office at Orillia has all its stone work from these quarries. The company is composed of Messrs. William and George Thompson, of Orillia, Ont. (the well known and pushing lumbermen of Longford Mills), Mr. Andrew Craig as manager, who is considered to be one of the best quarry men in Ontario, and Mr. Maxwell Hall as secretary treas. With the record of the past and the business ability of the members of the company, the building trade have a guarantee that any business entrusted to them will be carried out in good faith.

The company believe in advertising, and in order to bring their material before the public they erected a beautiful monument with a piece of wall at the exhibition grounds at Toronto during the past season, and now with pleasure refer the trade to their advertisment in the columns of this journal.

MIRAMICHI STONE.

About two miles below Newcastle, New Brunswick, on the Miramichi River, is situated the historical French Fort Cove property, comprising about twelve hundred acres, owned and occupied by Mr. C. E. Fish. The place derives its name from the fact that many years ago, when the French occupied this portion of Canada, they erected at the mouth of the Cove, a stone fort which was afterwards destroyed by the English. Just inside the Cove, and extending at least two miles up the bank, are almost inexhaustible beds of Freestone, suitable for building stone, bridge stone, and abrasive purposes. The deposit is regular, ranging from twenty feet down to thin sheets, and is probably the most extensive deposit of sandstone in Eastern Canada. Like the sandstone deposits in all districts, it varies in fineness, color and density.

The building stone, known as "Miramichi Stone" (Miramichi meaning "happy retreat"), is of a rich olive color, and possesses all the merits of a first-class structural material. It is easily worked and long years of exposure have failed to change its color or density.

The "Langevin Block" in Ottawa, New City Hall in Hamilton, Ont., the residences of Messrs. James Ross and Duncan McIntyre, in Montreal, are a few of the buildings more recently constructed entirely of this stone. The coarser grades have been largely used for bridges, culverts, docks and general foundation purposes under water. It is particularly well adapted for paving purposes, its grittiness giving a good foothold which its hardness prevents wearing smooth, and its non-absorbent qualities render it capable of shedding ice and snow readily. There is also a good grindstone and wood pulp stone quarry on the property, but as yet it has only been worked on a small scale.

The quarry is equipped with modern machinery throughout, and has good shipping facilities by rail or water. Mr. John Laurie, 162 St. James Street, Montreal, is sole agent for the quarries.

A FINE QUARRY.

What is now said to be one of the best stone quarries in the Dominion and perhaps on the continent, is situated one hundred and forty miles below Quebec, three miles from Trois Pistoles station on the Intercolonial Railway, which is also on the St. Lawrence River, thus affording facilities for shipping by rail and vessel.

The quarry is a mountain of red sandstone of the most beautiful color and of the very best grain. It covers an area of about two miles long by half a mile broad, and ranges from about twenty to one hundred and fifty feet high. The property was acquired from several farmers by Mr. F. G. Dubé, of River du Loup, Que., a couple of years ago. Mr. Dubé, although a very enterprising gentleman, was not able to go into the working of the quarry on account of ill-health, and to the regret of his many friends died in May last, leaving this magnificent property without realizing anything from it himself. Samples of the stone were sent to New York, Boston and Montreal, where it was recognized by connoiseurs to be of a superior quality and color. It is claimed to have many points of superiority over the imported Scotch stone, as it is acclimated to our country and will not be damaged by exposure to the weather, but instead will increase in strength with age. It is of a very close and compact grain, and can be cut to any shape desired. When fresh from the quarry it is soft and easy to work. A sample which was lately sent to this office justifies the superiority in character claimed for this stone. We understand that this quarry will have to be sold to close the estate of the late Mr. Dubé. This ought to prove a rare chance to some one interested in the stone business.

CANADIAN GRANITE CO.

This company own an extensive granite quarry at Kingston, and works at Ottawa, Ont., where every description of marble and granite work required for architectural purposes is manufactured.

THE ONTARIO ASSOCIATION OF ARCHITECTS.

The coming convention of the association, which will take place on February 7th and 8th, will be the most important that has been held. In response to a request sent out by the Registrar for suggestions on the part of the members as to questions to be discussed at the coming convention, many answers have been received suggesting points for discussion which will amount to a review of the state of the Association. As this will be a critical point in the history of the Association, there ought to be, and probably will be, a full attendance of members on the first afternoon, when this discussion will be opened. The second day's proceedings will consist of testing the strength of materials in the testing machines of the School of Practical Science, papers by members eminent in the profession, and the election of new members for the Council. The proceedings of the two days will, we understand, be concluded by a dinner on the evening of February 8th. We are given to understand that something of a surprise in the way of entertainment is in store for those who may attend the convention.

PERSONAL.

Mr. Wm. Stewart, architect, Hamilton, Ont., has admitted his son as a partner, the firm name being now Stewart & Son.

Mr. W. R. Gregg, architect, Toronto, has admitted to partnership his brother, Mr. Alfred H. Gregg. The title of the new firm is Gregg & Gregg.

Mr. Eustace G. Bird, recently a student in Toronto Architectural offices, has secured a position with Mr. Calcutt, a prominent London architect. It is Mr. Bird's intention next summer to make a tour of France and Italy.

Mr. Rutan, of Boston, one of the architects of the New Montreal Board of Trade building, recently made a thorough inspection of the work and pronounced himself well satisfied therewith. Mr. Edward Maxwell is the superintendent. The building is expected to be ready for occupation early in April.

TORONTO ARCHITECTURAL CLUB ORGANIZED 1889

PHOTOGRAPHY FOR ARCHITECTS.

WE herewith publish a paper on "Photography for Architects," by Mr. J. J. Woolnough, delivered before the Toronto Architectural Club, at its second meeting in November last, together with the introductory remarks of the President, Mr. Alfred H. Gregg. The paper was illustrated by photographs and photographic apparatus, and at the conclusion flash light views of those present were taken. The president in introducing the subject spoke as follows :

IT was suggested by several members of our Club that we devote one of our evenings to the study of photography. The task was then assigned to me, in addition to introducing the speaker of the evening, to dwell on the special advantages derived by an architect from the pursuit of this branch of art. The more scientific details of photography and the ways of working the camera will be taken up by our friend, Mr. Woolnough.

An architect should be not only a lover but a producer of the beautiful, and it should be his endeavor to raise the standard of art education in every way possible. That a camera will give him material assistance in emphasizing all these characteristics, it will be the aim of this paper to set forth.

His mechanical instincts soon give him the mastery over the details, and ere long he sees in the subject an art never before realized. The picture-making, the arrangement of lights and shades, the perspective, are necessary parts of the photographer's education, and as he delights in these he becomes more and more the devotee of art. Failure may follow failure, but perseverance brings reward, and soon he becomes a producer as well as a lover of the beautiful.

Let him walk forth some fine morning, leaving the turmoil of the city behind him. Close to its confines he may find innumerable signs of Nature's art—the noble trees, the hills, the rocks, the valleys with their trickling streams, the pebbly beach, the grand old sea, even the clouds in their billowy beauty—all scenes to be reproduced by his trusty lens, and soon by old Sol's kindly aid he becomes possessed of indelible mementos of his trip. To others his pictures seem a revelation, for none but a trained eye detects how much of the beautiful lies all around us.

But dearer to an architect's heart are ancient buildings crumbling to decay, with details over which days and weeks have been spent by skillful hands. Are these to be lost? Nay, rather let us train the rising generation to know and love the works of their ancestors. Truly, pictures are produced for the photographer, whichever way he looks. Take a street scene, for instance, in which some special grouping of figures has attracted his notice. Quickly he chooses the best position for his camera, composing his picture, with proper amount of foreground and background, and with accessories well distributed. It is thus that the photographer becomes the lover and the producer of the beautiful, and it is thus he may educate others to a better appreciation of their artistic surroundings.

But before deciding on the expenditure of one cent on the required apparatus, an architect would do well to make up his mind to two or three things. First, he should decide to do everything, from the exposure of the plate to the final printing, himself. He should not permit anyone to "do the rest" at any stage of his proceedings. Only thus can photography become of practical use. Just here let me say, that the uninitiated seldom dream of the pleasure to be found in developing. To take the cold white plate and by the application of a few chemicals to see the image gradually developing—if a landscape, to watch the one tree after another appear; or if some group of friends, to see the faces rising as if by magic until the perfect result is before us. The exposure is not by any means the most pleasant part of the process. There is then an omnipresent feeling of dread lest something has gone wrong. It is when developing that we are first able to judge of the actual success we have made.

But especially is it of advantage to be able to go through the whole process yourself, as by doing so one may easily obtain a finished print much more quickly than by employing a professional photographer, and that, too, without interfering with your business to any noticeable extent. Another word to would-be disciples of Daguerre—expect failures at first. With care they will become less and less frequent till finally they may be reasonably certain of success every time.

At the outset of this paper it was attempted in a general way to show how advantageous as an artist, trainer and art producer the camera may become. There are some more technical ways in which it will be found of incalculable service. First, for perspective work, in supplying trees, figures, etc., and in obtaining certain street views, that correct representation may be given of neighboring buildings, also in the study of sciography or the science of shadows. Second, in preparing measured drawings of existing work. Much labour may thus be saved in counting bricks, etc. Third, for use of the clerk of works. Views thus obtained would give correct representations to the architect of the progress of the work, and certificates could then be granted. Fourth and last, the collection of a series of photographs of his own designs and details, and of any architectural views which may be of interest to him.

To an Englishman, our Canadian climate seems an ideal one for a photographer. The clear atmosphere lasting from January to December should surely not be wasted.

But after all, there is another question which may be asked—can we afford it? I answer by asking—can we put our money to better use? Here we are, a gathering of architects and students, with wealth staring us in the face. Are we misers with hearts of stone and blood turned to ice, that we endure accumulating burdens of useless hoarded gold? Surely not! Let us be up and doing, let us rather meet the danger manfully, courageously, and, I may add, efficaciously, by throwing off these needless weights, by casting aside the carking care of a Crœsus for the glad, though perchance penurious, life of an amateur photographer. This may seem like levity, but seriously, be our savings great or small, we may with the initial expenditure of from ten to fifteen dollars, become possessed of a camera amply sufficient for all our needs. Our developing and printing outfits will cost but little more. All that is required will be two or three trays, a pair of scales, a ruby lantern—easily home-made—and a few chemicals, all of them cheap. For a dark room, the modern bath-room admirably fulfils all necessary conditions.

What more can I say to inspire you? Certainly nothing I can think of at present—for I would fain see every office equipped with this useful instrument. We are here to consider every means, great and small, for the advancement of architecture in our country, and if we can force the sunbeams to do more work for us, let us by no means miss the opportunity.

ALFRED H. GREGG.

MR. Woolnough was then called upon and read the following paper :

GENTLEMEN,—Before plunging into a description of photography, and how it is done, I should like to emphasize that part of our worthy president's paper, dealing with its practical use to architects. I myself have found photographs of old buildings very useful as an aid to memory, in preparing measured drawings. Furthermore, it must not be forgotten, that photography is not only one of the most fascinating and absorbing of hobbies, but that it requires for its successful working, those supremely useful qualities of patience, care, order, precision, close observation and thoughtfulness, which are, I believe, specially required by all architects who wish to ensure a successful career.

The production of a finished photograph can be divided into three heads: 1st, Exposure; 2nd, Development; 3rd, Printing.

Commencing at No. 1, The Exposure, you will require a camera, with lens, tripod and plate holder, also a focussing cloth, and lastly, the dry plates. The majority of cameras on the market are sold complete with lens tripod and plate holder. I will now unpack my set and explain the use of each part.

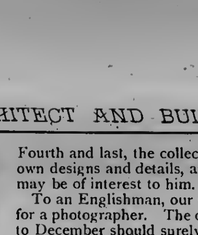


FIG 1.

On being the happy possessor of a complete set, of course there is an uncontrollable desire to set forth and immortalize some dainty bit of scenery, but it will be first necessary to fill the plate holder with two plates, and as the plates are extremely sensitive to ordinary light, this has to be done in a dark room, by the light of a red lamp.—red and orange light having (within certain limits) no effect on the plates. On unpacking plates and placing in holders, you will notice that the plates are sheets of glass, coated on one side with the sensitizing compound.

Going back to the camera, I will now take up and describe each part. Taking the camera first, it is absolutely necessary that it is light tight, with no pinholes in the bellows, and also its base should fit firmly and rigidly on top of tripod, so as to prevent all vibration. The bellows should be long enough to extend far along focus lens, and the base board should be of a length so as not to interfere with the use of a short focus lens (see Fig. 1). The focussing screw should be within easy reach, the front of camera being a very awkward position for it. Of more importance for architectural subjects are the facts that a camera must possess a swing back ; a

FIG 2.

rising front is also very useful. The necessity of a swing back comes in when photographing a tall building in a confined space, when it will be found necessary to point the lens slightly upwards so as to take in all the subject. With a *fixed* back to camera, the result of a picture so taken would be somewhat like Fig. 2, owing to the dry plate being out of upright. By having a swing back, the dry plate can be placed in an upright position, thus ensuring vertical parallel lines. This is a very important item. The rising front is a moveable board at front of camera, and on which the lens is mounted—this is useful for cutting off any excess of foreground ; a photo of a building with the roof line at top of picture, and about one-third up all foreground, gives a very unsatisfactory impression (see Fig. 3).

FIG 3.

Next to the camera comes the lens. Lenses can be divided into two classes, the *single* and the *compound*. The single lens is formed of either one disc of glass, or else two in optical contact. The compound lenses are formed of a series of two or three lenses fixed slightly apart in the one mount. The single class of lens is by far the cheapest, and for pure landscape work is all that can be desired, but for architectural subjects it causes a slight curving to all straight lines, especially those near the margins of a photo. The compound lenses of the rectilinear form are perfection for architectural subjects, but are rather expensive in comparison with the single class. I myself have always used single lenses, and find that the slight curvature given to some lines is hardly noticeable.

The focus of a lens, that is the distance of the lens from the focussing screen, varies according to whether the lens is a short focus or wide angle, a

FIG 4.

medium focus, or a long focus or narrow angle. In a confined situation a wide angle lens is necessary to embrace the whole subject. A medium focus is useful for general subjects, and is the lens usually supplied with camera. A long focus lens is useful for distant shots. As an example of the special advantage of a long focus lens I have made these rough sketches of an imaginary bridge, the only point of view being the opposite side of a river. Fig. 4 would be the probable result with a wide angle lens, Fig. 5 with a narrow angle or long focus, and the medium focus would come about half way between. Lenses are provided with *stops* for increasing the detail

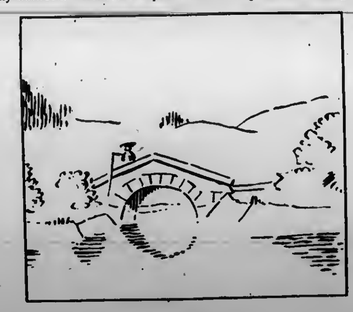


FIG 5.

in the resulting photo ; the smaller the aperture of stop the sharper the detail ; and just here I might mention that *as far as the lens is concerned*, the length of exposure depends upon the size of the stop ; the larger the stop, the more light passes through and the shorter is the required exposure. The amount of light passing through different size stops *varies directly as the area of each stop*. For example I will take two stops an ½" (Fig. 6), and an ⅛" (Fig. 7). Now as the area of one circle is to another as the squares of their diameters, by finding the areas you get the proportionate exposure. And as a circle ½" diam. is 1/16 the area of one ½" diam., Fig. 7 stop will require 16 times the exposure of Fig. 6, because only 1/16 the amount of

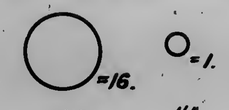


FIG 6. FIG 7.

intensity of light will pass through. So when you have by experiment found out the time of exposure for one stop, you can easily arrive at all the others. Stops are of three makes: 1st, "the diaphragm," which is inserted in a slit in top of lens mount, and objectionable because they are loose and liable to be lost ; 2nd, "the revolving," which is attached to lens mount ; and 3rd, "the Iris," also attached, and by which any size stop desired can be formed. Besides the aperture of stop, the time of exposure depends upon two other factors, the quality of the light and also the rapidity of the dry plate.

For instantaneous work, that is when a shutter is used, it is necessary first to have a bright day, second, an open view with few dark shadows, and third, the largest stop of lens should be used and should be in diameter not less than 1/10 the focus of the lens—that is, if the distance from lens to plate is 5 inches, the stop should be at least ½" diameter. As for shutters, I will not touch on them now ; their name is legion, they are all sorts, sizes and prices, and I should not advise a beginner to get one to start off on, as instantaneous shots are much more difficult to develop than ordinary time exposures, because they require rapid, or very sensitive dry plates, and the quicker the plate the more care and experience is required in development.

The next part is the tripod. This should be strong, light, and rigid when set up, should have sharp points at foot to grip a floor with, and should be easily and quickly set up and down, and make a neat and compact affair when folded up. All such inventions as walking stick tripods and folding tripods, warranted to go in vest pocket, are to be avoided ; get something that can stand a gust of wind, which the beforementioned contrivances assuredly cannot do.

The dry plate holders are of two kinds—the "book holder," so called because it opens like a book ; and the solid, both of which you can see here to-night ; the solid is the best kind, being the most convenient. It is very necessary that they should be well made and thoroughly light tight ; and even then it is best not to expose them more than necessary to direct sunlight. It is best to have three slides ; each slide holds two plates, which are placed back to back, and have a thin sheet of opaque card between them to prevent exposure having effect on the back plate.

The prepared glass plates on which the image is taken are called dry plates, to distinguish from the old style of wet plate used in the early days of photography. In those days it was necessary when taking views, for the photographer to take a kit with him comprising a fully equipped dark room, with chemicals complete, right on the ground where the view was ; he had to prepare and sensitize his glass plate right on the spot, and make the exposure and develop the negative while the plate was still wet, and as this had to be done in all weathers, you will recognize what a "snap" the modern amateur photographer has, especially with his aggressive little hand camera loaded for a dozen or more shots at all the out-of-the-way and novel bits his restless optic seizes on.

The dry plates are coated on one side with a mixture called "the emulsion," and composed chiefly of gelatine and nitrate of silver ; the sensitiveness of plate is due to the nitrate of silver, the gelatine being chiefly a vehicle to carry the silver salt.

Dry plates are made of different degrees of sensitiveness or rapidity, the rapid being used as I have mentioned, for instantaneous work. It is decidedly best for beginners to work at first on slow plates, as there is a greater amount of latitude ; the exposure and development has not to be brought down to the fine point that the rapid ones require.

Although the manufacture and subsequent working with dry plates is so well understood, it is a curious and remarkable fact that the true chemical effect the action of the light has on the dry plate has not yet been discovered.

The remaining necessity for exposure is a focussing cloth to throw over head and camera, so that image on ground glass can be seen while focussing. The best article is of rubber cloth, which would also come in handy for covering camera in case of a shower of rain.

I now come to the second head, viz., *Development*. For development, you will require scales and weights, chemicals, a glass graduated measure, two stoppered bottles, two trays, a dark room with red lamp, and plenty of clean water. Before lighting the red lamp, solutions of the necessary chemicals must be prepared. These are pyrogallic acid and an alkali—generally carbonate of soda—and cold solutions of these are poured into the glass bottles. The pyrogallic acid is the developer proper, but if used by itself would be tediously slow, therefore an alkali is used to quicken the appearance of the image, and this alkali is called the "*accelerator*." You will also require to prepare a solution of hyposulphite of soda, which can be at once poured into one of the trays.

You now light the red lamp and see that no stray rays of white light find their way into dark room. On taking dry plate out of plate holder, it will be found on examination to have the same appearance as it had when placed in holder before exposure ; no trace of image can be seen. The plate is laid in tray, gelatine side up, and a small quantity of the two solutions is then mixed, just enough to cover plate, and is poured evenly over. The tray is gently rocked and the image begins gradually to appear, the sky or any other high lights showing at first as dark patches. Development is finished when image begins to show through to back of plate, which must be watched. The plate is then rinsed in water to wash off the developer and is then laid in fixing solution. Up to this part the plate, although showing every detail of picture, has retained its semi-opaque creamy appearance, but on placing in fixing bath this is dissolved out in about ten minutes, leaving the negative perfectly clear and transparent in the shadows, and when it is so fixed it must be taken out and given a good washing in cold water. The plate after washing is then laid to drain and dry, and when perfectly dry your negative is complete. The development of a plate is by far the most fascinating part of photography, and the charm of watching a picture lull of rich detail, slowly appear on the surface is quite sufficient to account for the enthusiasm that all amateur photographers feel for this their hobby.

The third heading is the *Printing*. For this you will require a printing frame, sensitive paper and chemicals. The negative is placed in frame, film

side up; the sensitive paper is placed on negative prepared side down; this can be done in an ordinary room, but not too close to a window; the sensitive paper has nothing like the sensitiveness of the dry plates. The frame is then placed in a good light, not direct sunlight. It can be taken indoors and examined from time to time, and printing should be carried on until the print is a few shades darker than the finished photo is required, as it loses depth in toning. When a sufficient quantity are printed it is necessary to tone them and then fix the image. Toning can be done by gas or lamp light; and you will require to mix up a solution of chloride of gold with sufficient alkali to neutralize the acidity of the gold. The prints are first washed to get rid of the free silver, which leaves them of a brick red color, and then placed in toning bath. It is best to use crockery ware for the necessary dishes for toning. I myself generally make a raid on the kitchen for my supply. In a few minutes after placing in toning bath the prints will change to a more pleasing tone, and can be taken out at any stage desired, or can be left in until the tone is almost a black. Prints are then rinsed and placed in fixing bath for 15 minutes; they are then given a good washing and left to dry. All that then remains is to trim them and mount with starch.

There are several methods of printing, each of which has its own particular beauty and suitability for special subjects; you will find on table a few specimens of the different methods.

The many by-ways of photography, such as "lantern slide making," "enlarging," "stereoscopic work" and other branches, all have their devoted followers and enthusiasts, and all help to raise photography to that summit of true art which it richly deserves. When a camerist has perfected himself in the purely mechanical part of the processes, he then stays his hand at reckless firing off at everything he sees. He finds himself almost unconsciously developing a taste for something better than a merely good technical photograph, and by this means his mind is expanded; he sees beauties in nature he would otherwise have passed unheeded, and he finds himself the possessor of bits of composition that all help as an inspiration and make him feel that life is very well worth living.

Coming now to that very practical and important part, the cost, I think I can give you a full price list of the various articles required. A camera like mine, called the "Instantograph," will cost $15 complete with camera, lens, shutter, plate holder and tripod. The dry plates cost 45 cents a dozen; scales and weights, 75 cents; 2 trays, 20 cents each; a 2 oz. glass measure, 30 cents; 2 stoppered bottles, 12 cents each; printing frame, 20 cents. The cost of chemicals and paper is purely nominal; I have worked out the cost of six prints finished complete, and it comes to an average of 10 cents for 6 prints, which includes everything except cost of dry plates. All these prices are for ¼ plate size.

I think I have now exhausted my subject, and I sincerely hope you are not in the same condition. I would say in conclusion that if there are any present who think of becoming amateur photographers, both our worthy president and myself are entirely at your service for any advice or help that you may require.

THE POTSDAM RED SANDSTONE CO.

THE quarries of this company are situated at Potsdam, N. Y., and their selling yards for the Canadian trade at Prescott, Ont. The Parliament Buildings at Ottawa, are constructed of this stone. Prof. J. S. Newberry, of the Columbia College School of Mines., made an examination of the Potsdam quarries in 1860, and in his report says:

As I have said, I was surprised to find in the different quarries of this Company so many varieties of color in the stone. In the west quarries, the typical "Red Potsdam," either plain or banded, prevails. On their southern tracts are out-crops of homogeneous and monochrome, chocolate colored stone, in heavy ledges, which will yield blocks of any desired size. while in their quarries on the east side are exposed about fifty feet of rather massive layers, seperated by a band of fifteen feet of foundation or bridge stone. The upper and lower bands composing the fifty feet referred to, are mainly of light colored homogeneous stone, to which I was a stranger before visiting the quarries. This is of a reddish cream color, very uniform in tint and pleasing to the eye. It comes out in layers from two to six feet in thickness, and splits with ease and certainty in any direction. With the choclate colored stone, to which reference has been made, it may be combined with fine effect, one variety being used for trimming to the other, as corner stones, door and window caps, porches, etc., or associated as block stones in plain walls. This cream colored variety works with comparative ease, and may be wrought into mouldings and ornaments, much more cheaply than the harder varieties, which will be best used when hammer dressed, a style of treatment to which every phase of the stone will lend itself, as it breaks true and even under hammer.

The different tracts of land controlled by this Company comprise about two hundred acres.

The long-established hardware firm of Aikenhead & Crambie, Toronto, has been succeeded by the Aikenhead Hardware Co. The business will be continued as before in the premises at No. 60 Adelaide street east, which will, however, be altered in such a way as will best serve the requirements of the business. A specialty will be made of builders' hardware. Mr. Thos. E. Aikenhead is the manager of the new company.

SHAVINGS.

Messrs. Carroll & Vick, Toronto, are preparing specimens of brown Credit Valley stone for exhibition at the World's Fair. The block will be 3 feet high by 2½ on the side, and will be richly carved with foliage and the name of the stone, also the Ontario coat of arms.

The Toronto Chemical Smelting Company, of Port Colborne, Ont., is about to manufacture hard, black glass building and paving brick. The material is obtained as a result of the use of a new patent process of reducing and refining nickel from the ores, and would, unless utilized in this manner, be an absolute waste. It is claimed for these brick that they will be extremely hard and durable, and especially adapted for paving purposes. One of the streets in Port Colborne will shortly be paved with them.

Messrs. Pilkington Bros., the well known English glass manufacturers, have recently opened a Canadian agency in Montreal, and are protesting against the action of the Canadian Customs authorities in imposing a higher import duty on their material than is charged Belgian glass of the same quality. The matter is under consideration by the Controller of Customs. The effect of the discrimination against the English house is said to amount to about $100 in duty for every 1000 boxes or 100 feet of glass sold.

Mr. Wm. Jones, who was the original contractor for the erection of the Freehold Loan Company's new building, Toronto, but was dismissed from the work by the architect, Mr. E. J. Lennox, on the ground that satisfactory progress was not being made, has caused writs to be issued against the Freehold Loan for $20,000 for work done, also for $20,000 damages for breach of the contract; against Mr. Lennox for $20,000 for trespass, and against Mr. Snarr, to whom the completion of the contract was entrusted, for $5,000 for taking possession of the plaintiff's property.

G. WILLIAM KING,
ARCHITECT
9½ Adelaide Street East, - TORONTO.

GILMOR & CASEY.
House and Sign Painters,
Telephone 149. 47 VICTORIA STREET.

MOAT QUARRY FREE STONE
AGENTS FOR CANADA:
THOMAS SAMUEL & SON,
St. Helen St., Montreal. 3 Wellington St. E, Toronto

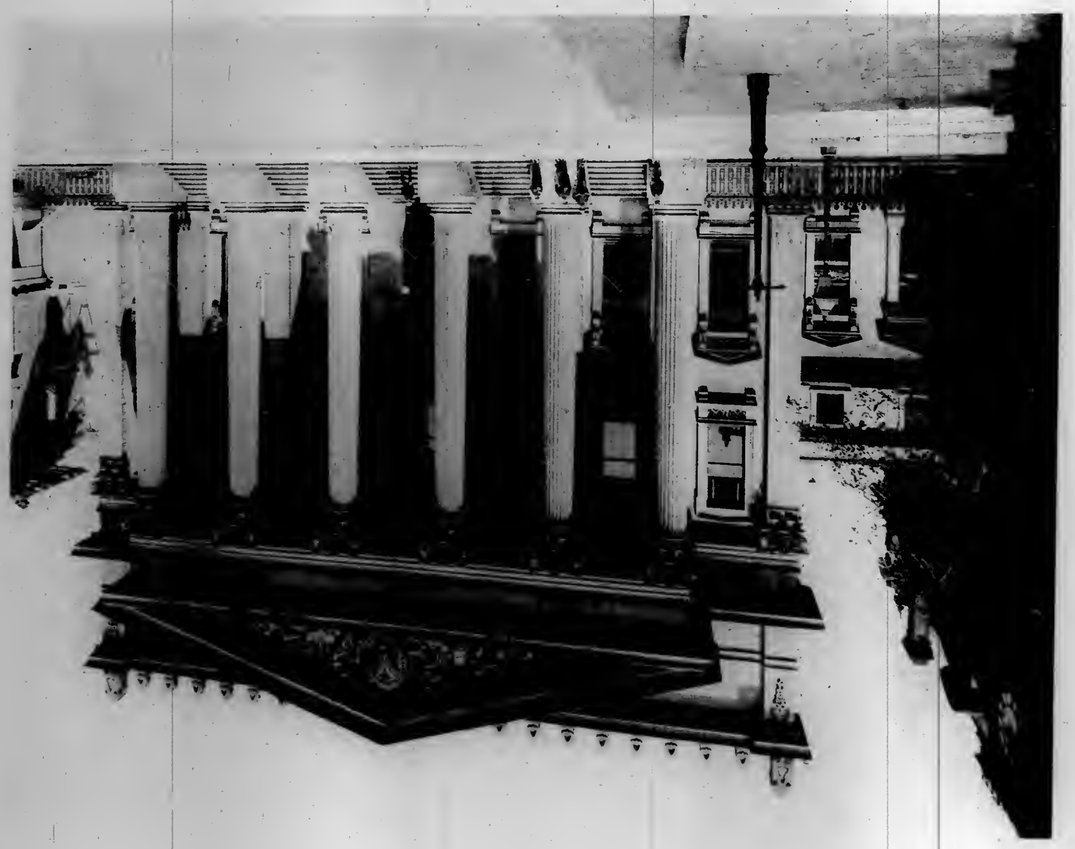
The "STAR VENTILATOR"
SECTIONAL VIEW

Galvanized Iron, Copper or Brass.
Down Draughts Prevented.
For Ventilating Mills, Factories, Foundries, Breweries, also Churches, Schoolhouses, Theatres—in fact all kinds of buildings, none equal the "Star."
A cheap Ventilator which will not do the work required, is costly at any price; our claim for Superiority of the "STAR" Ventilator is based on Merit only—believing the first cost to be a secondary consideration.
Send for a copy of our little book on Ventilation.
MERCHANT & CO.
Philadelphia. New York. Chicago. London.

Works: ST. HELENS, ENGLAND.
PILKINGTON BROTHERS
MANUFACTURERS OF
POLISHED PLATE
Rolled and Rough Cast Plate,
BRITISH SHEET GLASS
P.B.
FANCY CATHEDRAL
ENAMELLED, GROUND
and all kinds of ornamental
WINDOW GLASS
Depot: BUSBY STREET, MONTREAL.

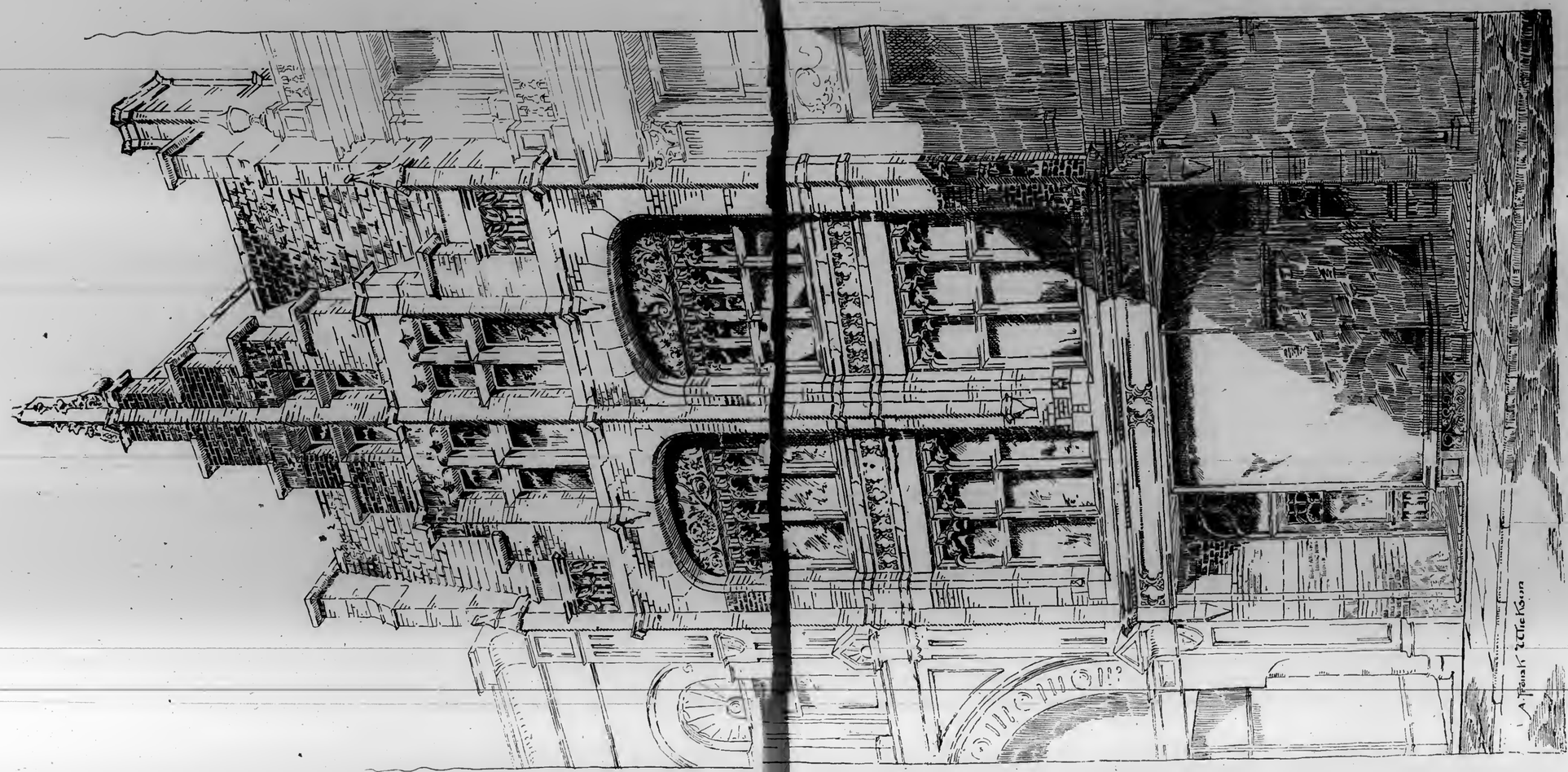
BEAUTIFUL, Ornamental and Decorative Wood-Work, for Doors, Transoms, Arches and Windows, known as MOORISH FRET-WORK, is manufactured (only) by
C. S. RANSOM & CO.,
CLEVELAND, OHIO.
New York Office, - 10 West 28th Street.
There is no limit of design into which this work can be made. It is made of any domestic or imported woods, finished natural, stained, or in white and gold or bronzes. All leading decorating, drapery or furniture houses will supply you. Patented as an article of manufacture, September 15, 1885.

BANK OF MONTREAL, MONTREAL, QUE.

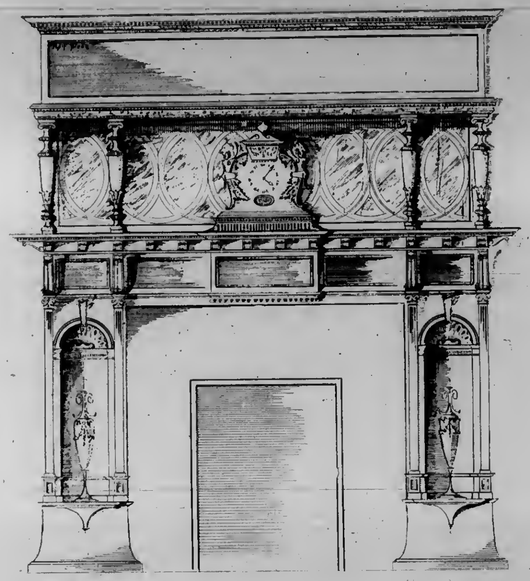


SUPPLEMENT TO
CANADIAN ARCHITECT AND BUILDER

MR. JOHN WELLS,
Architect



"Elgin Block," Yonge Street, Toronto.
Dick & Wickson, Architects.



Mahogany Mantelpiece. *Fred. Wright.*

WRIGHT & CO.,

Manufacturers and Designers of

ART WOODWORK

MANTELPIECES, ECCLESIASTICAL FURNITURE,

OFFICE AND BANK FITTINGS,

Designs and Quotations on application.

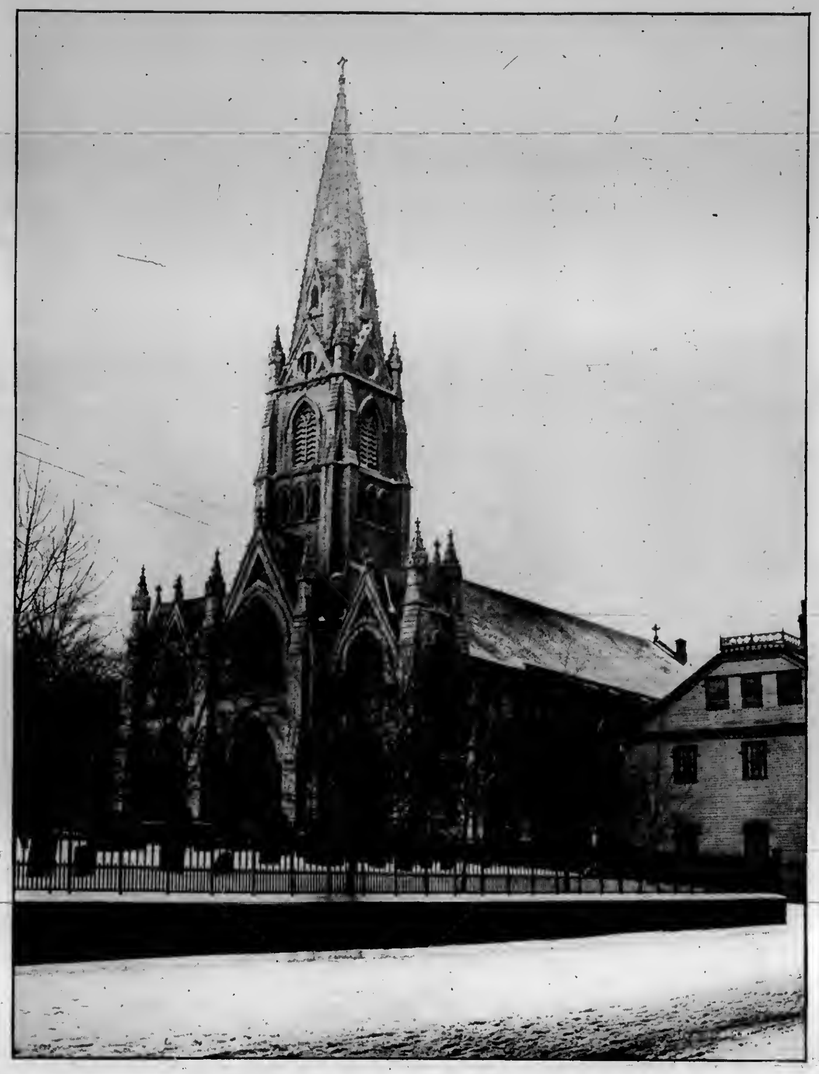
GRANGE AVE. AND ESTHER STREETS,

TORONTO.

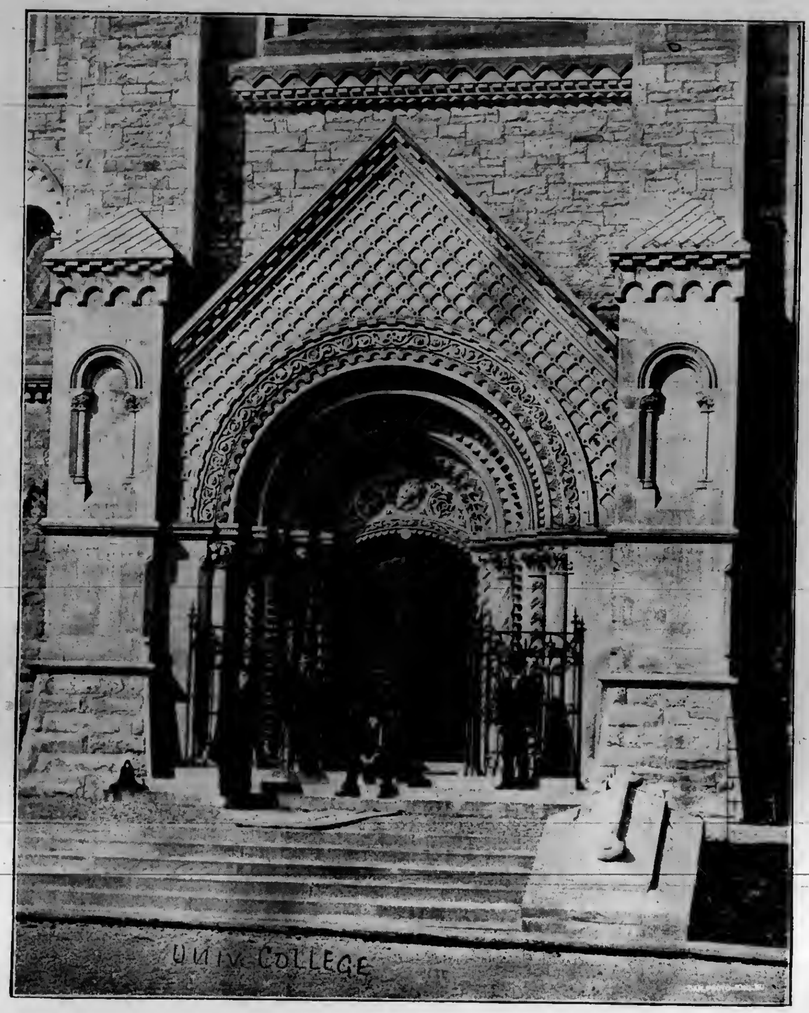
For Refitting for rooms and Art Furniture, apply to

WRIGHT & CO.

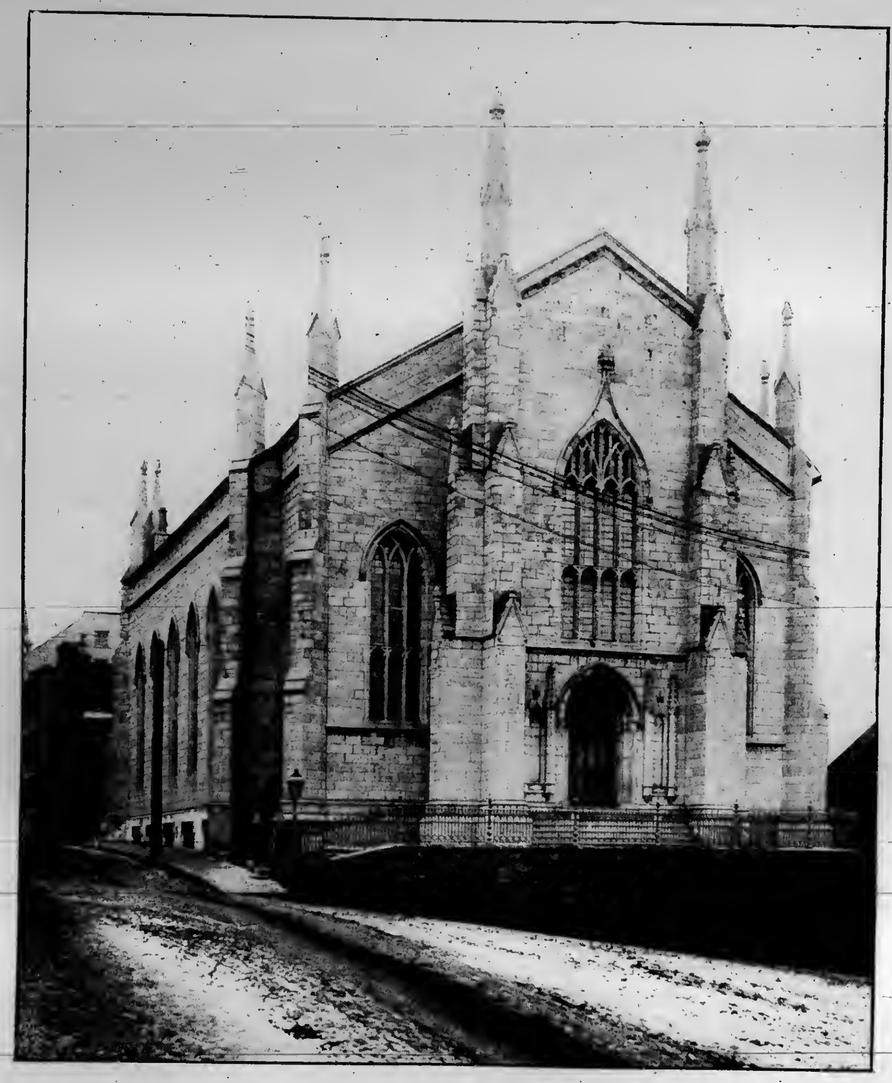
Bank of Montreal, Hamilton, Ont.



St. Mary's Cathedral, Halifax, Nova Scotia.
Mr. McCarthy, Architect, New York.

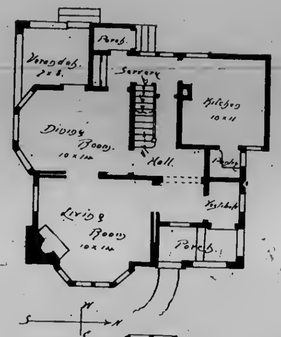


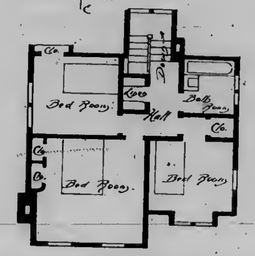
Entrance of University College, Toronto,
Cumberland & Storm, Architects.



Methodist Church, Quebec.

Edward Staveley, Architect.

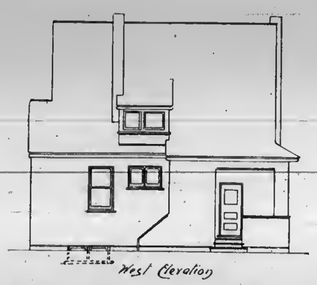




Bed Room Floor.

North Elevation

South Elevation



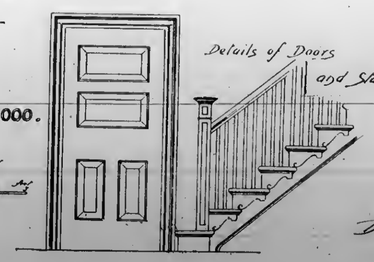
West Elevation

- DESIGN FOR A TOWN COTTAGE -

TO COST FROM £1500 TO £2000.

Scale for plans

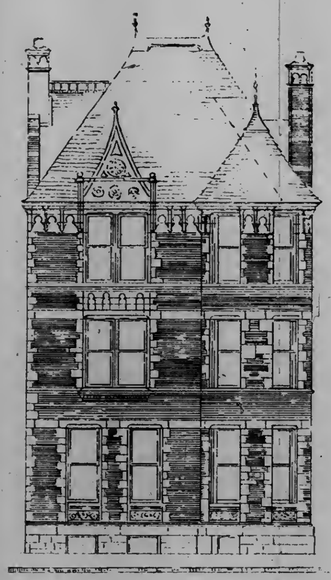
Scale for details



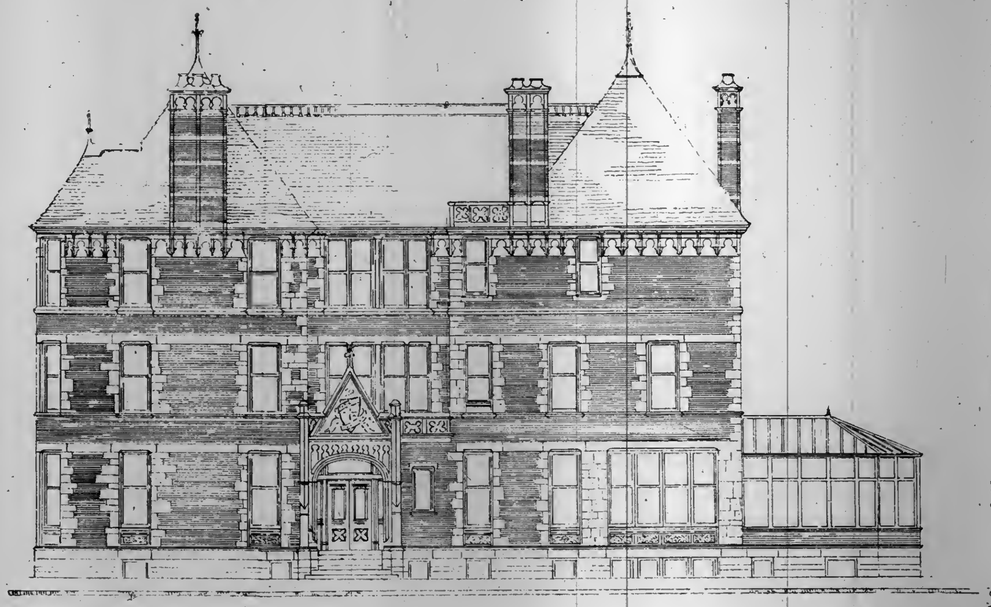
Details of Doors and Staircase.

Demos

"Canadian Architect & Builder" Competition
for a City House. Design by "New Year"

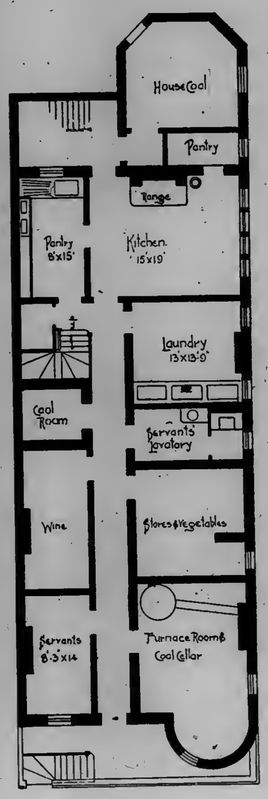


South Elevation



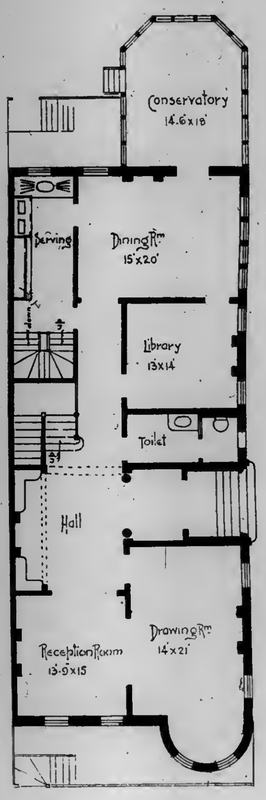
East Elevation

Scale:- 1/8"=1ft.



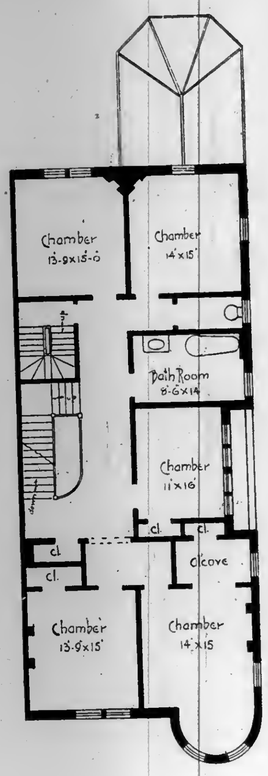
Basement Plan

Scale:- 1/8" = 1ft



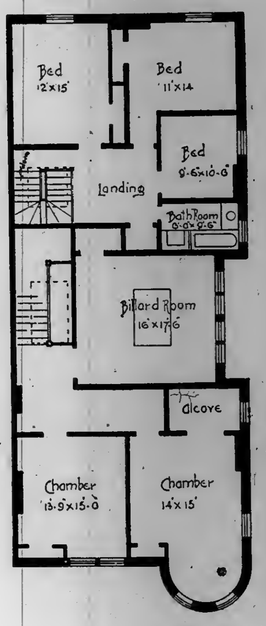
Ground Floor Plan

"Canadian Architect & Builder" Competition.
for a City House. Design by "New Year."



First Floor Plan

Scale:- 1/8" = 1ft.



Second Floor Plan

CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—No. 11. TORONTO AND MONTREAL, CANADA, FEBRUARY, 1893. PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
64 TEMPLE BUILDING, - MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	D. B. DICK, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	JOHN E. BELCHER, Peterboro'.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

FRANK DARLING,	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
W. A. EDWARDS	Hamilton.
S. G. CURRY	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1892.

PRESIDENT	V. ROY, Montreal.
1ST VICE-PRESIDENT	J. NELSON, Montreal.
2ND VICE-PRESIDENT	H. STAVELEY, Quebec.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
J. J. BROWNE	Montreal.
J. HAYNES	Montreal.
D. OUELLET	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
GEO. MOIR, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JOHN ALDRIDGE.
WM. PARK.
JAS. CRANG.
WM. J. HILL.
WM BOOTH.

JOHN L. PHILLIPS, Secretary.

WE have received many compliments from subscribers and advertisers upon the character of the New Year Number of the ARCHITECT AND BUILDER published last month, for which we return our sincere thanks.

SOME Toronto architects and contractors, acting upon the suggestion printed in these columns soon after the conflagration which destroyed the city of St. John's Nfld., have visited the colony, and secured a considerable amount of work. Canadian manufacturers are also supplying large quantities of materials, which are being employed in the rebuilding of the city.

REPRESENTATIVES of the Toronto Builders' Exchange recently waited upon the members of the Ontario Government and presented arguments in support of needed amendments to the Mechanics' Lien Act. It is to be hoped that at the coming session of the Legislature an effort will be made to simplify the Act and render more equitable its provisions.

THERE is reason to protest against the unfair treatment which is frequently accorded to non-resident contractors who, in response to public advertisements inviting tenders, submit bids for municipal works. A thoroughly responsible contractor of Hamilton recently sent in the lowest tender for the supply of certain iron pipe required by the city of Toronto, and was given the contract. Subsequently, we believe, a pretext was found for taking the work from him and giving it to a local firm. Since then a contract for paving has been awarded to a Toronto contractor by the Board of Works of Hamilton, and pressure is being brought to bear on behalf of local contractors with the object of depriving him of it. This is a most unjust way of doing business. Either let it be publicly understood that no outside contractor need expect to get the work, regardless of what may be his ability to perform it as satisfactorily and at less cost than local contractors, or else let each tender, by whomsoever submitted, be considered entirely on its merits. Circumstances should in most instances enable the local contractor to the work more cheaply than an outsider, but if notwithstanding this advantage, the estimate of the outsider should be the lowest, and his ability to carry out the work equally unquestionable, he most certainly should receive the contract.

THE question as to the best course to be pursued in the erection of the new city and county buildings in Toronto, has been under the serious consideration of the City Council and the architect for several weeks past. The Council have been advised by their solicitor that they are powerless under the terms of the contract to interfere in any way with the architect in any course of action which he may see fit to pursue. On the other hand the opinion is expressed that so long as the city authorities refrain from attempting to direct the architect's course, no responsibility will attach to the city for his conduct. The city's solicitor deems it improbable that the courts would in any event order that the present contractor for the work be entrusted with its completion, but that he should be otherwise compensated for any damages to which he may be found to be entitled. The Council at their last meeting adopted a resolution in which the opinion was expressed, that while fully protecting the interests of the city, the architect should at once take such steps as would insure the resumption of building operations at the earliest moment in the spring. The situation undoubtedly requires the most cautious procedure on the part of the architect in order to avoid the

possibility of expensive complications. Before the publication of our March number the Courts will probably be engaged on the evidence in the dispute between the architect and the contractor.

THE third annual convention of the Ontario Association of Architects, the proceedings of which *in extenso* are printed in this paper, was the most important that has tak n plaee since the time of organization. Questions of vital importance to the welwelfare and even to the existence of the Association called for consideration. One of the most important related to the dissatisfaction of the country members, as expressed in their petition to the Council, with the amount of the annual fees. In the petition referred to they pointed to the surplus of nearly $2,000 standing to the credit of the Association in the bank, as evidence that the fees were unnecessarily high. Another question of much importance was that concerning the action which should be taken to induce the Ontario Legislature to amend the Architects' Act by striking out the word "registered" which at present appears in the Act in conjunction with the word "architect." In an ably constructed opening address the President considered at length these and other matters affecting the Association, and suggested the manner in which he thought they should be dealt with. The comprehensive and reasonable views expressed in this address, coupled with the fact that all reports concerning matters to be brought before the convention were, for the first time, placed in the hands of members in printed form at the opening of the meeting, had, no doubt, much to do with the very full and intelligent discussions which followed, and with, as we believe, the wise conclusions arrived at. It is somewhat difficult to account for the fact that only a small proportion of those who petitioned for a reduction in the fees were present at the convention to take part in the consideration of the question which they had been the means of introducing. There is every reason to expect that the conclusion reached with regard to this matter, will prove to them satisfactory, but should it unfortunately be otherwise, they should have no difficulty in deciding that to their own neglect is due the blame. The fees as altered would seem to be as low as could be adopted without impairing the financial standing of the Association. Time will no doubt prove the wisdom of the decision to fix the fees at definite amounts for every year rather than allow them to fluctuate from year to year according to circumstances. As to the return which outside members may receive for the fees which they are called on to pay, the benefits to be derived from a liberal use of the Association Library should alone be considered worth the expenditure. The additions which the Council have been authorized to make to the Library will render it increasingly valuable, and members would do well to take advantage of it to a greater extent than formerly. The result of the steps which are being taken to secure the amendment of the Architects' Act in the particular already mentioned, will be awaited with no little anxiety, as upon it must largely depend the future success and usefulness of the organization. The members throughout the country should lose no time in endeavoring to enlist the support of their representatives in the Legislature on behalf of the amendment. The object sought can be most efficiently promoted by this method, and at least cost. The formation of Chapters in various parts of the province, as suggested by Mr. Gregg, would, if practicable, prove most beneficial, but the experience of those who have tried the experiment, throws doubt on the probabilities of success. It might be worth considering whether interest in the Association would not be promoted by sometimes holding the meetings elsewhere than in Toronto—as for example, in Ottawa, Hamilton or London. The printed result of the tests of Canadian building stones made last year at the School of Practical Science, Toronto, under the direction of the Association, as presented by Mr. Townsend, chairman of the committee entrusted with the oversight of the work. They form a valuable feature of the proceedings, and must prove of great assistance to architects and builders. It is to be hoped that additional specimens of native stones may be tested, and also that similar tests may be applied to the varieties of native woods and other materials which enter into architectural and engineering work, in order that exactness of knowledge might characterize their use. A retrospective view of what the Association has already accomplished, despite the disadvantages under which it has had to labor, and consideration of the many directions in which it might do valuable service on behalf of the profession and the public in the future, should assure to it at this critical period in its history the wisest counsel and earnest support of every architect in the Province.

ILLUSTRATIONS.

DESIGN FOR AN $800 COTTAGE.

This cottage is designed to face south, and comprises a kitchen and a living room (or parlor and dining room combined) together with three bedrooms. It is purposed to be constructed of frame on a stone foundation, and to have excavation under kitchen for cellar. External walls and roof are intended to be shingled, and the interior to be lathed and plastered throughout.

DESIGN FOR CONCERT HALL AND COLLEGE OF MUSIC.—G. F. STALKER, ARCHITECT, OTTAWA, ONT.

ST. BASIL'S NOVITIATE, TORONTO.—POST & HOLMES, ARCHITECTS, TORONTO.

C. A. & B. COMPETITION FOR A CITY HOUSE—DESIGN BY "ETUDIANT" (MR. J. EUGENE PAYETTE, MONTREAL) AWARDED SECOND POSITION.

TORONTO BUILDERS' EXCHANGE.

The annual meeting of the Builders' Exchange, of Toronto, took place on Wednesday, January 18th. The following were present:

Messrs. Wm Hill, Curtis & Rowe, J. Lister Nicholls, Wm. Booth, James Crang, D. Williams, Jno. Aldridge, Wm. Pears, Wm. Britnell, Jno. Brodigan, M. Murphy, Jno. Hanrahan, Wm. Park, Wickett Bros., J. Isaac, Bayliss & McCurdy, Jno. Price, Isaac Price, Geo. W. Gore, H. Martin, Benj. Brick, R. Robertson, Geo. Moir, Mr. Richardson, W. J. Burroughes, R. Hewitt, Oakley & Holmes, Mr. Fox, Geo. Wright, F. Lockwood, R. Chalkley, Wm. Wood, Jas. Priestley, Jas. Pears, A. E. Smythe, Jno. Maloney, M. Vokes, Jno. M. Gander, W. R. Simmons, Robt. Whittam, Jos. Brown, E. Farquhar, T. W. Self, Samuel Young and John Barnard.

The President, Wm. J. Hill, took the chair at 3 o'clock. The Treasurer's report showed the finances to be in a very satisfactory condition. The report of the Secretary showed a membership of 146, divided as follows: Brick Manufacturers' Section, 25 members; Masons' and Builders' Section, 68 members; Cut Stone Section, 14 members. The remaining members comprise carpenters, plasterers, plumbers, stone merchants and dealers in lumber, sewer pipes and cement, etc., who have not yet organized into sections. The Board of Directors had held 36 meetings during the year, and the Finance Committee met nine times. Attention was called to the fact that the by-laws had been amended so that, when necessary, disputes between members and the expense of litigation might be avoided.

The election of officers was then proceeded with. The name of Wm. J. Hill was proposed for re-election as President, but Mr. Hill stated that his duties in the City Council would prevent him giving the time necessary for the performance of the duties of the position.

The following officers were duly elected: Wm. Pears, President; Geo. Moir, 1st Vice-President; Geo. Oakley, 2nd Vice-President; David Williams, Treasurer; Wm. J. Hill, James Crang, Wm. Park, Jno. Aldridge, Wm. Booth, Directors.

The Board of Directors will further be increased by one representative from each Section of the Exchange. Wm. J. Hill then vacated the chair, and Mr. Wm. Pears upon taking his seat as President, thanked the Exchange for the honor conferred on him, and asked for the assistance of all the members in carrying forward the work of the Exchange.

A very hearty vote of thanks was tendered Mr. Hill, the retiring President, for the very able manner in which he had performed his duties. Mr. Hill responded in suitable terms, and the meeting then adjourned.

LEGAL DECISIONS.

ROBERT A. BALLOCH v. FRANKLIN H. HOOPER.—Where one borrows money to erect houses upon land belonging to him and conveys the land before the houses are finished to another, and the latter borrows other moneys to finish the houses from the same company who loaned to the former, all which moneys are secured by deeds of trust, in an action by the first owner against the second and the company which loaned the money for an accounting, &c., such company is entitled to a lien upon the property to secure the payment of all moneys advanced by it, says the Supreme Court of the United States.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Of the 34,455 houses standing this year in Montreal, 25,774 are built of brick, 5,482 of stone, and 3,118 of wood.

Mr. John J. Macdonald, one of the most prominent railroad contractors in Canada, died at the St. Lawrence Hall hotel, in this city, on the 12th inst. Mr. Macdonald was of late years a partner in the well-known firm of Manning, Macdonald, McLaren & Co., who built Section B. of the C. P. railroad on the north shore of Lake Superior, a most difficult piece of work. Mr. Macdonald was highly esteemed in business and social circles.

A board of arbitrators awarded $16,308 damages to the Trustees of Calvary Congregational Church, against the Atlantic and Northwest Railroad Co., on account of loss alleged to have been sustained in depreciation in the value of their property by reason of the running of trains close to their property since the railroad obtained its entrance to the Windsor street depot. The Superior Court has reduced the award to $1,367, refusing to allow damages except for the right of which the church had been deprived to build over a lane, and for deprivation of light and air. An appeal has been taken by the trustees from this judgment, and the decision is expected to be given on the 28th inst.

AT the last monthly meeting of the resident members of the Province of Quebec Association of Architects, Mr. Joseph Veuve gave an address on "Archæology in its Relation to Architecture." The benefits accruing from the study of archæology, in freeing the student of architecture from narrowness of ideas, were dwelt upon. The paper was a most interesting one, and evoked considerable discussion. Mr. Taylor promised on his own behalf and that of other members of the Association to deliver lectures before the students during the winter, provided those for whose benefit the proposal was made, would show by their attendance that they were desirous of being thus instructed. The bill concerning laborers, mechanics and contractors, which is to be presented at the next session of the Legislature, was also discussed, and the opinion of the Association was that laborers and mechanics were quite sufficiently protected under the present code, and that no further protection should be furnished, as it would lead to fraud and would encourage the growth of an irresponsible class of contractors.

AN IMPORTANT POINT AFFECTING BUILDERS AND ARCHITECTS IN THE PROVINCE OF QUEBEC.

An action was brought against the Royal Electric Co. to recover $325 for rebuilding a chimney which had been constructed a short time previous by plaintiff, and had fallen. The plaintiff alleged and proved that the defect in the construction was owing to the defective plan furnished him by defendant's architect. The Court held, however, that this did not exonerate the plaintiff from responsibility, that the law made him jointly and severally liable with the architect for the loss, and dismissed his action. This rule of responsibility appears to be hard, but it has been long settled on principles of public policy, and is or should be known to every builder, who must contract therefore with reference to it. If any one does not wish to assume the full responsibility imposed by the law he should have an express provision inserted in his contract to exclude or modify his responsibility. The decision was based upon the following Articles of the Civil Code, which are declaratory of the law of the Province of Quebec:—Art. 1688—If a building perish in whole or in part, within ten years, from a defect in the construction, or even from the unfavorable nature of the ground, the architect superintending the work and the builder are jointly and severally liable for the loss. Art. 1689.—If in the case stated in the last preceding Article, the architect do not superintend the work, he is liable only for the loss which is occasioned by defect or error in the plan furnished by him. After ten years architects and contractors are discharged from the warranty of the work they have directed or done.

USEFUL HINTS.

Granite is the lowest rock in the earth's crust. It is the bed rock of the world. It shows no evidence of animal or vegetable life. It is from two to ten inches as thick as the united thickness of all other rocks. It is the parent rock from which all other rocks have been either directly or indirectly derived.

A Pacific coast journal says: It is a well known fact among car and bridge builders that Douglas fir is stronger than white oak and will last fully as long. Tests bear out the assertion. A recent test was made at the Northern Pacific car shops, Tacoma, with a piece of fir and one of white oak. Both pieces were of the same length, width and thickness. By laying the two pieces with the end on a piece of iron and putting weights in the centre, it was found that the white oak broke, while the fir sustained one-quarter more weight without showing signs of breaking. In a test for end breaking the white oak showed its superiority on account of its fine, close grain. Therefore, where fir can be used flat, it is stronger than oak; but where the timbers are to be used in the shape of pile drivers or battering-rams, oak or other fine-grained woods are best.

TO DARKEN OAK.—Oak for decorative wood work is produced by fumigating the material with ammoniacal vapor, which effectively produces the dark coloring so much desired. In accomplishing this, the method consists in placing the material to be darkened in an approximately air-tight room in which no light enters; or for small work a packing box will suffice, the joints or cracks to be well pasted over with paper. In this room or receptacle for depositing the furniture or other article is placed a flat porcelain or earthen vessel filled with ammonia, the vessel containing the liquid being, of course, set on the ground or floor, that the fumes or vapor may strike to advantage the articles to be darkened; if the apartment is large, two or more vessels containing ammonia may be employed and allowed to remain until the desired effect is secured. The ammonia does not touch the oak, but the gas that proceeds from it acts in a peculiar manner upon the tannic acid contained in oak, browning it so deeply that a shaving or two may actually be taken off without removing the color. The depth of shade depends upon the quantity of ammonia used and the duration of exposure.

BAY WINDOWS AND ORIELS.

The distinction between a bay and an oriel is as follows: By the former is understood a projecting window, or rather a projection pierced with window opening in its entire width and rising immediately from the ground, whether it be confined to the lower part of the building or carried up through one or more stories above the ground floor; by the latter a bay which does not descend to the ground, but is suspended over the face of the wall beneath it. Oriel accordingly corresponds with the German terms *Erker-fenster* and *Bhor-fenster*, which are almost the only ones of similar import in any foreign language. This absence of a name for it is accounted for by the thing itself being scarcely known in the architecture of other countries, and in our own it occurs only in our Domestic Gothic or Tudor, such form of window being very rare indeed in ecclesiastical structures. In our Domestic, which also comprises collegiate architecture it is, a beautiful and valuable feature, and one which admits of very great diversity of design and also imparts much variety and liveliness of effect to a building, more especially if there be ground bays likewise, the two kinds of projection both harmonizing and contrasting with each other. Internally there is no distinction between bays and oriels inasmuch as both the one and the other form a recess whose sides are filled with windows. But greater variety of plan occurs in oriels than in bays, which are usually more spacious as to breadth and of shallower proportions as to depth; they are also either rectangular in plan, or form three sides of an octagon, whether a regular one or not, whereas curved forms are of frequent occurrence in the plans of oriels and are occasionally combined with straight ones. Yet as similar plans do occur in bays no real distinction can be found upon such accident of design.—*Architect.*

BORED MOLDING.

Hardwood, a Chicago lumber trade paper, suggests that hardwood moldings would be much more popular if they were bored for nailing, similar to the way hardwood flooring is now bored by many first-class mills. It says: A great deal of stained softwood molding is used, simply because it is so easy to fasten in place, when hardwood would be preferred and would be used but for the extra work required in using it, much hand boring and the most careful nailing being necessary to prevent splitting. Maple makes a beautiful molding in connection with certain kinds of finish, but it is almost impossible to fasten it without boring to prevent splitting. This is especially true of the cleanest and whitest of soft or white maple. Much oak, both white and red, also requires boring, while chestnut, which is very desirable from its lightness and close resemblance to oak, should always be bored for every nail. Black walnut will always pay for the extra trouble even of the expensive hand boring, and such cheap and common woods as gum and basswood will be found to pay for boring, as would Norway and yellow pine. A competent machinist declares that a machine for boring can be attached to the sticker or regular molding planer, so that the stock will require no extra handling, and that can be made adjustable to any width of molding or any sized bit or any length of space between holes, varying from the finest cabinet stock to the ordinary house trim or picture molding. House trimmers and cabinetmakers are ready to welcome the first bored stock offered. They know and realize the benefit such a thing would be to them. Who will be the first to advertise molding with the catching alliterative phrase of the flooring men, "bored, butted and bundled?"

A sketch for a Canadian cottage, by Mr. Ernest Willby, late of Toronto, appeared in the London *Building News* of Nov. 18th.

The medal offered by the *Painters' Magazine* to the pupil of the painting class of the New York Trades Schools has been awarded to William H. Leacock, of Westport, Ont.

TESTS OF BUILDING STONES.

WE present below the result of the tests of building stones conducted last year at the School of Science, Toronto, under the direction of the Ontario Association of Architects, together with the report thereon of the Committee appointed to conduct the tests. This Committee was composed of the following members of the O. A. A.: Messrs. S. H. Townsend, W. G. Storm, D. B. Dick, E. Burke and S. G. Curry, Mr. Townsend being the Chairman. The Committee was assisted by Professors Galbraith and Coleman, Messrs. Wright and Rosebrugh, of the School of Science. We publish also several illustrations, taken from photographs, showing the appearance of some of the most perfect specimens at point of fracture.

TORONTO, JANUARY 31st, 1893.

To the President and Council of the Ontario Association of Architects:

GENTLEMEN:—

I have the honor on behalf of your Committee to lay before you the results of the tests of building stones, lately conducted at the School of Practical Science.

The stone to be tested was first sawn into cubes, then set in plaster of Paris in a steel frame made for the purpose, and brought to perfectly parallel faces by rubbing.

In placing the specimens in the machines care has been taken that the pressure was always applied at right angles to the natural or quarry bed of the stone.

Specimens of all the stones tested have been preserved, and a complete set of these, together with all data connected with the tests, including in most cases photographs of the stones broken, will be kept at the School of Practical Science and at the office of the Association, for the benefit of those wishing further details.

Very truly yours,

S. H. TOWNSEND,
Chairman of Com.

No. 1.

Connecticut Brown Sandstone from the Middlesex Quarry Co., Portland, Connecticut. Supplied by Messrs. Brown & Love.

SANDSTONE, medium grained, purplish brown, consists of quartz grains, with some grains of felspar, and many scales of white mica. Very slight effervescence with acid.

Specimen.	Section under Pressure.	Height.	Crushing Load.	Crushing Stress per Sq. In.	Average Crushing Stress per Sq. Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 1/8 x 3	2 7/8	89,000	9,493	
B	3 1/8 x 3	2 7/8	92,000	9,813	
C	2 7/8 x 3 1/8	2 7/8	78,000	8,858	
D	2 7/8 x 3	2 7/8	64,000	7,420	8,896

No. 2.

Stone from the "MONO" Quarry, owned by the Owen Sound Stone Co., and situated two and a half miles north of Orangeville, Ont.

SANDSTONE, very fine grained, pale greenish grey. Effervesces slightly with acid, showing presence of carbonates. The stone is in beds of from one to four feet thick and can be got out in large sizes. It has to be teamed to Orangeville Station.

Specimen.	Section under Pressure.	Height.	Crushing Load.	Crushing Stress per Sq. In.	Average Crushing Stress per Sq. Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 1/8 x 3	2 1/4	139,600	15,194	
B	3 1/8 x 3	2 1/4	130,000	13,866	
C	2 1/8 x 3	2 1/4	114,000	13,155	
D	3 x 3	2 1/4	131,000	14,555	14,192

No. 3.

Credit Forks Brown Stone, from Carroll & Vick's No. 2 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. In.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	2 7/8 x 3	2 7/8	131,000	15,188	
C	2 1/8 x 3	2 7/8	130,000	14 751	
D	3 x 3	2 7/8	133,000	14,777	14,905

No. 4.

Stone from the St. John's Quarries, Longford Mills, owned by Messrs. A. McPherson & Co.

LIMESTONE, compact, with some fissures, pale grey, effervesces strongly with acid. The stone is in beds of from 6 inches to 2 feet, and may be loaded upon cars in quarry.

Specimen.	Section under Pressure.	Height.	Crushing Load.	Crushing Stress per Sq. In.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	2 7/8	200,000	22,222	
B	3 1/8 x 3 1/8	2 7/8	210,000	22,390	
C	.....	.....	.....	.....	
D	3 x 3	2 7/8	175,000	19,444	21,352

No. 5.

Stone from the Hope Bay Quarries, owned by Messrs. Wm. Hooson & Sons, Plumper Pass, B.C.

SANDSTONE, medium grained, with some larger grains, bluish grey. Contains quartz, with some felspar and mica, and probably hornblende. Effervesces slightly with acid. The stone is in parallel beds of from two to ten feet, and can be loaded on scows or light draught vessels at the Quarry, which is situated on the North shore of Pender Island, about midway between Victoria, Vancouver, and New Westminster.

Specimen.	Section under Pressure	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 1/8 x 3	2 1/4	200,000	21,768	
B	.....	.....	.....	.....	
C	2 1/8 x 3	2 1/4	186,000	21,106	
D	3 1/8 x 3 1/8	2 1/4	176,000	18,765	20,546

No. 6.

Stone from the Parrsboro Marble Quarry, owned by Mr. Thos. Kirkpatrick, and situated two miles west of Parrsboro, N.S.

LIMESTONE, very fine grained, dark grey (almost black), on fresh surface, bituminous odor when struck, effervesces strongly with acid. The stone is in beds of from four inches to two feet, and must be teamed to Parrsboro, where it can be shipped either by rail or water.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	2 1/8 x 3 1/8	2 1/4	199,000	22,120	
B	3 x 3 1/8	2 1/4	200,000	21,768	
C	2 1/8 x 3	2 1/4	189,000	21,446	
D	3 x 3	2 1/4	195,000	21,666	21,750

No. 7.

Rain Drop Stone, from Fuerst, New & Co., Chicago. Supplied by Messrs. Brown & Love.

SANDSTONE, medium grained, with a few pebbles 1/4 inch in length, pale purplish brown with many darker colored spots. Contains quartz, felspar, and a green mineral, also some scales of mica. A whitish cement in the lighter portions. Argillaceous odor.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	2 1/4	52,000	5,777	
B	2 1/8 x 3	2 1/4	51,000	5 787	
C	3 x 3	2 1/4	53,000	5,888	
D	3 x 3	2 1/4	52,500	5,833	5,821

No. 8.

Corsehill (Scotland) Red Sandstone. Supplied by Messrs. Brown & Love.

SANDSTONE, very fine grained, brick red. Components hardly distinguishable with lens. Argillaceous odor, effervesces very slightly with acid.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	2 3/4	136,000	15,111	
B	2 1/8 x 3	2 3/4	150,000	17,461	
C	3 x 3	2 3/4	143,000	15,888	
D	3 1/8 x 3	2 3/4	144,000	15,674	16,033

No. 9.

Ohio Blue Sandstone "BEREA." From the Cleveland Stone Co., Cleveland, Ohio. Supplied by Messrs. Brown & Love.

SANDSTONE, fine grained, pale grey, consists of quartz grains with yellow and black particles, probably oxides of iron. Argillaceous odor.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds	Pds.
A	3 1/8 x 3	2 3/4	79,000	8,598	
B	3 1/8 x 3 1/8	2 3/4	92,000	9,810	
C	3 x 3 1/8	2 3/4	92,000	10,116	
D	3 x 3	2 3/4	99,000	11,000	9,881

No. 10.

Ohio Buff Sandstone. From the Cleveland Stone Co., Cleveland, Ohio. Supplied by Messrs. Brown & Love.

SANDSTONE, fine grained, pale brownish grey or buff. Contains quartz, some felspar, and mica, and a rusty iron oxide in small particles.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	2 3/4	68,000	7,555	
B	3 1/8 x 2 1/8	2 3/4	68,000	7 406	
C	3 1/8 x 3 1/8	2 3/4	77,000	8,209	
D	3 x 3	2 3/4	80,000	8,888	8,014

No. 11.

Stone from the Dorchester Union Freestone Co., Wallace, N.S. Supplied by Messrs. Brown & Love.

SANDSTONE, fine grained, greenish grey. Grains of quartz, with a good deal of felspar and other decomposed silicates, clayey cement.

Specimen.	Section under Pressure.	Height.	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	2 3/4	96,000	10,666	
B	3 1/8 x 3 1/8	2 3/4	100,000	10,662	
C	3 x 3	2 3/4	95,000	10,555	
D	.....	.....	.....	.....	10,628

No. 12.

New Brunswick Brown Sandstone, supplied by Messrs. Brown & Love.

SANDSTONE, rather coarse grained, purplish brown. Contains quartz with much felspar, and a green silicate; also few scales of mica. Strongly argillaceous odor, effervesces with acid in spots.

Specimen.	Section under Pressure.	Height.	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 2 1/8	2 3/4	68,000	7,716	
B	3 x 3 1/8	2 3/4	62,000	6,748	
C	3 x 3 1/8	2 3/4	68,000	7,401	
D	3 1/8 x 3 1/8	2 3/4	65,000	6,930	7,198

No. 13.

Stone from the Anderson Quarries, owned by Mr. Thos. B. White, Gordon P. O., and situated two miles from Amherstburg on the M.C.R.R., and three-quarters of a mile from the Detroit River.

DOLOMITIC LIMESTONE, very fine grained, pale buff or yellowish brown, contains grains of quartz, effervesces somewhat with cold dilute acid. The stone is in beds of from three inches to five feet, and can be handled in large sizes.

Specimen.	Section under Pressure.	Height.	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	2 1/4	86,000	9,555	
B	3 x 2 1/8	2 1/8	89,000	10,548	
C	3 1/8 x 3 1/8	2 1/8	85,000	9,062	
D	3 x 2 1/8	2 1/8	78,000	8,851	9,504

No. 14.

Stone from Six Mile Brook Quarry, owned by Mr. Robert L. Elliott, Stillmann P. O

SANDSTONE, very fine grained, greenish grey. Contains grains of quartz with a large amount of green and brown silicates, a little mica, and a few fragments of garnet. The stone is in beds of from two to six feet thick, and has to be teamed ten miles to ship by rail or water.

Specimen.	Sections under Pressure.	Height.	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 2 1/8	2 3/4	76,000	8,624	
B	3 1/8 x 3	2 3/4	89,000	9,687	
C	3 1/8 x 3	2 3/4	96,000	10,448	
D	3 x 3	2 3/4	92,000	10,222	9.745

No. 15.

Stone from the Montreal and Russel Street Quarry, Kingston, owned by Mr. W. S. Shuffiebotham, 466 Montreal Street, Kingston, Ont.

LIMESTONE, compact, pale bluish grey, effervesces strongly with acid. Stone in beds of from two to twelve inches, and can be obtained in large sizes.

Specimen.	Section under Pressure.	Height.	
	Ins.	Ins.	
A	2 7/8 x 3 1/8	2 7/8	These stones all stood a pressure of 200,000 lbs. without crushing. B was cracked.
B	2 1/8 x 3	2 7/8	
C	3 1/8 x 3	2 7/8	
D	3 x 3 1/8	2 7/8	

No. 16.

Stone from the Rama Limestone Quarry, owned by Mr. W. R. Seadding, Longford Mills.

LIMESTONE, compact, with some crystals of calcite, pale bluish grey, somewhat flawed with veins of calcite; effervesces strongly with acid. Stone in beds of 4, 6, 8, 9, 11, 12, 14, 16, 18, 24, 27 and 28 ins., and can be obtained any size up to six feet square. The Grand Trunk Railway runs through the quarry. Specimens prepared by owner.

Specimen.	Section under Pressure.	Height.	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	3	78,000	8,666	
B	3 3/32 x 3 1/8	3	132,000	14,219	
C	3 x 3	3	116,000	12,889	
D	3 3/32 x 3 1/32	3 3/32	64,000	6,967	10,685

No. 17.

Pelee Island Limestone, supplied by Messrs. Brown & Love.

LIMESTONE (probably somewhat dolomitic), very fine grained, pale buff or yellowish brown, effervesces somewhat with cold dilute acid.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Sq. Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	2 1/8	61,000	6,777	
B	3 1/8 x 3 1/8	2 1/8	72,000	7,676	
					7,226

No. 18.

Stone from the Queenston Limestone Quarries, owned by Messrs. P. A. Johnson & Co., Queenston.

LIMESTONE, rather fine grained, pale grey, effervesces strongly with acid. The stone is in beds of from one to five feet, and can be handled in large sizes. May be shipped on G. T. R. cars in quarry, or by water, 1½ miles from quarry.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Sq. Inch.
	tns.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	2 1/8	134,000	14,888	
B	3 x 3	2 1/4	122,000	13,555	
C	3 x 3 9/16	2 1/4	135,000	14 694	
D	3 x 3	2 1/8	130,000	14,444	14,395

No. 19.

Stone from the Victoria Limestone Quarry, Cookston, North Hastings, owned by Messrs. Brodigan & Co., Madoc, Ont.

LIMESTONE, very fine grained, with some crystals of calcite, rather dark grey, slightly brownish on fresh surface, bluish grey on dressed face, slightly bituminous, effervesces strongly with acid. Stone in beds of 6, 10, 12, 14, 16, 18, 20, 24, 28, 38 and 48 inches, and can be got out in any sizes possible to handle. Quarry on main line of G.T.R.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	2 1/8	183,000	20,333	
B	3 x 3 1/8	2 1/8	147,000	16,000	
C	.....	.....	.....	.....	
D	2 3/4 x 3	2 1/8	181,000	21,939	19,424

No. 20.

Red Granite. Red Granite Co. From the New Brunswick Red Mr. F. T. C. Burpee, Manager, St. John, N.B.

GRANITE (var. Granitite or Biotite Granite), coarse grained, strong flesh red, appears fresh and takes a good polish. Contains quartz (grey), orthoclase (red), plagioclase (yellow), and biotite (black). Specimens prepared by owner.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	2 1/8 x 2 1/8	2	68,000	13,837	
B	2 1/8 x 2 1/8	2 1/8	84,000	17,568	
C	2 1/8 x 2 1/8	2 1/8	69,000	13,629	
D	2 1/8 x 2 1/8	2	79,000	15,617	15,162

No. 21.

Grey Granite from the New Brunswick Red Granite Co., Mr. F. T. C. Burpee, Manager, St. John, N.B.

GRANITE, (var. Granitite), medium grained, grey, fresh looking. Contains quartz, orthoclase in greyish white, slightly porphyritic crystals, black biotite, and some reddish brown titanite. Specimens prepared by owner.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	2 1/8 x 2	2 1/4	69,000	16,235	
B	2 1/8 x 2 1/8	2 1/4	68,000	15,059	
C	2 x 2 1/8	2	79,200	18,635	
D	2 1/8 x 2 1/8	2	61,000	13,917	15,961

No. 22.

Grey Granite from the Stanstead Quarry, owned by Mr. James Brodie, Lineboro, P.Q.

GRANITE (var. Granitite), rather coarse grained, grey, fresh looking. Contains quartz, white orthoclase, white plagioclase, greenish black biotite, and a trace of pyrite. Stone in beds of from one to ten feet, and can be obtained any size up to 40 feet long. Specimens prepared by owner.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	
A	.....	.....	.....	.....	
B	2 1/4 x 2 1/4	2	32,000	6,321	
C	2 1/4 x 2 1/8	2	30,000	6,844	
D	2 1/8 x 2 1/8	2	40,000	8,865	7.343

No. 23.

Stone from the Cumberland Basin Brown Stone Quarry, owned by the Atlantic Brown Stone Co., Box 118, Sackville, N.B.

SANDSTONE, medium grained, purplish brown. Contains quartz, much reddish felspar, and a few grains of a green silicate, and scales of mica. Strong argillaceous odor, effervesces slightly, with acid. Stone in beds of from four to ten feet, and can be got out up to twelve tons.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	3	30,000	3,333	
B	2 1/4 x 3 1/8	3 1/8	42,600	4,735	
C	2 3/4 x 2 3/4	3 1/8	38,000	4,311	
D	3 x 3 1/8	3	41,500	4,517	4.224

No. 24.

Indiana Oolitic Limestone, from Perry Bros'. Quarry, Ellettsville, Monroe Co., Indiana. Supplied by Messrs. Brown & Love.

LIMESTONE, very fine grained, oolitic globules easily seen with a lens, pale yellowish-brown or buff, effervesces strongly with acid.

Specimen.	Section under Pressure.	Height	Crushing Stress.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	.....	.....	.....	.....	
C	3 x 3	3	56,900	6,322	
D	.....	.....	.....	.....	6,322

No. 25.

Miramichi Stone from the "French Fort" Quarries on the Miramichi River, owned by Mr. C. E. Fish.

SANDSTONE, somewhat fine grained, yellowish brown. Contains quartz, a good deal of felspar, and a few scales of mica. Stone in beds of from one to eight feet, and can be quarried up to ninety cubic feet.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch.	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	3	41,000	4,555	
B	2 3/8 x 3	3	36,000	4,174	
C	2 3/8 x 3	3	42,000	4,870	
D	3 x 3	3	47,500	5,277	4,719

No. 26.

Sandstone from Thomas Gatelawbridge Quarries. Supplied by Messrs. W. M. Knowles & Co., Agents, Montreal.

SANDSTONE, rather fine grained, brick red, reddish quartz grains, with a few whitish grains of felspar. Argillaceous odor. No effervescence with acid. Specimens prepared by owner.

Specimen.	Section under Pressure.	Height	Crushing Load.	Crushing Stress per Sq. Inch	Average Crushing Stress per Square Inch.
	Ins.	Ins.	Pds.	Pds.	Pds.
A	3 x 3	2 1/4	37,500	4,166	
B	2 1/4 x 2 1/4	3	40,000	4,839	
C	2 1/4 x 2 1/4	3	46,000	5,818	
D	2 1/4 x 3	3	37,000	4,289	4,778

THIRD ANNUAL CONVENTION ONTARIO ASSOCIATION OF ARCHITECTS.

THE third annual convention of the Ontario Association of Architects was held pursuant to announcement, on Tuesday and Wednesday, the 7th and 8th inst.

FIRST DAY.

The chair was taken by the President, Mr. S. G. Curry, at 3 p. m.

The following members were present:

S. G. Curry, Toronto; K. Arnoldi, Ottawa; W. A. Edwards, Hamilton: J. E. Belchei, Peterboro': F. H. Herbert, Toronto: E. L. Rastrick, Hamilton; H. C. McBride, London; Jos. W. Power, Kingston; M. B. Aylesworth, Toronto; J. A. Ellis, Toronto Junction; A. F. Wickson, Toronto; John Gemmell, Toronto; Mark Hall, Toronto; Geo. Gouinlock, Toronto; F. S. Baker, Toronto; W. A. Langton, Toronto; Fred. Henry, London; W. L. Symons, Toronto; Frank Darling, Toronto; Edmund Burke, Toronto; W. R. Gregg, Toronto; A. H. Gregg, Toronto; John Kay, Paris; J. W. Kenny, Collingwood; Frank Helliwell, Toronto; S. H. Townsend, Toronto; H. J. Webster, Toronto: R. J. E. Edwards, Toronto; N. B. Dick, Toronto; T. J. Ruttley, Chatham: H. Simpson, Toronto; Commander Law, Toronto; H. B. Gordon, Toronto.

The minutes of the last meeting having been read by the Registrar, the President read his address, as follows:

PRESIDENT'S ADDRESS.

This is the third annual meeting of the Ontario Association of Architects, and I believe that it will be considered in the future as having been weighted with most important issues. At this meeting, many questions of vital interest must come up for discussion and settlement. The life of the Association depends upon the action which the members may take during this convention. We have nearly reached the critical point in our existence which many of us have seen coming from the beginning, and which if safely passed will carry the Association forward to a period of great usefulness.

This Association is working under an Act of the Provincial Legislature which, to all intents and purposes gives us neither benefits nor privileges, while it imposes on us the duty of educating the future members of the profession, that the public may be benefitted in the future. The Act is of so little practical benefit that it was only after considerable discussion and consideration that it was determined to try to carry out its provisions. This decision was arrived at only when it was pointed out that we could expect to obtain all that we desired in our first effort, and that there was reasonable hope that we should eventually succeed in having the Act changed so that it would really serve the purpose for which it was passed. As you will see by referring to the report of the Council, an effort was made at the last session of the Legislature to have the Act amended. We found the opposition from the members of the Legislature against legislation having the slightest appearance of giving special privileges to any profession or organization so strong, that it was worse than useless to press it at that time. Moreover, we were in hopes that by waiting one year we should be enabled to cite the State of New York as having passed an Act giving the profession in that State greater privileges than we were seeking. The Act passed both bodies of the New York Legislature, but was vetoed by Governor Flower on representations made to him by five architects residing in the city of New York. That the Act was approved by the representatives of the people proves progress, but it does not materially assist us in procuring any changes in our Act. However, another effort on the part of the architects of New York State will probably give them the Act which they so nearly succeeded in obtaining, and which should benefit the people of the State to an extent to which they have little or no conception.

The Legislature of British Columbia failed by just one vote in making the profession in that province a close corporation. If the architects had asked for no more than we are now asking for, they would have secured the required legislation with little or no opposition.

Our Council has been pursuing the course which they think most likely to lead to eventual success, that is, to try and carry out the educational features of the Act and thereby show that we are in earnest in our desire to improve the professional standing of our members.

The public have no sympathy with us in any efforts which we may make to improve our own condition unless they can see some direct benefit to themselves. We must therefore take up the measures in which the public are directly interested before we attempt to improve our condition as a profession in those respects in which we are more directly interested as practising architects.

The difficulties in the way of obtaining amended legislation can only be properly understood by those upon whom the duty has been imposed of getting the desired legislation. At this point I would like to draw the attention of the members of the Association who reside outside the cities to one of our difficulties in obtaining such changes in the Act as nearly all of us believe to be necessary to its successful working; and that is, that while it is possible to convince the city members that there is danger to life and health from the incompetency of an architect, simply because they live in large centres of population and can see the result of such incompetency, it is not so impossible to convince the average country members that any danger exists. The fact that those who bring the question before him are city architects is sufficient to place him in opposition, as he immediately conceives that they have some ulterior object in view which is opposed to the interests of the architect or the builder in his locality.

If each of our members residing in the smaller cities, towns and villages should explain our position to his representative in the legislature, showing him that the amendments to the Act which we seek would not only benefit the city architects but all the architects in the Province, while at the same time benefitting the public, nearly all opposition would be removed. I do not think it unreasonable that the Council should expect some assistance from the individual members of the Association; but I regret to say that very little assistance has been given; the majority of the members seeming to think that the Council required no assistance. There are even a few who apparently take delight in placing stumbling blocks in the way, if the course of the Council does not meet with their entire approval, no matter how much or how little they may know of the inward condition of affairs. There is not the slightest objection to any member having opinions of his own, but he should advocate them at the proper time and in the proper place. If his suggestions are accepted by the majority, he should be more than satisfied, but if not, he should be willing to abide by the decision of his fellow-members and loyally aid in carrying out that decision until he is able to win over a majority by fair and open criticism. No good is gained by personal opposition but much injury is done and as a result all suffer—the obstructionist along with those to whom he has placed himself in opposition.

The Council interviewed the Government two weeks ago, and have reason to believe that we may succeed in having the Act amended by the striking out of the word "Registered" where it occurs in the Act if each member will do his duty in the premises. The Council ask that every member will do his utmost to aid them in obtaining the amended legislation. Let no one believe that his assistance is of no importance. Every member of the Legislature who is convinced that the changes which we suggest in the Act will be of benefit to the public, is just one opponent gained over to our side to give us his assistance.

The first examination of the Association was held last April in the examination hall of the School of Practical Science. The report of the Council gives a clear statement of the number of students who came up for examination and of the number who passed. A supplemental examination was held in September which is also referred to in the report. The Association is to be congratulated on the success of its first examination, as a large number of those who should have taken the examinations presented themselves.

I am aware that many of the members look upon the educating and examining of the students as a work the expense of which should not be borne by the Association. Some of them hold that the student should pay sufficient fees to clear expenses—that since they receive the direct benefit they should be made to meet the cost. This argument may be a very good one on general principles, but it is impracticable. If the student is asked to pay high fees on presenting himself for examinations, he will decline to take them, and the educational work of the Association will be blocked. No doubt it would be urged that if the students should not present themselves they would be the principal sufferers and that the Association could wait until they recognized the value of the examination; but how long could the Association wait under the present condition of affairs? It could wait, it is true, but while it would be waiting there would be formed a body of architects outside its influence and opposed to its principles. It is evident that until we get greater power, we must be content to bear the expense of the examinations or give them up altogether, for the students will not assist to any appreciable extent. As a matter of fact, there were a number of students who refused to present themselves for examination last April stating that they could not see that they would be placed in any better position as architects by taking the examinations. This feeling on the part of the students is more likely to increase than diminish until the Association is in a position to offer greater inducements to bring the students up for examination of their own free will or is enabled to force their compliance.

Before dropping this question I should like to state that in my opinion every member is interested more or less in the better education of the students. A student who studies systematically in order to pass an examination will be of more service while under indenture than one who is idle and indifferent. The draughtsman who has acquired his training under the above conditions will be able to render more valuable services than the man who has picked up his knowledge without method. The architect who has students, or who employs draughtsmen should derive some benefit from their greater efficiency. There is another way in which he will derive a benefit, and that is in the fact that the better the man is educated for his work the more likely he is to insist upon receiving proper and suitable compensation, thus reducing competition as to the amount of commission to be received by the architect. It is true, however, that while the competition as to the amount of commission to be paid may be reduced, the competition against which the less proficient architects will have to work will be greater owing to the better and more efficient training of their competitors. But still, I think that even under such conditions the position of the older men will be much improved through the greater respect which the public will have for the profession as a whole, when the younger men are forced to properly prepare themselves for their work. But the strongest argument which I can urge in favor of the Association carrying on this work of education, is that it is about the only way in which we, as members of the profession can show that we have, not only our own interests, but those of the public at heart. We certainly cannot be expected to be given privileges, which, so far as anyone outside of the profession can discover, will only benefit ourselves. We cannot expect to be assisted in building up a close profession or trades union. Whatever privileges we may obtain can only be secured in return for work accomplished or to be accomplished through us for the benefit of the general public. I believe that few would complain if the Act gave us only adequate assistance in doing the work which it has imposed upon us. Where the trouble lies, is in the fact that we are expected to do educational work without the power to do it effectively. We are asked to do work persuasively where we should be empowered to enforce compliance with the educational provisions of the Act. Under these conditions some have become discouraged and desire to give up the struggle. But I strongly urge that before accepting defeat, every effort should be made to win. Much has been done, and it may be that now when everything appears dark and disheartening we are near the period when success is at hand. Whatever we do, do not let us entirely give up the work which we have undertaken until it is absolutely hopeless to struggle longer.

You will also see by the report that we have a very useful though small library. Some of the students and a few of the members have profited by it; but a careful study of the report will show that the library is not patronized as it would be if all were anxious for instruction. The library, it is true, is not of very much benefit to the members as yet, except in so far as it enables them to supply their students with standard architectural works suitable to their attainments. Still, at the same time, there are books in the library which would be very useful to all of us if we would but read them. It was the intention of the Council, when we established the library, that as soon as such books as were absolutely necessary to the advancement of the students had been acquired, to purchase by degrees, as the finances of the Association would allow, the more expensive standard works which are not within the means of the average architect. Such books, under our method of sending them to members, would be of very great value, but they can only be acquired by years of effort on the part of the Association. Owing to the condition of the Association, the Council have not, during the past year bought any more books than they found absolutely necessary.

The Council is able to, at last, present the report of the committee appointed to test the stones used in this Province in the erection of the more important buildings. This report has been long delayed and some complaints have been made that it was not published months ago. But I should like to point out that the preparing of the report has almost entirely devolved upon the chairman of the committee, Mr. Townsend. It has taken up a large amount of his time, as he had all the computations and tabulations to make, as the other members of the committee only assisted in making the tests, which occupied several days. You can hardly expect a man to completely neglect his own private work to do that of the Association. I for one consider that all the members of the Association are greatly indebted to Mr. Townsend for the work he has done, at so much sacrifice of time. We as an Association must not expect that those who do our work without remuneration should do it as if they were paid officials. It is largely a work of love on the part of such members and it should be accepted as such by us, with proper acknowledgement of our indebtedness. This report is a most valuable one and should be useful to each and every member of the Association.

During the past year the Council sent a deputation to Ottawa to interview the Government, relative to the fact that plans were admitted into this country practically duty free. It was in many respects a disagreeable duty which the Council had to perform, but as many of our members were complaining of the unjust competition with which they had to contend, the Council determined to make an effort to mend matters.

We as a section of the community paying our due proportion of the duties levied by the Dominion Government under the National Policy, upon the necessaries and luxuries required by us in living comfortably, have every whit as much right to the consideration of the Government, as the manufacturers or other bodies of the community. I am pleased to inform you that the Manufacturers' Association recognized this point and gave us such assistance as they could, in presenting our case before the Hon. Ministers, Messrs. Foster and Bowell. While as you may see by the report, we were promised something—indefinite it is true—we have received nothing so far as we can discover.

The Council were also instructed by the last convention to determine what could be done to protect an architect's design from being used by a second party without compensation. You will see by the very thorough report of Messrs. Arnoldi and Ewart that under the present copyright law, nothing can be done to remedy the evil, and it is more than hopeless to have the matter dealt with in a way that would be satisfactory to us and to the public at the same time.

At the request of the British Columbia Institute of Architects, the Government of British Columbia requested the Council of the Ontario Association to name experts to decide the competition for the new Legislative and Departmental buildings proposed to be erected in that province. The Council selected Mr. Andrew Taylor, P.R.I.B.A., R.C.A., of Montreal, and myself to act as the experts, and the appointment was immediately confirmed by the Government of British Columbia. The fact that the Government of British Columbia asked our assistance on this most important occasion, shows that they had confidence in us as an Association of Architects. We can therefore congratulate ourselves that our efforts to improve our professional standing have received recognition, while at the same time we were enabled to render some small assistance to a sister Association.

The Council arranged during the year that the Registrar should keep a list of draughtsmen who desired employment. Very little advantage was taken of this arrangement, owing, probably, to the fact that, as there was so little work in progress during the summer, the draughtsmen deemed it useless to register their names. However, it was the means of several draughtsmen obtaining positions during the year.

You are no doubt aware that the Association has a regular indenture for students, which was approved of at the last convention.

The "Conditions of Competition" which were approved by the Association have not been printed as the Council deemed it unnecessary to incur that expense until an occasion should arise for their use.

The Association is now in possession of a seal, which was designed by Mr. Edmund Burke.

I had the pleasure last September of attending the annual meeting of the Quebec Association, and cannot speak too highly of their hospitality, which, no doubt, was extended to me as your representative. I believe it would be of great benefit to both Associations if each would send at least two representatives to take part in the conventional proceedings of the sister Association. They should have every privilege extended to them except the power of voting. By such means we would be brought closer together and each would have a better knowledge of the work carried on by the other Association.

I also had an invitation to attend the second annual meeting of the Southern Chapter of the A. I. A. which met in Birmingham, Alabama, on the 12th of January last. I was unable to accept the invitation owing to lack of time and the distance to be travelled.

The extending of invitations by the representatives of one Association to those of another, to be present at the annual conventions, is a very friendly and effective way of showing our interest in each other's work. This spirit of mutual interest should be cultivated by the accepting of such invitations on all occasions when possible.

I now wish to refer to a petition for a reduction in the annual fees, which was received by the Council during the year. This petition was sent in so very late in the year that it was impossible for the Council to take any action on the lines suggested, even though they had deemed it desirable. The annual fees had been fixed by the first Council and practically approved by the Association, as no objection had been raised by any member until the petition had been sent in. By referring to the by-laws of the Association and Council, you will find that the entrance fee was placed at $15.00, which also included the fee for the balance of the first year. The regular annual fee was placed at $15.00 for Toronto members and $10.00 for members residing in other portions of the province. Such being the case, it was unwise to circulate a petition in the middle of the year and long after the fees were due. The effect of circulating the petition was to delay the payment of fees in very many cases, and to induce some not to pay them at all.

Such questions as this, should be brought up at the annual meetings, where there is an opportunity for a full and ample explanation and intelligent discussion and settlement. Do not misunderstand me, I am not opposed to criticism, either fair or unfair, of the management or of any interest of the Association, so long as the criticism is made honestly and when and where it can be dealt with at once and effectively; but I am opposed to any action on the part of anyone which tends to unsettle the minds of the members during the year, when it is utterly impossible for the Council to take any action, especially when such action, if taken, would be a radical change in the policy of the Association.

One of the objects of holding these annual meetings is to allow the members to bring up any questions which they may deem of importance, for discussion and settlement; and if any member considers that the fees are too high, it is his place to bring the question before this convention and to have it settled by the full membership of the Association. The Council does not desire to control the affairs of the Association except for its benefit, and to the entire satisfaction of its members; and when their policy has met with no opposition during the past year it is only natural to believe that it will meet with approval in the succeeding year. No radical change in the management of this Association should take place on the suggestion of the Council or of any number of the members of the Association, unless such change has been discussed and approved by the members in convention.

I will now refer directly to the substance of the petition. The surplus which was quoted as a reason for the lowering of the fees was not really as large as it was stated to be, as all the accounts against the Association were not in at the time the books were closed. The surplus has been acquired from the registration fees and not from dues over and above the running expenses. The running expenses of the Association now rather exceed the income than otherwise, and if our membership should decrease, as no doubt it will, unless we obtain a change in our Act, there will be annual deficits to be met out of the surplus. The Council have from the first assumed that the membership of the Association would diminish each year. Many of the members joined, under the impression that it would benefit them in some direct way, since the Association was formed under a special Act of Parliament; they have since found that our position is not what they supposed and are now allowing their membership to lapse.

The reduction in membership has naturally reduced our receipts, and we are therefore in a position in which we must not only consider the minimum amount at which our annual fees should be fixed, but also in what respects the work of the Association can be reduced with the least possible injury.

Some will hold that by reducing our fees we may retain our full membership, but the trouble is that if we reduce our fees to a point sufficiently low to retain our membership, we shall receive a very small total income; whereas if we hold our fees at the present amounts we shall have a larger total income on a very much reduced membership. With a small membership our numbers will consist of men who are enthusiastic in the work of the Association, and I believe greater progress will be made.

We have now reached a condition where careful study of our position, and a far sighted policy is required to carry us safely into port. It will also require on the part of each member a willingness to do all that he possibly can, to tide the Association over present difficulties. It is for this meeting to take such action as it may deem best in the interests of the Association.

To aid in the solution of our difficulties, I would suggest that the fees payable to the Association be changed to the following amounts, graded to represent the interests of the different classes of members, viz.:—Members residing in Toronto of five years standing and over, or those who are members of firms of five years standing and over, $15.00; members residing in Toronto of less than five years standing, $10.00; members residing in other cities in the province, of five years standing and over, or who are members of firms of five years standing and over, $10.00; other members in these cities $5.00; members in towns, villages, etc., $5.00; members in civil service or in the employment of corporations but who do not practice *privately*, $5.00; travelling members or those not residing in the province, $5.00; draughtsmen who have passed the final examinations, $5.00. If the fees were thus graded, no member would have any reasonable ground of complaint, since the members who derive most benefit from the Association would pay the highest fees.

It is not advisable to lower the fees to too great an extent, as we should look forward to establishing a reading room containing all the published professional papers and a library of the most important and valuable standard architectural works. The members in Toronto could use the reading room with much advantage to themselves, while it would be at the service of the country members for the transaction of business whenever they were in the city. The library would save members buying expensive books for which they have comparatively little use.

During the year some of the members have complained that they were not receiving anything in return for their fees. If they meant they were not receiving any monetary return they were probably right. This Association was not formed on the basis of giving values for fees in a direct and tangible form, but rather in an indirect and possibly intangible form. But I think that anyone who is impartial and reasonable will be able to discover that he has received some benefit even now, and that there is every hope of his receiving greater benefit in the near future, if the members of this Association are true to it and themselves. Do those who join the many fraternal societies hope to receive any monetary return for their fees? I know of none except possibly those who use these societies for their own personal advantage. The greater number of our members, I am sure, joined this Association, not so much for the good that it would do them, as for the good that they might do in aiding the Association to accomplish a much needed and highly desirable work. This work is the raising of our profession to the position to which it is justly entitled in the vanguard of the other professions. And if this position should be attained, will anyone here state that each and every one will not then have received full value for what little he may have paid out in fees to this Association? But are there not some returns even now which are of some little value? Is the library of no benefit? It certainly is not to those who do not use it, but would it not be of great benefit to very many who do not use it and who also complain of receiving nothing in return for their fees? Is the report on the crushing and other qualities of our building stones of no value? Are not the papers which have been read at these conventions and afterwards published of benefit? Are not many of these subjects on which reports have been made of importance to our members? Has not the drawing up of a student's indenture and a set of competition conditions, been some good accomplished?

Gentlemen, I have no hesitation in stating that if all of our members were loyal to the Association, and upheld the Council in its action, much more good would be accomplished to the advantage of us all. But where we have personal opposition which even goes so far as to strive to bring about serious defections, we cannot hope to accomplish over much. Do all our members refuse to take students who do not register? And do they not retain in their offices both students and draughtsmen who will not comply with the requirements made by the Council and approved by the Association? Some have even gone so far as to abet such opposition on the part of students and draughtsmen. Is such conduct what one should expect from members of this or any other Association? Is not the work of the Council and this Association sufficiently difficult one without it being made still more so, by petty opposition? Let those who do not approve of the management of the Association, come here and enter their protests in a manly way, and if possible gain the support of their fellow-members for any suggestion they have to make, which in their opinion will be beneficial.

I have devoted this address entirely to considering the position and business affairs of this Association. Our position at the present time is a serious one, and it behooves us to carefully consider our affairs, that we may go forward if possible along the road which will carry us to the goal of our aims and desires.

I have spoken plainly, but I hope without offence to anyone. I have no desire to hurt or offend any member, but I think that plain dealing with difficult questions at a serious period is the only way in which we can acquire a firm foothold on a sound foundation. My anxiety to see this Association secure in its position is my excuse for stating my opinions plainly, and I only hope that others will do the same and then we shall know exactly where and how we stand.

I regret that it is my sad duty to refer to the serious loss which our Association sustained in the sudden and lamented death of Mr. W. G. Storm, R. C. A., the first President of this Association. Little we thought one short year ago, when Mr. Storm took his position on the platform in the room below this one, as President of the Association, that he would ere another year had passed, have departed from this world and his work, to that other world of which we know so little and to which we are all travelling. Of his skill as an architect I will not speak, but will leave the buildings which he erected during his busy life, to speak for me, since you are as capable as I am of estimating his professional attainments through them. For the advancement of this Association he worked earnestly and at considerable sacrifice of his material interests. He did not work in hope of any personal gain or benefit, but out of love for his profession. Many times, he stated that it was more than likely that he would have passed away, long before

the Association would be enabled to do very much for the advancement of the profession. But he cherished the hope that the students of the present day, who will be the architects of the future, would derive some benefits from his labours. He did not live for himself alone, but for the good of his fellow-men and especially for those engaged in his chosen profession. He set us, one and all, an example which we could follow with much advantage to this Association and ourselves.

Many of us hoped, when he retired last year from the Presidency, that we should see him again in his old position as President of this Association, but it has, however, been ordered otherwise. But while we will never again see him in body, we may keep him in remembrance by taking him for our example, and carrying through the work which he supported so loyally. Let not his name nor his works pass out of our remembrance.

The President then called upon the Acting Treasurer to read the Treasurer's report.

Mr. Burke, who stated that he had been requested by the Treasurer, Mr. Dick, when that gentleman was leaving for the old country a few weeks ago, to take charge of the books and report, read the report as follows:

THE TREASURER IN ACCOUNT WITH THE ONTARIO ASSOCIATION OF ARCHITECTS.

1892	*Receipts.*		
Jan. 1	To balance in bank	$2,163 15	
Feb. 19	To cash from Registrar	32 45	
July 26	" " " receipts 1st February to 30th June	901 65	
Sept. 16	To cash from Registrar, receipts for July	96 00	
Sept. 16	" " " " Aug.	12 00	
Oct. 18	" " " " Sept.	10 00	
Nov. 21	" " " " Oct.	32 00	
Dec. 12	" " " " Nov.	115 00	
Dec. 31	Interest on bank account to date	75 91	
			$3.438 16

1892	*Expenditures.*		
Feb. 19	By cash to Registrar for disbursements	$ 28 71	
" —	" W. A. Langton, Regisirar's salary to Feb. 19th, 1892	100 00	
Feb. 19	By W. A. Langton, Librarian's salary to Dec. 31st, 1891	50 00	
Feb. 19	By cash to Registrar for Disbursements	200 00	
June 22	By W. A. Langton, Librarian's salary to June 30th, 1892	50 00	
July 26	By cash to Registrar for disbursements	488 24	
Aug. 16	By James Pape, Floral Cross, funeral Mr. Storm	15 00	
Sept. 16	By cash to Registrar for disbursements	120 86	
Sept. 16	By W. A. Langton, Registrar's salary to August 19th, 1892	100 00	
Dec. 31	By balance in bank	2,285 35	
			$3,438 16

We have examined the books, vouchers, etc., of the Association, and certify that the above is a correct statement thereof.

(Signed) HENRY LANGLEY, W. L. SYMONS } Auditors.

The Registrar then read the following report:

REPORT OF THE REGISTRAR AND LIBRARIAN FOR 1893.

Members.

The roll of membership of the Association on January 1st, 1892, contained 73 resident members and 74 non-resident members, in all 147. Of these, 11 resident members and 7 non-resident members, in all 18 members, were in arrears with their fee for the portion of the year 1891 between August 7th, the anniversary of the date of registration, and December 31st, the close of the financial year of the Association. Thus, though the Council decided to assume the continued membership of all and continue all names on the roll, the number of members in good standing at the close of the year 1891 was only 62 resident members and 67 non-resident members, 129 in all. Of these 2 resident members and 1 non-resident member have since paid these arrears. The remaining 15 form part of the number of members to be subtracted, as not in good standing, from the roll of membership at the close of the year 1892.

The roll at the close of the year 1892 numbered 119, there having been 1 registration as architect of a student who had passed the final examination, and 1 architect in practice at the time of the passing of the Act admitted to registration, under sec. 22, sub-sec. 2, of the Act. Of these 104 paid their fees during 1892, and 11 sent in their resignation, leaving 34 who have not paid their fee, but have not signified their intention of withdrawing from the Association.

Since the beginning of the year there have been 2 more membership fees paid and 2 registrations as architect on the part of students, so that the roll of members in good standing at the time of publication of this report numbers 108, consisting of 44 resident members, 59 non-resident members, and 5 members not practising in Ontario. This latter class of members was created by the Council to meet the needs of members who found it necessary during the present depression of business to seek employment elsewhere, but who did not wish to give up their membership of the Association.

Students.

There were 96 students on the roll at the beginning of 1892, classified according to the examination required of them, as follows:—

First intermediate	4
Second intermediate	30
Final	62

36 students came up for examination in April, classified as follows:—

First intermediate	4
Second intermediate	12
Final	20

Of these the Board of Examiners recommended and the Council passed:

First intermediate	2
Second intermediate	3
Final	13

11 were conditioned for a supplementary examination in September.

9 came up for examination, viz.:—

First intermediate	2
Second intermediate	4
Final	3

Of these were passed:—

First intermediate	2
Second intermediate	4
Final	2

In all there were 15 students who passed the final examination, and are entitled to register. Of these only 2 have registered.

The new form of indenture, approved by the last Convention, came into use as soon after as it could be lithographed, and there are now 9 students articled under this form.

The register of draughtsmen out of work, which is open at the office of the Registrar, and of which notice was given at the last Convention, and in the CANADIAN ARCHITECT by the publication of the Registrar's report, has been practically unused, 4 students only and 1 architect, who was in search of a superintendent's place, having entered their names. I think I may say that it was in consequence of this application that the architect is at present prosperously employed.

Proceedings of the Council.

The Council have held three meetings; the first on February 4th, the second on May 5th, and the third on October 18th.

Following instructions from the Convention, the Council appointed a Committee to investigate the possibility of obtaining copyright for architectural plans. The report of the Committee has been printed, and is in the hands of the members of the Association.

The Convention had further instructed the Council to procure, if possible, amendment to the Act of Incorporation, by striking out the word "Registered" before the word "Architect." Application to this end was made to the Minister of Education, who replied that it would not be prudent to attempt any amendment in the current session.

A deputation in conjunction with the Province of Quebec Association of Architects, went to Ottawa with a memorial to the Minister of Customs. The memorial and report of the deputation have been printed, and are in the hands of the members of the Association.

A design has been adopted for the seal of the Association. It has been cut and is now in use.

Subsequent to the May meeting of the Council a memorial signed by 49 non-resident members of the Association was received by the Registrar. The President called a meeting of the Toronto members of the Council, who instructed the Registrar to send out the circular letter to members of the Council, which has been printed and is in the hands of the members of the Association. The non-resident members of the Council wrote in reply their opinion as to the right course to pursue. The Council agreed that the fee should remain as fixed by by-law until the next Convention. Pursuant to this decision the Registrar sent out the circular dated July 18th, to all non-resident members, which has been appended to the printed copy of the circular letter to the members of the Council concerning the protest.

The register not being fully signed at the close of the last Convention, it was first sent to the larger cities to procure signatures of the members residing in them. Afterward, a slip with a headline, "Signature for Register of Ontario Association of Architects,' was sent to all members whose signature had not been received. Many signatures were thus returned, and have been pasted in the register; but there still remain 25 members who have paid all fees, but have not signed the register. Of the signatures received, there are 13 of the members who are in arrears for the fee of 1892, and 2 of members who have paid no fee since registration.

A letter was received in October from the Commissioner of Lands and Works, of British Columbia, asking the Council of our Association to select two architects to act with the Department of Lands and Works in examining the plans sent in for competition of designs for new Government Buildings, to be erected at Victoria. The Council selected Mr. Curry, our President, and Mr. A. T. Taylor, of Montreal. The selection was accepted by the Commissioner of Lands and Works, and these gentlemen acted as experts in the preliminary competition which was decided in November.

A Committee of the Council waited in January upon the Ontario Government, and presented a memorial concerning the amendment of the Ontario Architects' Act. The Government expressed themselves favorably towards the proposed amendment, and steps are being taken to have a bill introduced at the coming session of the Legislature.

The Library.

The Library contains the following works:—

Bayles. "House Drainage and Water Supply."
Baillairgé. "Geometrie and Toise Tables."
"Clef du Tableau Stereometrique."
"The Stereometrican."
Papers read before the Royal Society of Canada and the Quebec Literary and Historical Society.
Baldwin. "Steam Heating for Buildings."
Billings. "Ventilation and Heating," 2 copies.
Bloxam. "The Principles of Gothic Ecclesiastical Architecture," 2 vols.
Brandon. "Analysis of Gothick Architecture," 2 vols.
Chambers. "Civil Architecture."
Clark. "Building Superintendence."
Cotterill & Slade. "Lessons in Applied Mechanics."
D'Avesnes Prisse. "La Decoration Arabe."
Fergusson. "History of Architecture," 2 vols.
Gerhard. "Drainage and Sewerage of Dwellings."
Gibbons. "Law of Contracts."
Gruner. "Specimens of Ornamental Art with Descriptive Text by Emil Braun."
Gwilt. "Encyclopedia of Architecture."
Hendrick's Architect's and Builders' Guide and Contractors' Directory of America.
Jenkins & Raymond. "The Architects' Legal Handbook."
Kidder. "Architects' & Builders' Pocket Book."
Macassey & Strahan. "The Law Relating to Civil Engineers, Architects and Contractors, 4 copies.
Mitchell. "Building Construction."
Osborne. "Notes on the Art of House Planning."
Paley. "Gothic Moldings."
Parker. "A. B. C. of Gothic Architecture."
"Concise Glossary of Architecture."
"Introduction to Gothic Architecture."
Parkes. "Practical Hygiene."
Powell. "Foundations and Foundation Walls," 3 copies.
Pugin. "Apology for the Revival of Christian Architecture in England."
"True Principles of Pointed Christian Architecture."
Reid. "The Manufacture of Cement."
Ricker. "Trussed Roofs."
Rickman. "Styles of Architecture in England."
Royal Institute of British Architects. "Journal of Proceedings from October, 1891."
Rosengarten. "A Handbook of Architectural Styles."

Society of Architects (Eng.) "Proceedings from November, 1891."
"South Kensington Notes on Building Construction," 3 vols.
Stevenson. "House Architecture," 2 vols.
Stoney. "The Theory of Stresses in Girders and Similar Structures."
Stuart & Revett. "Antiquities of Athens."
Taylor & Cresy. "Rome."
Vignola. "The Five Orders of Architecture."
Viollet le Duc. "Lectures on Architecture," 2 vols.
"The Habitations of Man in all Ages."
Wightwick. "Hints to Young Architects."
Wright. "Architectural Perspective."

The sum of $235.30 has been spent in the purchase of books; $184.05 in 1891, and $51.25 in 1892.

The Library was opened for lending on October 1st, 1891. Since that time there have been 203 books borrowed; 31 in 1891, 157 in 1892, and 15 in January of the present year. Of the 203 borrowings, 31 were by architects, and 172 by students.

On motion of Mr. Burke, seconded by Mr. Belcher, the report of the Treasurer was adopted.

On motion by Mr. Gemmell, seconded by Mr. Edwards, the report of the Registrar and Librarian was adopted.

The Convention then proceeded to the consideration of "Business arising out of the minutes."

DISCUSSION.

Mr. Edwards called attention to the desirability of having the "Conditions of Competition" printed and circulated among the members of the Association, so that they might be in a position at any time when called upon to hand those Conditions to persons seeking competition. He would, if necessary, move that the Conditions be printed, though it was merely a suggestion on his part, as he recognized that it was the work of the Council.

The President replied that although the action to be taken was a matter for the Council, it was within the province of the members assembled in convention to instruct the Council to take any steps thought advisable.

Mr. Edwards: Then I will move that the "Conditions of Competition" be printed and circulated among the members of the Association.

Mr. Helliwell, in seconding Mr. Edwards' motion, stated that there was much force in that gentleman's arguments as to the importance of having the Conditions of Competition printed, not merely for the reason given, but also that the matter might be kept before members themselves. While speaking of printing, he desired to bear testimony to the great advantage of having the various reports printed and placed in the hands of members attending the Convention, as had been done on the present occasion, as it enabled them to follow and discuss the matters in question more intelligently than would otherwise be the case. He thought the slight expenditure this incurred was a very wise one.

Mr. Wickson inquired if another benefit arising from the printing of the Conditions would not be that members who were approached and asked to submit competitive sketches would find it a very easy and concise method of replying, to forward the printed Conditions to such applicants, stating that under those Conditions only, they submitted competitive drawings.

Mr. Gordon thought the proposed action of printing and circulating the Conditions would have a valuable educational effect.

Mr. Burke believed that not only the public, but some of the members, would derive an educational benefit from the perusal of the Conditions, if printed and circulated as proposed.

Mr. Edwards expressed his gratification at finding his views so generally endorsed, and his ideas elaborated upon by the members present. He thought what had been said covered the ground admirably.

The President: I certainly think it would be a decided advantage to have the Conditions of Competition printed as has been suggested. I may say the only reason they have not been printed is, that the Council, having received a petition to reduce the fees, felt that for the remainder of the year it would be well to conduct the affairs of the Association as economically as possible, and meanwhile to ascertain what was really the feeling of the Association with regard to expenditure. It is, of course, impossible to go on making expenditures unless we have an income. As far as the surplus is concerned, it will not be difficult to dispose of that, but at the same time, I think we should make our income and our expenditure as nearly equal as we can.

The President then put Mr. Edwards' motion to the convention.

Mr. Edwards suggested that sufficient copies be printed to enable a few copies to be in the hands of every member.

Mr. Simpson thought it would be well to have printed on the same sheet the scale of architects' fees.

The President said that there was no tariff adopted by the Association.

The motion was then carried.

THE LIBRARY.

Mr. Aylesworth, referring to the advisability of reducing expenditure, said he had been struck by the idea that the money expended on the library might not perhaps be well applied. For his own part, while aware of its existence, he did not know where it was, or of what it consisted, and he wondered to what extent it was known of by other members. If it was not of any particular advantage, was it well to continue to expend money on it in the meantime?

The President: The meaning of the last speaker, to me, is not very plain. The announcement of the library's existence has been placed in the hands of every member, with information as to the conditions, etc., on which books can be obtained. While perhaps not in constant use for purposes of reference, the library certainly has been made use of in that way to some extent. The only trouble is that it is in need of improvement to be of advantage to members, its advantages at present being almost entirely confined to students preparing for examinations. What I, for one, would advocate is the application of a portion of our surplus to the purchase of books of greater value to members of the Association. I may say that every member of the Association, no matter where he resides, can have any book sent to him, and is allowed to keep it for a certain length of time, the only obligation cast upon him being to pay the postage and preserve the book in proper condition.

Mr. Aylesworth: What I meant to say was, that so far I have not looked up the library, and I understood from others that they were in the same position; and I did not know whether it had been of service to anyone. There are a number of valuable books both in the School of Practical Science and in the Public Library, but how many of them are being used? If they are not used, our small library would be less made use of, and if it is not of practical benefit, why should we continue to expend money on it? Of course, if it is being made use of, well and good, and if additions to it will enhance its value, it is merely a question of how useful it will be.

Mr. Gordon: If I may criticize in any way the financial aspect of this matter, I would say that I cannot see the wisdom of having $2,000 odd lying in the bank, when a portion of it might be much better utilized in procuring for the library works which might be looked at by architects with advantage. While it is true Toronto members have access to the Public Library and other collections, certainly those residing in the country should be very anxious for the improvement of the library, and I may say, speaking of my firm, that we have occasionally made use of the Association Library, and I think the city members should also be anxious to increase its efficiency. I think we should instruct the Council for the coming year to expend more money upon this library, and, if a motion were in order, or necessary, I would move that the Association, recognizing the desirability of increasing the efficiency of the library, recommends the Council to make such judicious expenditure of the moneys in their hands as may to them seem advisable to that end.

Mr. N. B. Dick: I do not quite agree with what Mr. Gordon says about increasing the expenditure. I am not one of the forty-nine kickers against paying fees, but it is evident from the results of high fees that we are diminishing our membership, and I think we ought to move in the direction of reducing expenses, for that seems to be the trouble with many of the outside members, and, indeed, many in our own city. It seems to me that the expenses of the Association have been unnecessarily large. I think something may be done in the way of reducing the expenses of meetings of the Council. I hardly see the necessity of bringing in members from a distance to consult on matters of minor importance, and paying their railway and travelling expenses. I think most members of the Association will be satisfied to appoint men in Toronto, or in some other city. Then I would like to ask what the expenses are in connection with students? There is an item of, I think, $250 in connection with the examination. Are examiners paid for their services?

The President: Yes.

Mr. Dick: Don't you think members of this Association ought to take sufficient interest in its affairs to be willing to give their necessary time gratuitously? Let us cut down expenses in that way. (Hear, hear.) I know, for my own part, though I fear my usefulness would not be great, that I should be very glad to do anything I could without remuneration. While I am not sufficiently conversant with the matter to enter into its minutiæ, I believe it would be possible to reduce our expenses by one half, and thus not only retain our present membership, but add to it, instead of having it decrease from year to year.

The Registrar: I think I had better explain to Mr. Dick that the amount of labor involved in connection with the examinations is very great, and means a great deal more than a few days' attendance here. There was at first the arranging of the curriculum, then setting papers and attendance during the examination, afterwards the labor of examining the papers. The fee of each examiner was $25, for which some of them examined on four or five subjects. That sum is entirely out of proportion to the fees paid to an examiner in the School of Practical Science or the University, and, as far as being any adequate return for the services rendered in connection with the examinations, might almost as well be dispensed with, but I think it would be most unreasonable to expect four or five members to do all this work for the whole Association for nothing, and also, if the examiners are paid, it establishes better the business character of the examinations and the responsibility of the examiners to the Association. Some other way out of the difficulty must be found. A proper way would be to increase the charge to students, but that is a matter for future consideration.

Mr. Edwards called the attention of the chairman to the fact that proceedings were becoming somewhat irregular, there being two subjects under discussion at one time, the reduction of fees and the augmentation, or otherwise, of the library.

The President, while admitting the discussion to be slightly irregular, thought it would do no harm, as the matters under

consideration were intimately related, to spend a little time in that way.

Mr. Gregg suggested that, as the next report was that of the Committee appointed to make tests of building stone in use in Canada, it would be well to hear that report and then devote the remaining time to the discussion of the state of the Association.

The President concurring,

Mr. Thompson moved that the report be taken as read. Carried.

Mr. Gregg moved the reception and adoption of the report, together with a vote of thanks to Mr. Townsend and the other members who assisted in its preparation.

The motion being seconded by Mr. Belcher, was carried.

THE STATE OF THE ASSOCIATION.

Mr. Edwards, referring to the proposed changes in the Act, spoken of in the President's address, expressed a desire for a little more information on the subject. He thought it would be a matter of congratulation if they were as successful in the near future as the President's address seemed to contemplate. He wished to say that the Council had not, as stated in the address, been laboring unaided, for he felt sure that outside members had been bringing to bear what influence they could towards the desired end. At the same time, would it not cause a good deal of kicking throughout the country if the change were effected? He thought it well not to be too sanguine in regard to this matter, but if the President had any reasons for the hope he had expressed, which could be made public, the members would no doubt be glad to hear them.

The President: With regard to the change and amendments, there is really no deviation from the policy adopted in the beginning. We sought to procure an Act conferring upon qualified members of the profession the right to use the word "architect." The Government, or some one connected with the Government, inserted in the Act the word "registered," which had the effect of destroying its force, and which we desire to have removed from it. The sooner that word is removed, the sooner will the opposition we encounter be decreased. If it is allowed to remain five years, there will be so many more outsiders opposed to it, or who will have to come in, because, practically, when that word is knocked out, we will have to admit every man who at that time is working at the profession; we could not at the end of that time interfere with the men who had started up in practice, and had made use of the word architect. That would be interfering with a vested right, which is something we could not do.

Mr. Edwards: Then anyone commencing business now as a practising architect can join the Association, and all we have done to the contrary is of no effect. In other words, we just place them where we ourselves stood at the time of the formation of the Association; they just come in as we did on organization, without passing any examination?

The President: Of course, I am only speaking of what I think myself. I think it would be unwise for us to adopt any other course, or to ask the Government to do anything else; it would only stir up opposition.

Mr. Aylesworth: I think this is a very important point. It is the first time it has been raised, and I think it would be well if all the members present would make themselves acquainted with that phase of the question, and, of course, it should also be early explained to the Government, that no one practising as an architect would be interfered with, even if they should not come in for several years. Of course, we did not contemplate this at first, but time has passed now, and probably more time will pass, so it will be well to keep in view this fact, that everyone now practising will have the same right he would have had a year or two ago. I think the matter should be thoroughly discussed and understood, and I think if the matter were presented to the Government in that light, it might have the effect of hurrying matters up.

The President: It has been placed before the Government in that light.

Mr. Gregg: It should be a matter of paramount importance with the Association to push this through, for until that word "registered" is struck out we will have accomplished practically nothing. With that object in view, I think it would be well for outside members to use their influence with members of the Legislature in their districts, so that when the matter comes before the House they will be properly acquainted with the nature of it.

Mr. Burke: The point with regard to members outside cannot be too strongly emphasized. Members outside of Toronto can approach thirty or forty members of the Legislature where the Association in Toronto can only approach three or four. I think, therefore, that our success in securing this amendment rests largely with the country members, for if they can favorably influence thirty or forty members of the Legislature the thing will go through without any trouble.

Mr. Gordon suggested sending to each member of the Legislature a printed statement of the argument in favor of striking out the word "registered." He thought if this was done it would make the work easier for members of the Association who approached them regarding the change.

The President said that a plain statement of the facts had been prepared for the purpose of forwarding to members of the Association, but no attempt had been made at any argument in it; that had been left to those who would approach the members of the Legislature, who, being acquainted with them, would be in a better position to judge of the best standpoint from which to present the argument. He feared a printed argument might possibly give rise to some misapprehension.

Mr. Helliwell thought the work of interviewing members of the Legislature could be better carried out by a Committee specially appointed for that purpose, as what was everybody's business often proved to be nobody's business. He would move the formation of such a committee.

The President replied that such a Committee already existed, in the Council of the Association, but it was better the work should be done by individual members, residents in the districts of the members of the Legislature it was desired to influence, and who, by reason of that fact, could appeal to them more forcibly than a stranger.

Mr. Belcher expressed the opinion that if properly approached the members would offer very little opposition. He had seen the members for both ridings of Peterboro', and also for the County of Victoria, and they had expressed themselves favorably. He thought if each individual member of the Association would put his shoulder to the wheel, very few could be found who would seriously oppose their wishes. He might add that both of the gentlemen he had spoken to were opposed to him in politics, but nevertheless the result had been as he stated.

Mr. Burke added that whereas in a city like Toronto many of the members of the Association were quite unacquainted with their representatives in the Legislature, in the smaller towns it was quite the reverse; probably they met these gentlemen almost every day, and on quite familiar terms. He thought, however, it would be well for a deputation from the Association to wait on the Attorney-General.

Mr. Helliwell explained that he had not meant that members of the Committee he suggested should personally wait on members of the Legislature, but rather that it should be their province to ascertain that they were seen by the members of the Association resident in their respective districts.

The President said the opposition which the Association might expect to encounter would arise from the prevalent feeling against close corporations, and instanced the opposition which was last year offered to the Surveyors' Bill. That opposition was engendered by want of knowledge and understanding of the object of the legislation sought, and that knowledge could be best imparted by the members of the Association who had opportunities of meeting with their representatives in the Legislature in their own districts.

Mr. Edwards reminded the Association that the opposition to close corporations was not confined to the Legislative Assembly, but was to be met with in the community generally. If the architects were influential in political circles, and could influence votes, it would go far to remove any opposition on the part of the legislators.

Mr. Helliwell disclaimed any desire to push his motion; he thought the publication of the discussion would serve to awaken members to the necessity of taking the requisite action. He would, under the circumstances withdraw his motion.

Mr. Gregg urged the necessity of reaching all the architects in the Province. If the proposed change would have the effect that had been stated on members of the profession outside of the Association it would be well they should know it, and they might assist in making a big push up the hill. He would suggest a petition, to be signed by all the architects in the Province.

Mr. Burke expressed approval of the last speaker's idea, and, as a member of the Council, he desired to see a large Committee entrusted with the matter, embodying, perhaps, the present Committee of the Council, and as many more members from the Association. He thought there could not be too many interested in the matter.

The President thought Mr. Gregg's suggestion a good one; but notwithstanding that course had been followed before, with reference to the desired change, the Government passed the Act without making the alteration. He thought he was correct in saying that members of the Association in default for fees still remained on the list of members.

The Registrar said nothing had been done towards removing such members' names, and they had been furnished with all matter connected with the present meeting.

Mr. Burke said if the request for the change were signed by every member and every ex-member of the Association, it would disarm all opposition.

Mr. Townsend expressed himself as being in favor of action in the line of Mr. Gregg's proposal; he would suggest that it be an instruction from this meeting to the Council to consider the advisability of obtaining such a petition.

Mr. Gregg stated that his object was that it might go out from this Convention that it was the desire of those present to secure the co-operation of all the members in the Province, whether they had attended the Convention or not, and whether they had paid their fees or not. He wished to preserve the friendship for the Association of every man who was practising in the Province, and to have it conveyed to them that the Association bore no ill-will against those who for various reasons might have dropped out.

Mr. Edwards believed that that line of conduct would defeat the objects of the Association. He advocated an adherence to the policy at first proposed, that each member should leave the Convention animated by a determination to influence those with whom he came in contact who were in a position to further the end desired. It was all very well, he thought, to be generous and magnanimous, but he disapproved of soliciting the co-operation of those who had separated themselves from the Association, many of whom would stay out under any circumstances; he thought the desired object could be attained by other means.

The Registrar said that the question of the proposed change would come before the Legislature at the approaching session. Members of the Government had already been seen by the Council, and had expressed themselves favorably towards the proposed change, although stating their inability to vouch for the opinion of the House on the subject. The matter was probably the most important with which the Convention had to deal, and the course which to him appeared most desirable, was that suggested by Mr. Burke, that the Committee of resident members should be requested to add to their number, so as to form a large Committee, and that the present discussion should form a portion of their instructions from the Association. If Mr. Burke saw fit to make the motion he would have pleasure in seconding it.

Mr. Burke accordingly moved that five members of the Association be added to the five members of the Council now constituting a Committee to interview the Legislature with the object of preparing for legislation in order to drop the word "registered" from the Act.

Mr. Gordon seconded the motion, and in doing so said that he was very loth that it should go out that they were prepared to surrender everything at the very outset. While fully appreciating the generosity and liberality of the views given utterance to by the President and the very nice way in which he had put things, and also believing that perhaps, in the end, those views might have to be adopted, he still believed that they ought not at the very beginning to be prepared to make that surrender. (Hear, hear.) He thought that in seeking to make confidants of the gentlemen who had elected to remain without the ranks of the Association, and, as it were, almost begging of them to come in, the dignity of the Association would be lowered without accomplishing the object which Mr. Gregg so earnestly desired. He gave that gentleman full credit for the object he had in view, viz., the disarming of opposition, but at the same time did not think it would be effected by such a policy. He thought the instructions of the Committee should be, first of all, to endeavor to get the word "registered" struck out of the Act without agreeing to any conditions, reserving assent to such conditions as a last resort, the supreme object being to get the objectionable word "registered" removed.

Mr. Aylesworth inquired if there was any number of the older members of the profession who were not members of the Association.

The Registrar replied, that, as far as could be gathered from letters he had received, all or at least all but a few of the older members of the profession were included in the Association.

Mr. Simpson asked if those who were practising as architects before the inception of the Act, and had failed to register, could, in the event of the word "registered" being struck out of the Act, be debarred from calling themselves architects?

The President thought they could not, unless the Legislature so provided.

Mr. Burke's motion was then put to the meeting, and carried.

COPYRIGHT AND CUSTOMS DUTIES.

The President called attention to the instructions given to the Council last year in regard to copyright, and asked if anyone was sufficiently interested to be desirous of making any remarks on the subject of customs dues.

Mr. Aylesworth remarked that he was so far interested in regard to the latter that he would like to hear how the proposition was received by the Minister of Customs.

It was explained to Mr. Aylesworth that the information with respect to the reception which the deputation met with was to be found printed in the report.

Mr. Gordon asked if it would not be well to express to the incoming Council the desirability of following up the question during the present year.

The President: It is a matter for the Association.

Mr. Gordon moved, seconded by Mr. Edwards, "That it is desirable that the matter of customs dues upon plans, etc., of foreign architects be again brought before the notice of the Canadian Government by the incoming Council." Carried.

GENERAL CONDITION OF THE ASSOCIATION.

The President: Some months ago the Council had sent out to each member of the Association a request that he would send in any suggestions which occurred to him regarding the better management or working of the Association. The Registrar will now read the replies to that request.

The Registrar having read the letters in question:—

Mr. Gordon said, that in view of the many feeling—with the emphasis on the last syllable—replies, the suggestion embodied in the address of the President as to grading fees was a good one. So far as he could see, the fees could not be very materially reduced without endangering the financial standing of the Association. In approving of the suggestion in question, he claimed credit for being disinterested, as he would still have to pay the larger amount. He thought the suggested plan of rating outside members from $10 down to $5 would remove the hardship under which, to judge from the communications received, some of them were laboring.

Mr. N. B. Dick said that it was evident there was much dissatisfaction among outside members and opposition to the fees now charged. He again advocated retrenchment in expenses. He would not like to see a motion passed to reduce the fees to any stipulated amount, but thought the matter should receive from the Council careful consideration, in view of the desirability of retaining in the Association as many members as possible, instead of having the membership reduced year by year.

Mr. Edwards, speaking of himself as a "country member," said he did not object to paying $15 as his membership fee, nor did he object to the reduction of the fee to $10 if it would help anyone to do right, but if the reduction was going to help men such as he knew of, who while too poor to pay the fees of the Association were rich enough to offer to give $1,000 to procure a $20,000 work of church alteration, he most decidedly objected. He was quite willing to help those who could not help themselves, but he entertained a decided aversion to helping others to take money out of his pocket.

Mr. Belcher expressed his satisfaction personally with the existing scale of fees. He was not aware that any of the so-called country architects were grumbling at the fees.

Mr. Aylesworth said that in order to test the feeling of the Convention he would move that the scale of fees suggested in the address of the President be adopted by the Association.

Mr. Burke thought that the fact that the older members had to pay the highest fee might in some instances be productive of hardship.

Mr. Darling said it was evident from the letters read that the matter called for consideration. The Association was yet in need of being fostered and nursed along, and while he did not express any opinion as to whether or not the fees were too high or otherwise, he advocated whatever would best do that. It would be a very great thing if they could stick together until the word "registered" had been got rid of. He did not think the question was one which could be disposed of off-hand at a meeting like the present, but that it would be better left to the Council.

Mr. Gregg thought one objection to the graded fees would be found in the extra labor entailed on the Registrar in keeping an account of the exact length of time members had been in business. He thought the best thing to be done was to drop the idea of augmenting the library, and some other things, draw on capital and reduce the fees for one year, hoping that with improving times, and the securing of the amendment, more interest would be manifested in the Association.

Mr. Edwards was opposed to asking Toronto members to pay any more than those outside.

The President explained that the scale of fees suggested in his address was prompted by information he had obtained from representatives of different sections to which the membership of the Association extended. He thought there was a great deal to be said in favor of only assessing members in proportion to the amount of benefit they derived from the Association. To men living in the smaller towns and villages, whose practice was limited, $10 was quite a serious item. He did not, however, think that the reduction would have the effect of keeping men in the Association—there would always be defaulters even if the fee was only one dollar. He thought that on the whole they might congratulate themselves that really very few members were retiring. On the formation of the Association a great many rushed in and registered, under the impression that by not doing so they would lose some right, and, not finding things just as they expected, after a time fell away. Yet there were 80 per cent. of those who had registered in good standing, so he thought the Association was really in very fair condition.

Mr. Burke suggested that a reduction of the fee by $5 be made all around.

The President said that would leave the Association without an income to meet necessary expenses.

Mr. Gregg thought a less reduction than that proposed by Mr. Burke would suffice, but thought the Association could afford some reduction.

Mr. Baker thought it was not so much a reduction of fees the non-resident members desired as something in the way of a return for them. He thought if meetings could be held three or four times a year, at which papers of interest could be read, and minutes published in pamphlet form, it would be regarded as some return for the fees.

Mr. Belcher agreed with the last speaker, that the periodical reading of interesting and instructive papers, and their distribution among the members who had not the opportunity of hearing them read, would stimulate interest in the Association. The members of the Society of Engineers received two reports a year, which contained a large amount of very valuable matter.

Mr. Gordon said there seemed to be some misapprehension existing in the minds of non-resident members as to the benefits derived by resident members from the Association. He in common with other architects in Toronto, belonged to three distinct organizations. As members of this Association, resident archi-

tects received no more benefits in the way of meetings or papers than were enjoyed by those living at a distance. But there was the Architects' Guild and the Architectural Club, each having fees of their own, and whose members received certain benefits. The only advantages enjoyed by city members of this Association over their brethren in the country, was that they had no railway fare to pay in coming to attend the annual meetings, and it was thought when the fees were fixed that a slight reduction in the fees of those outside might have the effect of equalizing matters in that respect.

Mr. Belcher said he had been under the impression that quarterly meetings were held by local members of the Association as was the case with the Engineers' Association. In that Association, papers were read in various towns before local branches of the organization, and then forwarded to the central society, and there discussed, and, if approved, printed and forwarded to the members of the Association generally.

The Registrar said that the suggestion made in Mr. Gregg's post card, and that made by Mr. Baker tallied very well with a letter which appeared in the CANADIAN ARCHITECT AND BUILDER a couple of months ago. The Association might encourage the delivery of papers on various subjects, which would be published in the CANADIAN ARCHITECT AND BUILDER and thus reach members who had not an opportunity of hearing them read. He noticed that all the members who did not pay their fees had something to say about hard times, and it must be borne in mind that the present was undoubtedly a time of considerable depression in business, many architects having very little work. As to advantages, it was true the resident members had the advantage of access to the library, but of that they had availed themselves to a very limited extent. As a matter of fact, the country members have been far more regular in the payment of their fees than the city members—the proportion of those who had not paid in the city being as 13 to 23, or almost one half not paid, whereas in the case of outside members the proportion was as 20 to 25, a very much better showing. Times, however seemed to be improving, and some architects who wrote to him spoke of being very full of work. Something had been said in regard to civil servants. He was not convinced that they were a class who should be conceded any special privileges. They were in receipt of a salary from the country for performing certain duties, and being in that way secured in a living, were able to make plans at a very low rate, and had in several cases come into competition with members who wished to receive adequate remuneration for their services. If any reduction was made in the fees of civil servants, some provision ought to be made to protect members from that kind of thing.

Mr. Gregg said that after what Mr. Dick had said, he would venture to ask him to second his motion, that for this year the fees of city members be reduced to $12 and those of country members to $8.

Mr. Dick regretted his inability to comply with Mr. Gregg's request; the motion did not coincide with his views at all. He did not think that anyone sitting in the present convention was sufficiently conversant with the details of the working of the Association to be able to say what the fees should be for the coming year. If a seconder could be found for the motion, he would move that the question of fees to be paid for the coming year be left to the decision of the Council with a recommendation from the Association to make them as low as possible, consistent with the proper management of the affairs of the Association.

The President expressed himself as not in favor of any temporary reduction of fees; he thought there should be a fixed and definite sum arranged which would carry along for at least some considerable time. The Association was not in a position to make any material reduction of the fees, and if it was the opinion of the Association there should be such reduction, the expenditure would have to be reduced.

Mr. Dick was unable to see the necessity of the fees being the same every year. He thought in a year when there was special legislation going on, or other action involving larger expenditures, the fees might be increased, and reduced again in years when no such need of the money was apparent. That plan was adopted in some of the friendly associations; in some instances the assessments for the coming year were based on last year's expenditures.

Mr. Kenney thought a great deal of discussion was being devoted to a matter in regard to which there was very little complaint. He thought the most expeditious way of settling the matter was to leave it in the hands of the Council.

The President said that the fact must not be lost sight of that if the amendment to the Act was secured, members coming into the Association in order to be enabled to retain the right to call themselves architects, ought to do so on a definite understanding that they would be liable for certain fees right along. He thought it would be better to maintain a definite fee. He could understand that after running for a period of five years it might be possible to make a reduction, but he thought it would be inadvisable to drop them from year to year on the experience of one year.

On motion of Mr. Gordon, the meeting then adjourned.

THE BANQUET.

On Wednesday evening about thirty members of the Association spent a thoroughly enjoyable time in the dining hall of the Queen's hotel in connection with the annual banquet. The occasion was made as informal as possible and its enjoyability seemed thereby to be enhanced.

Among the toasts, in addition to those of a patriotic character, were the following: "The Province of Quebec Association of Architects", responded to by Messrs. Gordon and Arnoldi; "The School of Practical Science," responded to by Prof. Galbraith; "The Ontario Association of Architects," responded to by Mr. Langton; and the CANADIAN ARCHITECT AND BUILDER," responded to by Mr. C. H. Mortimer. The company listened with pleasure to songs by Messrs. Webster, Gouinlock, Baker, Belcher and Commander Law, Mr. Belcher also giving in good style a recitation.

SECOND DAY.

The first article on the programme was the testing of some material in one of the testing machines of the School of Practical Science. A 6" x 6" pine post and a 3 inch wrought iron pipe were subjected to the test and broken. The members then assembled in the room of meeting to hear an interesting paper on "Iron Fireproof Construction in New York," sent by Mr. J.C.B. Horwood, a Canadian student in New York. The paper was read by Mr. Edmund Burke, who had had enlarged drawings made from Mr. Horwood's sketches, so that each point in the construction described was clearly illustrated. After the conclusion of the paper, the subject was discussed at some length by the members present, the discussion occupying the remainder of the morning. The paper and the discussion thereon will be printed in a succeeding issue.

AFTERNOON SESSION.

The President: According to this Agenda, we are now to take up new business. Any member who has any new business to bring before the Association will please mention it now. You are aware the discussion of yesterday afternoon was postponed until this afternoon, and it would be as well, perhaps, to have the whole matter gone into at the same time.

Mr. Gregg then affixed to the blackboard two maps of the Province of Ontario, and explained that he had prepared them for the purpose of illustrating a suggestion he had made to the Registrar for the division of the Province, for the purposes of the Association, into districts. He thought it would be of great advantage if the country were organized into centres. For instance, in Ottawa the Association had ten members, and in the neighbourhood there were two members. This would constitute one district. Then, in Kingston there are five members, and in that neighbourhood, in Napanee and Deseronto, two members. He would suggest that as the next division. The third would be Peterboro', in which there were only seven members. Then came Toronto, with seventy-two members, including Toronto Junction, and with Toronto he had connected Barrie and Owen Sound. Hamilton, Paris, Guelph, Galt, Welland and Thorold would form another district. The London Centre would comprise London, Stratford, St. Thomas, Petrolea, Chatham, Ridgetown, Kingsville, Windsor and Port Elgin. This was the least satisfactory division of all, because the places were so far separated, but there were not enough members to justify the formation of two Chapters. In view of the proposed legislation, he proposed the immediate taking up of this idea in connection with making a canvass in support of the proposed amendments to the Act. For instance, upon the Ottawa centre or Chapter would devolve the duty of interviewing members, not only in that county, but in Prescott, Russell, Glengarry, Stormont, Lanark and Renfrew. He thought no more efficacious plan than this could be devised for accomplishing the present object of the Association, to say nothing of what might be accomplished in other ways in the future.

Mr. Paull suggested the appointment of a committee, to see what could be accomplished along the proposed lines.

The President thought it would be better for the Convention, if the proposal was approved of, to make a recommendation to the Council for the division of the Province into these districts, and that they get the thing into working order. It would not do to have committees working who were not under the control of the Council, which was responsible to the Association. There was no doubt the Council would attend to it if such a recommendation was made. He thought if the divisions were constituted, they ought each to have an organization of their own, subject, of course, to the Association.

Mr. Gregg moved that the Council be requested to divide the country into districts and centres, in which meetings are to be held, such divisions to be called Chapters, and that the action be taken at once, with a view to such divisions being utilized in the canvass for the desired legislation.

Mr. Paull seconded the motion.

Mr. Belcher said he understood the proposal only to refer to the mode of obtaining the support of the various members of the Legislature in those districts.

Mr. Gregg replied that the formation of the Chapters was not for that express purpose; his idea was that if the country ever grew, and continued to grow, the architects, draughtsmen and young men in architects' offices in these districts might form branches of the Association in these centres, having libraries and reading rooms of their own. In the meantime, until the

legislation sought was obtained, the machinery of these Chapters might be utilized in furthering the desired cause.

Mr. Gordon considered the proposition a very radical one, and of great importance, as it would change the whole complexion of the Association, and was of opinion that it was something which ought not to be put through hurriedly. For his own part, he could perceive many points cropping up in regard to which he was not prepared to come to a decision. He questioned whether the plan would work outside of Toronto and Hamilton. While the idea was no doubt a good one for the consideration of the governing body, he thought it was something which ought not to be decided upon at the present convention, certainly not without a great deal more consideration than it had yet received. For one thing, it would necessitate further expense on the part of the members, in the way of travelling expenses going to and from the respective centres, rent of rooms, etc., and it was not well in any way to interfere with the financial position of the Association. On the whole, he thought the motion premature, and he would rather, if it were permissible, move that the whole matter be left to the consideration of the governing body, rather as a suggestion than as a resolution carrying instructions.

Mr. Burke suggested that members from the districts proposed be heard as to the practicability of the proposition.

Mr. Belcher, while regarding the plan as a good one as far as endeavoring to secure influence towards the passage of the proposed legislation was concerned, and believing that some such plan might ultimately be made to work with advantage to the Association on the lines foreshadowed by Mr. Gregg, still thought it better to wait until the affairs of the Association were in a rather more fixed condition than at present.

Mr. Power endorsed everything that had been said by Mr. Gordon. It was difficult to get members sufficiently enthused to come to the conventions, and he thought it would be uphill work to get them together in smaller numbers at local centres. The proposition might have the effect of bringing together outside members in their districts for a time, but little local troubles would crop up and put the members at loggerheads, and the thing would fail to work satisfactorily. But with a view to canvassing the country at present, he thought the proposition was a good one, although it sufficient enthusiasm existed in the districts the canvass might be carried on by individual members without the expense attendant upon any special organization.

Mr. Gouinlock seconded Mr. Gordon's motion, and expressed his entire adherence to the views of that gentleman.

Mr. Arnoldi, while approving of the idea for the purpose of interviewing and watching the members of the Legislature in connection with the effort to secure the desired change, was doubtful of the success of the other features of the proposal.

Mr. Gregg expressed his entire willingness to accept Mr. Gordon's amendment. The only objection that had been made to his proposal, however, was that the branches might be started and then die. He did not think there was any harm in starting them if they were only effective in the one thing of working for the required legislation.

Mr. Gordon described what in another organization with which he was connected are called District Conferences, in which members from the central body at stated times visit certain points in the province, and co-operate with local members in holding meetings. Perhaps some such plan might be made to work well in connection with this Association, that one or two members of the governing body should meet with local men in that way, and a deputation wait upon the members of the Legislature. He threw out this suggestion merely to show what was done in other organizations.

Mr. Wickson was of opinion that the matter might safely be left in the hands of the Council.

The President thought Mr. Gregg's idea was a good one, as was also that just suggested by Mr. Gordon. He thought the organization of the proposed chapters should be proceeded with if at all workable. If the country could be divided up as proposed, and arrangements made that some person in each district should attend to the matter of seeing the members of the Legislature, the Association could pay the actual expenses incurred in doing so. For instance, if Mr. Arnoldi, at Ottawa, could arrange to see several of the members for constituencies in that district, let his expenses in doing so be paid. The same might be done by Mr. Power in Kingston, and by others in various places. He thought, however, it would be better to leave the matter to the Council. A great many members of the Council were present, and would through the medium of the present debate be fully aware of the wishes of the Association in regard to it.

Mr. Gordon's amendment was then put to the meeting, and carried.

CHANGE OF TIME OF HOLDING CONVENTION.

Mr. Arnoldi said he experienced a great deal of inconvenience in attending the Convention at the time at which it was now held, and thought that others must be similarly inconvenienced. He, therefore, moved that the by-laws of the Association be changed, so as to admit of the Convention being held at some time in the month of December.

Mr. Townsend said he thought a notice of motion would be necessary.

Mr. Belcher seconded the motion, though personally he found no difficulty in attending in February, but he thought the general convenience might be better served by the change.

Mr. Darling thought it would be convenient to hold the Convention just before Christmas; many people during the holiday time were in the habit of visiting Toronto, and that arrangement would enable them to kill two birds with one stone.

Mr. Power preferred some time in January. Members had not always their old work finished in December, and he thought the latter part of January, before new work began coming in, was a more convenient time.

The Registrar, as a point in favor of January, said by that time the books would be closed, which would not be the case in December, unless the beginning of the financial year was changed.

Mr. Henry expressed himself in favor of the change to December, and moved that the Council be requested to consider the desirability of making the alteration.

Mr. Townsend agreed with Mr. Henry that the matter had better be left to the Council.

Mr. Darling thought the Council was being loaded up altogether too much; surely some business at least might be done in the Convention. If a change was to be made he believed in doing it now.

Mr. Burke spoke in favor of January; he thought about the middle of that month would be an opportune time. He noticed, too, that the examinations came on at a very awkward time; perhaps a change could also be made in regard to them.

The President said he thought objections to coming to the Conventions would be raised by some members, no matter at what time it was held; they were always busy when the Convention took place. As the financial year ended on the 1st of January, it would be better to have the Convention as soon after that as was reasonable and convenient. At that time members generally had their previous year's business wound up, and had not yet got into the spring work. An objection to December would be found in the fact that although at the present meeting little had been done in the way of reading papers, one of the objects of the Conventions was to secure the preparation and reading of papers of interest, and members could hardly be asked to prepare them for December. A certain amount of preparation had also to be made by the Council, which would make December inconvenient. He thought from the 7th to the 15th of January would be a convenient time.

Mr. Power moved in amendment, that the Convention be held on the third Tuesday in January, but at the suggestion of another member changed it to the second Tuesday in January.

Mr. Aylesworth seconded the motion.

After some further discussion, the President suggested the first Tuesday in January after the 10th, and Mr. Power consenting to that change in his motion, it was put to the meeting, and carried.

VOTING BY LETTER BALLOT.

Mr. Arnoldi said that even after every provision had been made for the convenience of members attending the Convention there was still a number who really were unable to come, and in order to sustain their interest in the affairs of the Association, he thought they should not be debarred from voting; he would therefore move that the by-laws of the Association be so amended as to admit of such members voting for members of the Council by letter ballot.

Mr. Edwards had great pleasure in seconding the motion, he was really very much pleased with the motion, for, as things are at present, the nomination really carried with it the election of the nominees. Somebody knew how the thing was, but the candidates themselves did not know, nor did the Association. He therefore thought that voting by letter ballot would be a step in the right direction, as it would extend the franchise to those who were unavoidably absent from the convention. He heartily endorsed the proposal.

Mr. Gouinlock differed from the mover and seconder of the motion. He regarded the opportunity of voting as an incentive to the members to attend the Convention, and, as it was difficult enough, even with the existing inducements, to get them to attend, he was opposed to doing anything like placing a premium on absence from the meeting.

Mr. Burke thought the attendance of members at the convention afforded an index as to how the Association ought to vote for members of the Council; the men who were to be found attending the meeting were those who ought to be in the Council.

Mr. Power foresaw that there would be a difficulty in connection with the letter ballot which was now experienced in reference to the nomination papers sent out; that is, there would be voting for persons who lacked the necessary qualifications, and who were ineligible. Of course such names would be struck off by the Council, but it might engender ill feeling.

The President did not think that would be found an insuperable difficulty.

Mr. Kay had no faith whatever in the letter ballot. In the Odd Fellows, to which he belonged, that method had been tried, and on two successive years had resulted in an abortive election. He saw by the newspapers, that the same trouble had been experienced by the Medical Association, and the Druggists also had the same trouble.

Mr. Belcher said that the Society of Engineers sent to each member a list, such as the members present now had, and they

just marked with a pen through each name other than those they voted for, and returned the paper to the Secretary, and on that the members of the Council were elected.

Mr. Darling enquired how many of the people to whom nomination papers had been sent had filled them up and returned them ; he thought that would be some guide.

Mr. Arnoldi did not think that would furnish any guide. He knew that in Ottawa a good deal of interest was taken in this matter of election of members to the Council, the members there consulting with each other in regard to it. As to members not showing enough interest to come to the Convention, in the case of Ottawa there were sixteen members residing there, of whom he was the only one on the committee. Now it was not that these men had no interest in the Association—they had a great interest—but, owing to the nature of their duties, they really could not get away.

The Registrar, answering Mr. Darling's q uestion, said that out of 105 nomination papers sent out, 27 had been returned.

The President said that what had just been stated by Mr. Arnoldi was in itself a possible ground of objection to the letter ballot. If the members in Ottawa united on a candidate, and determined to elect him, and there was no such combination in other places, the candidate so supported would be sure of election. Of course, if there was no such arrangement and concentration of the vote, and each member voted as the expression of his individual opinion, that trouble would not exist, but there was that possibility. Sixteen votes concentrated in that manner would have a very decisive effect on the election. Of course, what he had said regarding Ottawa might apply to Hamilton, London, or any other place, where there were a number of members.

Mr. Townsend thought the meeting together of the members in the annual convention was a matter of great importance, and the introduction of the system of letter ballot would have the effect of reducing the number of those attending the Conventions. He instanced, in support of his contention, that yesterday there were not nearly so many members in attendance as to-day, the reason being that the election brought out the members. He would regard the adoption of the letter ballot as a very great mistake.

The President said that there was no doubt a degree of hardship to the Ottawa members, in the fact that they were practically shut out from the Convention. He would now put the motion : "That the by-laws of the Association be so amended as to enable members to vote for members of the Council by letter ballot." Lost.

ELECTION OF PRESIDENT.

Mr. Darling said that if the growth of the Association continued, and it attained the position which was looked forward to, it would be an honor anyone might covet to be its President, and he felt that it would be very much better that the President should be elected by the open vote of the Association, and not merely by a vote of the Council, as was now the case. He therefore desired to offer a motion to that effect.

Mr. Edwards asked if it was the intention to have an open vote ?

Mr. Darling said that was not the intention, but that the election of the President should be decided by the vote of the Association at large, not merely by the Council.

Mr. Gordon wished to second the motion ; like Mr. Darling he thought it far better that this should be a matter in which the Association at large would take an interest, and that the man placed in the position of President should be chosen by them as the one they thought best suited to fill the office.

Mr. Darling said the proposition might necessitate some change in the constitution, because the President was the one who had to sign checks, etc., and if the President elected lived at a distance away, it would be a serious obstacle unless some alteration was made. His idea would be to elect the President more as an honorary thing and let the Vice-President do the work.

Mr. Townsend, while admitting there was a good deal to be said in favor of Mr. Darling's proposition, called attention to the fact that the Association had not the power to make such a change without first getting the Act of Incorporation changed to allow of it.

The President suggested that Mr. Darling should change his motion to a request that the Council would try to secure the change in the Act necessary to admit of voting for the President by the Association at large.

Mr. Darling thought he would make the motion as one of instruction to the Council.

Mr. Wickson questioned the wisdom of bothering the Government about any more changes to the Act. Why could not the Association suggest to the Council the name of the person they desired to see elected as President? They instructed the Council in regard to other matters, why not in regard to this ? (Laughter.)

Mr. Darling urged as his reason for bringing the matter forward, that he thought such a mode of electing the President would carry with it greater honor. He had conceived that idea and one or two other members to whom he had spoken seemed to entertain the same view. For that purpose he made it a motion that the Council take the matter up, and endeavor to secure the necessary change in the Act.

Mr. Belcher inquired if it would not be prejudicial to the object in view, of getting the word "registered" withdrawn from the Act, to make too many suggestions to the Government at the present time?

Mr. Darling said if he for one moment thought that would be the case he would not press the matter. The one essential thing at present was to get rid of that word, and if that could be secured he was willing to abandon anything else.

Mr. Belcher said it had been suggested to him by Mr. Arnoldi, who was a more wily politician than he could claim to be, that the more changes they could suggest at the one time the better, as that would have the effect of concealing what was the real point they wanted, to which there might then be less opposition. (Laughter.)

Mr. Townsend seconded Mr. Darling's motion.

Mr. Power suggested that no action be taken until the two things could be brought forward together.

Mr. Darling said no doubt if the Council found that seeking the change in regard to the mode of electing the President at all prejudiced the prospects of the other change, they would at once drop it.

Mr. Kay thought there was a great deal of sentiment about this matter. The present method of electing the President was the one pursued by all Joint Stock Associations, Agricultural Associations, and almost every other incorporated body.

Mr. Paull said that in the Old Country the Mayor of a Corporation was elected by the Councilmen in just the same manner the President of the Association was now elected.

The President said that while he personally had a good deal of sympathy with the idea, it was still the fact that if a man could be elected to the Council by the Association, he should also be capable of securing election as President of the Association. If the Association as a body was prepared to elect any member on the Council, they would likely also elect him to the Presidency as well, and the Council would certainly be in a much better position to elect a President than the members as a whole. At the same time, as far as sentiment was concerned, he favored the election of the President by the Association rather than by the Council. As a pure, downright, business question it was another matter, and he did not know but what the present method was the most straightforward arrangement. However, if the feeling of the Convention was in favor of the change, he did not anticipate any trouble on the part of the Government, who he thought were desirous of meeting the wishes of the Association. He then requested the members who were in favor of the motion, "That the Council be requested to consider this matter, with a view to having the Act changed so as to permit of the election of the President by vote of the Association," to signify their approval of it.

Mr. Townsend said he understood Mr. Darling's motion to be that the office of President should be purely honorary, and that the work should be done by a Vice-President elected by the Council ?

Mr. Darling replied in the affirmative.

The President did not think that would be right ; he thought the man who did the work should enjoy the honors ; he did not think any man would care to do the work on any other terms. Perhaps, after all, the best plan would be, after the nine members of the Council had been elected, to have a vote of the Association to elect a President from among them. He thought that would be practicable.

Mr. Henry thought it would be sufficient if the Association expressed its wishes to the Council.

Mr. Burke said that there were three members retiring from the Council each year. By the plan proposed, the Council might elect one of those men President, which would give him a fourth year, and debar another man from coming in.

The President pointed out that the Council would be elected first, and when elected would bring on a vote for the Presidency.

Mr. Burke said he was referring to Mr. Darling's motion.

The President asked Mr. Darling if it would meet his idea, to let the Association elect a President from among the nine members elected to the Council ?

Mr. Darling replied that it had occurred to him that it would be adding honor to the office of President if the election was by the Association. Of course the matter was one which would have to be put in workable shape by the Council, and he was satisfied that the Council should undertake it.

The motion as last amended was then carried.

A CIRCULATING LIBRARY.

Mr. Arnoldi said he thought it would be pleasing to the country members if the books of the Association in the library could be sent holus bolus to Peterboro', Hamilton or other places, and retained there for a stated time, say three months, to enable the local members to enjoy the advantage of using them. He tendered a motion to that effect.

The motion having been seconded by Mr. Power :

A member inquired if it was not the fact that members residing outside of Toronto could have any of these books by simply writing to the Registrar.

The President said that was the fact ; any member, no matter where he lived, by sending a card to the Registrar, could have any book in the library sent to him at once, if the book was in the library, and if not, as soon as it was returned by the member then having it out. Of books for which the demand was great, there were three or four copies in the library.

Mr. Edwards said, while the proposition seemed all right on its face, it would be necessary to send along the Librarian with the books, and to engage a room in which to keep them. The matter was now in a practicable shape, and he advised keeping it so.

Mr. Gouinlock said the proposition suggested to him the idea of a travelling dairy.

The motion was lost.

ADDITIONS TO THE LIBRARY.

Mr. Gordon brought forward a motion of instruction to the Library Committee, coupling with it a vote of thanks to that committee for the manner in which they had in the past served the interests of the Association. He thought it was highly desirable to make the library as complete as was consistent with the state of the funds of the Association, and he therefore asked that they would take into their consideration the desirability of applying a portion of the capital account to the purchase of books. (Hear, hear). It was along that line that members could be shown they were getting something for their fees. He believed that the members who had received books from the library would feel at the end of the year that they were getting a very tangible return for their money.

Mr. Paull seconded the motion.

The President stated that it was the intention of the Council that the library should be increased, but that before taking action in that direction they wished to feel that they had behind them the support of the Association in making the necessary expenditure. He quite agreed that it was better to invest some of the capital in books rather than have it lying in the bank.

Mr. Gordon said that at all events the interest on the investment in the bank, and whatever was cleared from revenue above the necessary expenses, should be applied in this way.

Mr. Burke directed attention to the fact that it would be necessary this year to draw upon capital account for legislation expenses.

The motion was carried.

REDUCTION OF FEES.

Mr. Edwards asked if anything had been done towards the reduction of fees.

The President said that matter was now before the meeting ; it was open to anyone to bring in a resolution regarding it.

Mr. Gregg moved that the fees for city members be $12 per annum, and for country members $8 per annum, and that the Council consider the advisability of making those fees permanent.

Mr. Edwards was opposed to making any distinction between city members and others.

Mr. Helliwell suggested that, instead of making any general reduction or changing the amount definitely, for the present year the Council should allow a certain discount to be fixed upon the fees.

Mr. Darling thought the idea a good one, and that the discount should only be given to those who paid their fees at the first part of the year.

Mr. Burke also thought the suggestion a very practical one.

The President thought there would be difficulty in enforcing the latter part of the proposition.

Mr. Dick asked why could not the fees for the present year be reduced as suggested in the President's address, or upon that line. Then, if any moneys were wanted for legislation, or any other special purpose, he thought members would be only too glad to respond ; he knew that as far as he was personally concerned he would be very happy to do so.

Mr. Baker thought the present fee was a very reasonable one.

The President said the suggestions he had made were based upon a fairly wide knowledge of the feelings of outside members, and he thought they were reasonable in every way. The proposed arrangement was one which would enable the Association to retain its members. He certainly thought the amount paid in fees ought to be proportionate to the benefit derived by the member. Then, at the present time men came up for the examinations, and did not enter as members, and he thought the Association ought to be in a position to force them to become members as soon as they had passed the examination. To draughtsmen who had passed the examination the payment of $5 would not be a serious thing, whereas $15 was a considerable item. He also thought that for members working for corporations, or the Government, $5 would be a very fair fee, so long as they did not practice professionally ; those who put themselves in competition with other architects ought, of course, to pay the full fee. It would not be difficult to establish whether they were doing that. He thought it would be a mistake to have the fees fluctuating from year to year, and it would also be lacking in dignity. If the fees at present were too high, he was in favor of dealing with the matter in such a way as to satisfy the members. If there was any discontent, let them state their views. As a matter of fact, he thought there was very little dissatisfaction, when it came to the point, for nearly all the members who had signed the petition had paid their fees. He knew there were some who considered their fees too high, some in the city of Ottawa, and he felt that their complaint was not without reason, because they were in the employ of the Government, and paid their fee of $10 to the Association without receiving any direct benefit in return for it.

The President then read again that portion of his address in which the fees were referred to, and continuing, said he had made the suggestions after consideration of information he had received from various sources, and he thought while the proposed reduction was a reasonable one it would not so seriously diminish the revenue of the Association as to cripple it. He thought it might at all events be made to work for four or five years, and then, if it was found desirable, the higher fee could be reverted to.

Mr. Kenny seconded Mr. Gregg's motion.

Mr. Arnoldi moved that instead of reducing the subscription, the Council be recommended to make a rebate to each of the different classes mentioned by the President, on their making application for the same.

The Registrar seconded the motion.

Mr. Arnoldi said by that method, if a man was a civil servant, and only wanted to pay the smaller fee, he could secure the rebate by asking for it.

Mr. Gouinlock was unable to see why civil servants should get any reduction.

The President said that any such reduction to members of the civil service would be on the express understanding that they were not to practice outside of their departmental work. If they were known to take even one job, they should pay the higher fee. Another point which occurred to him was, that young men starting in the city of Toronto would find an assessment of $15 would come rather heavy on them, and he thought in such cases, if they desired it, the fee should be only $10.

The President then said he would submit Mr. Gregg's motion in amendment as opposed to the other ideas, and then, if that was lost, a decision could be made between the other two.

Mr. Gregg's amendment was then submitted to a vote, and was lost.

The President then said the vote would now be between a straight fee and Mr. Arnoldi's motion.

Mr. Gordon corrected the President, and said that his resolution was, that the Council be recommended to grade the fees in general accordance with the suggestions contained in the President's address, not necessarily binding them on that line.

The Registrar suggested the amalgamation of Mr. Gordon's motion and Mr. Arnoldi's amendment.

Mr. Gordon said there was nothing in Mr. Arnoldi's motion which conflicted with his.

Mr. Burke did not think the Council should be hampered with anything of this kind. There had been a very general expression of opinion, and he thought the matter should now be simply referred to the Council to thresh out and decide what was best.

Mr. Arnoldi thought it would be well, there having been so much talk, to have a motion carried.

Mr. Burke pointed out that there would be difficulty in the grading.

The President thought these matters would straighten themselves out ; it would not do to object to a straight principle because there might be difficulty in carrying it out. He thought the best way now would be to take a vote of those generally in favor of Mr. Gordon's motion.

The vote being taken, it was shown that the meeting was generally in favor of the motion of Mr. Gordon.

Mr. Gordon brought forward a motion in favor of holding future Conventions at some place down town, which would be more convenient than the School of Practical Science.

Mr. Darling, on the score of convenience, favored the proposal to hold the convention down town, at the same time expressing his sense of the obligation the Association was under to the Government for having placed at their disposal the room in which the present meeting was held. He thought, however, if the meetings were held down town, members would be able to attend them, and at the same time give some little attention to the business of their offices.

The Registrar thought that would be a decided disadvantage, for members would then be trying to attend to things which might very well be left to another day ; he thought it was better they should prepare to devote the whole day to the business of the Convention. Further, it was not well to lose sight of the advantages accruing to the Association from being in this manner affiliated with the School of Practical Science, which was the basis of their education, and the practical advantages afforded by the use of the magic lantern, which in the able hands of Mr. Wright was of such service in illustrating papers. With it the very smallest drawing could be reproduced on a very large scale on the screen, to say nothing of the many beautiful architectural illustrations, some of which Mr. Wright had kindly exhibited during the present meeting.

Mr. Burke also deprecated the idea of removing the Convention from the School of Practical Science, on account of the intimate relations existing between it and the Association, and in view of the future objects of the Association.

No action was taken in regard to the proposal.

ELECTION OF MEMBERS OF THE COUNCIL.

The election of three members of the Council was then proceeded with. Mr. Wright, of the School of Practical Science, and Mr. Emerson, stenographer of the Convention, were requested to act as scrutineers.

Three ballots having been taken, the scrutineers declared that

Messrs. Darling, D. B. Dick and Edwards had been elected to the Council.

Mr. Symons then moved that the Council be recommended to elect Mr. D. B. Dick to the office of President.

Mr. Kay seconded the motion.

Mr. Townsend, while expressing himself fully in sympathy with the result of the balloting, and the recommendation it was desired to make, did not think in the present state of the Act it would be a proper course to adopt; he objected to the principle.

The President said if that was the case the motion would have to be dropped, as there was no power on the part of the Association to pass such a motion.

Mr. Symons being desirous, on account of the delicate health of his partner in business, to relinquish the duties of auditor, it was moved by Mr. Gordon, seconded by Mr. Burke, that Messrs. Langley and Gemmell be the auditors for the coming year. Carried.

Mr. Baker inquired if it was not in order now to nominate the committee to assist the Council in the legislation which was being sought.

Mr. Townsend asked if it had not been decided that the Council should appoint members of that committee.

The Registrar said the sense of the meeting, at the time the question was being discussed was, that the selection should be made by the Convention, but no vote was taken on the subject.

The President said it was better to have a vote on the subject, which being taken, it was found that the meeting favored leaving the appointment in the hands of the Council.

The President remarked that he felt it incumbent upon him to thank the Association for the unlimited confidence they seemed to repose in the Council.

During the progress of the balloting for members of the Council, the Registrar read a paper contributed by Mr. R. C. Windeyer, which was listened to by those present with marked interest. At its close a vote of thanks, moved by Mr. Townsend, and seconded by Mr. Belcher, was accorded to Mr. Windeyer. This paper, owing to lack of space, is held over for future publication.

On motion of Mr. Baker, seconded by Mr. Power, the thanks of the Association were tendered to Hon. G. W. Ross and the Faculty of the School of Practical Science, for the use of the building, and the courtesy extended to members by Prof. Galbraith and Mr. Wright.

On motion of the Registrar, seconded by Mr. Burke, a vote of thanks to the retiring Auditor, Mr. Symons, was carried.

On motion of Mr. Gregg, the Registrar took the chair, and a vote of thanks was then tendered to the President, amid hearty applause.

On motion of Mr. Belcher, seconded by Mr. Arnoldi, the Convention then adjourned *sine die*.

A NEW DEPARTURE.

The suggestion was made in this journal that an exhibit of materials employed in building construction would form an interesting and instructive feature in connection with the annual convention of architects.

The idea was this year taken hold of by Mr. Taylor, manager of the Toronto Radiator Manufacturing Co., who invited and received the co-operation of the following firms: The Gurney Foundry Co., James Morrison, Rice Lewis & Son, Warden King & Son, the Steel Clad Bath & Metal Co., and the Canadian General Electric Co.

The architects were given an invitation to make an inspection of the establishments of the firms mentioned on the day following the close of the convention, which invitation was largely accepted.

Entering sleighs at half-past nine in the morning, they were conveyed first to the extensive manufactory of the Gurney Foundry Co., on King street west, through which they were personally conducted by Mr. Edward Gurney and Mr. Carrick, the manager. They were shown the various styles of hot water water boilers, radiators, etc., manufactured by the company and had explained to them as far as the time at their disposal would allow the details of construction.

The next stopping point was the factory of the Toronto Radiator Mfg. Co., on Dufferin street, where with a few words of welcome they were received by Mr. Taylor, the manager, who explained that the establishment was the most extensive in America manufacturing only radiators. Beginning with the show room where finished radiators in variety of design and adapted for almost every conceivable position were exhibited, the visitors were guided through the various departments and shown the methods employed in their manufacture. In many respects these were similar to those already witnessed, but in a few important particulars, as for example the method of jointing the sections of radiators, they differed.

It was a matter of observation in both establishments that the utmost thought and attention are given to perfecting the article manufactured, while at the same time by means of labor saving machinery and devices reducing to the lowest possible point the cost of production.

At Messrs. Rice Lewis & Sons' extensive hardware establishment on King street east the company next alighted, and were shown the newest things in this important department of interior finish. Amongst these were locks of the finest quality and mechanism, door finishings of aluminum, and bronze goods with sand-blast finish and having pleasing variation in color, and which the visitors were assured would never tarnish. These goods are excellent in design and are adapted to the principal architectural styles.

Fifteen minutes after leaving this interesting establishment, the company found themselves not less interestingly employed in discussing amid artistic surroundings, the merits of one of Webb's choicest menus. The proceedings were presided over by Mr. Taylor, having on his left Mr. Gurney, and on his right Mr. Curry.

Due appreciation having been shown to "material" things, brief speeches were made by the chairman, and by Messrs. Gurney, Lee (of Rice Lewis & Son,) James Morrison, Gregg, of Warden King & Son, Booth, of the Steel Clad Bath & Metal Co., Andrews, of the General Electric Co., and Cassidey, Secretary of the Canadian Manufacturers' Association.

On behalf of the Ontario Association of Architects, Messrs. Curry and Burke expressed appreciation of the hospitality of the manufacturers and of the opportunity of acquiring information which had been afforded to the members. Mr. Curry took occasion also to thank the Manufacturers' Association for the assistance which they had given at Ottawa to the deputation of architects which some months ago waited on the Government to urge that a proper duty be imposed upon the plans of foreign architects. He hoped that in any future efforts which the architects might make in this direction they would have the support of the manufacturers.

It was pointed out by some of the manufacturers present that American and not Canadian materials had usually been employed in buildings erected in Canada by American architects, and that in consequence the manufacturers were directly interested with the architects in endeavoring to have the present condition of things remedied.

Mr. Gurney was of the opinion that the remedy would only be found in the passing of a contract law similar to the alien labor law existing in the United States. The architects were assured of the support of the manufacturers in their endeavors to secure the enforcement of a more equitable tax on foreign plans.

After a couple of hours had been pleasantly and profitably spent the round of inspection was resumed.

In the establishment of the Steel Clad Bath Co., on Queen street east, was found a young, rapidly developing and prosperous industry, vigorously managed and equipped with every facility for achieving the maximum of efficiency at the minimum of cost. The enterprise of the company extends also to the other side of the line, another factory being located in Detroit, from which the American market is supplied.

Considerable time was spent to advantage in going through the various departments of Mr. James Morrison's brass manufacturing concern, on Adelaide street west, it being one of the largest of its kind on the continent.

The show rooms of Messrs. Warden King & Son, of Montreal, manufacturers of the well known "Daisy" hot water boiler, are situated on the opposite side of the street, and here a pleasant half hour was spent. This agency is in charge of Mr. Fairbairn.

A visit was likewise made to the offices and show rooms of the General Electric Co., at 95 Front street west, where a handsome exhibit of electric fixtures was shown.

The manufacturers having engaged a section of the theatre for the benefit of the visitors, quite a number witnessed the Duff Opera Company's performance of "The Basoche."

This closed a day of unusual interest, and so agreeable and profitable did the occasion prove to all who participated, that we are assured the first attempt in this direction is likely to be repeated at regular intervals in the future.

PERSONAL.

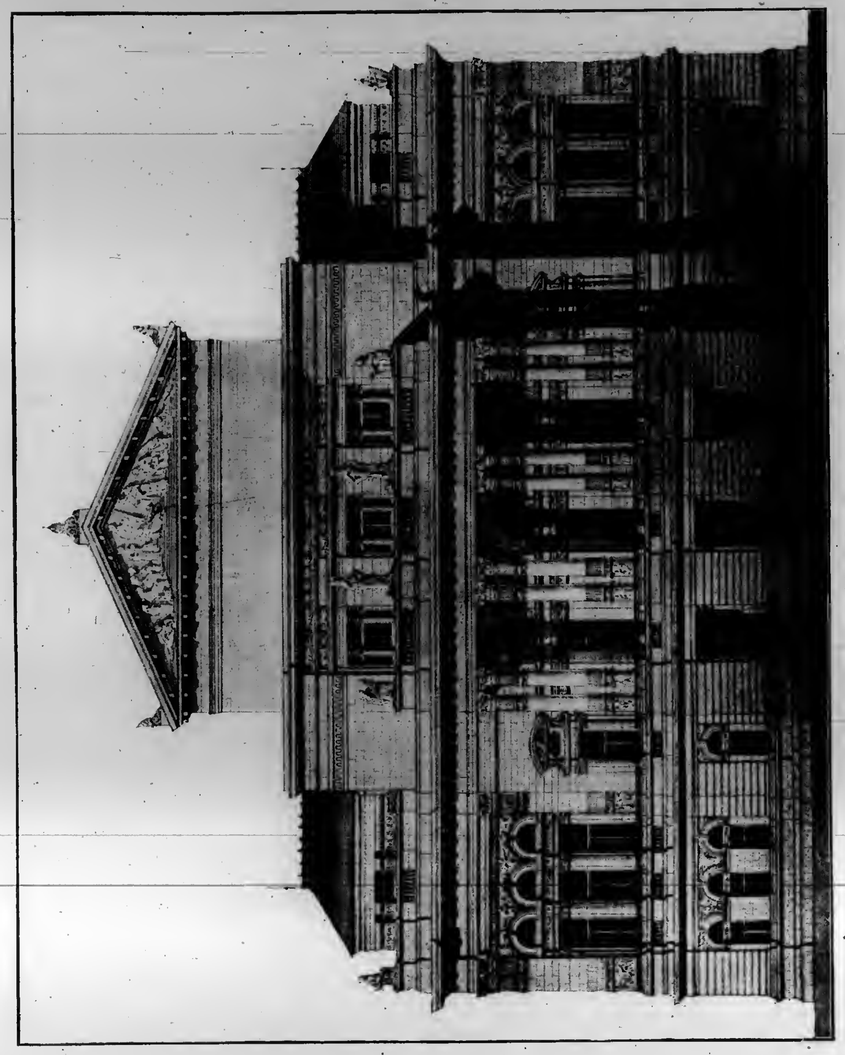
Mr. D. B. Dick, Treasurer of the O. A. A., is at present in Europe.

Mr. J. A. Pearson, of the firm of Darling, Sproatt & Pearson, architects, Toronto, is in St. Johns, Nfld., where the firm have secured considerable work.

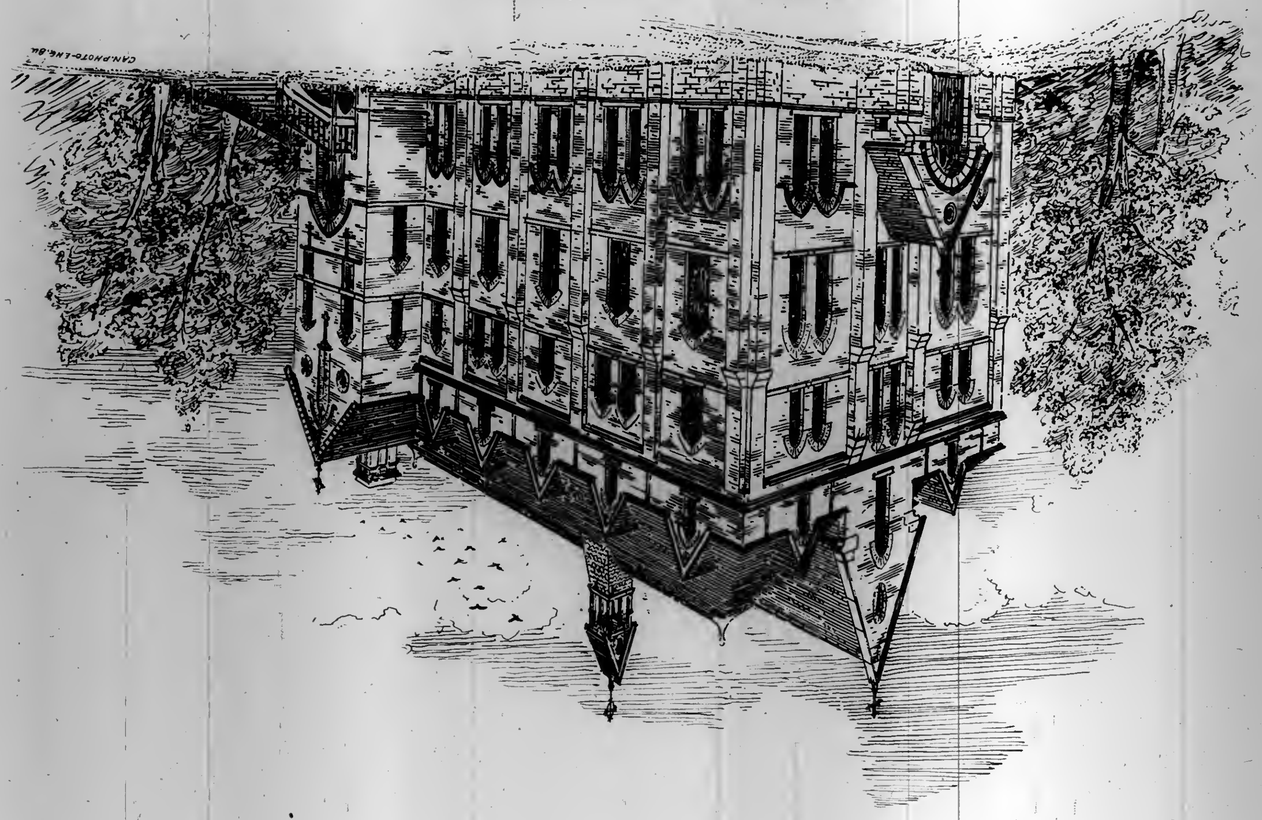
Messrs. Edmund Burke and W. R. Strickland have been appointed representatives of the Toronto Architectural Guild on the Toronto Technical School Board.

Robt. J. McCallum, architect, son of Robert McCallum, engineer of the Public Works Department of Ontario, died at his father's residence, Toronto, on the 12th inst.

The dead black finish which so often is used for cast iron backs and jambs for fireplaces, as well as for the ornamental iron work sold by the grate manufacturers, is not only always much admired, but it is quite durable as well. Painters are frequently asked to finish old iron work, that is to be repaired, in the same way, but they almost always look upon it as some secret process, the knowledge of which seems to be confined to the heater men. The process is really neither difficult nor secret, but is simply not a paint at all. The iron is first of all heated to redness and then plunged into a bath of linseed oil. Some of the oil appears to unite with the iron on the surface in some way, to form a chemical compound, similar in a measure to the black oxide produced by the Bower-Barff process. Another portion seems to be actually baked upon the surface of the iron, forming a sort of coating, which might perhaps be compared to the glaze which is baked upon porcelain.—*Painting and Decoration.*



Design for a Concert Hall and College of Music.
G. F. Stalker, Architect, Ottawa, Ont.

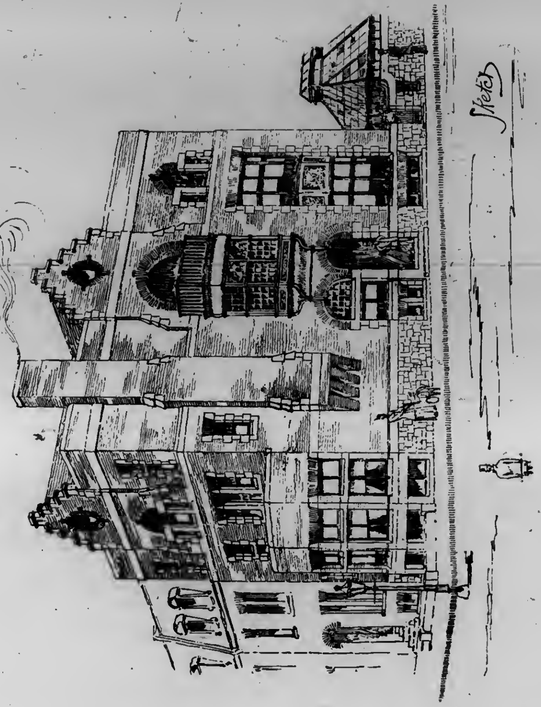


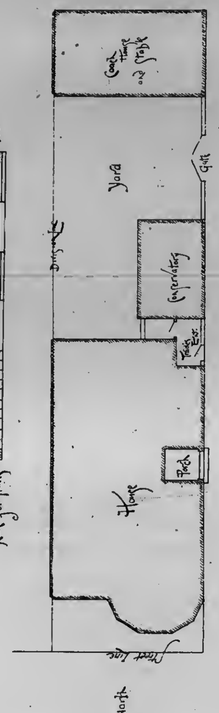
ST. BASIL'S · NOVITIATE · TORONTO · ONT.

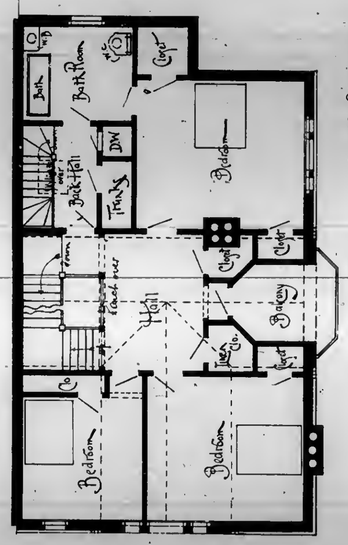
POST & HOLMES, ARCHITECTS,
TORONTO

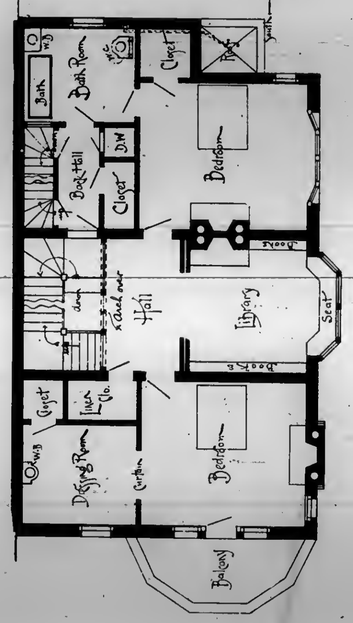
C.C.A.B. - Competition for a City House

Design by "Eviction"



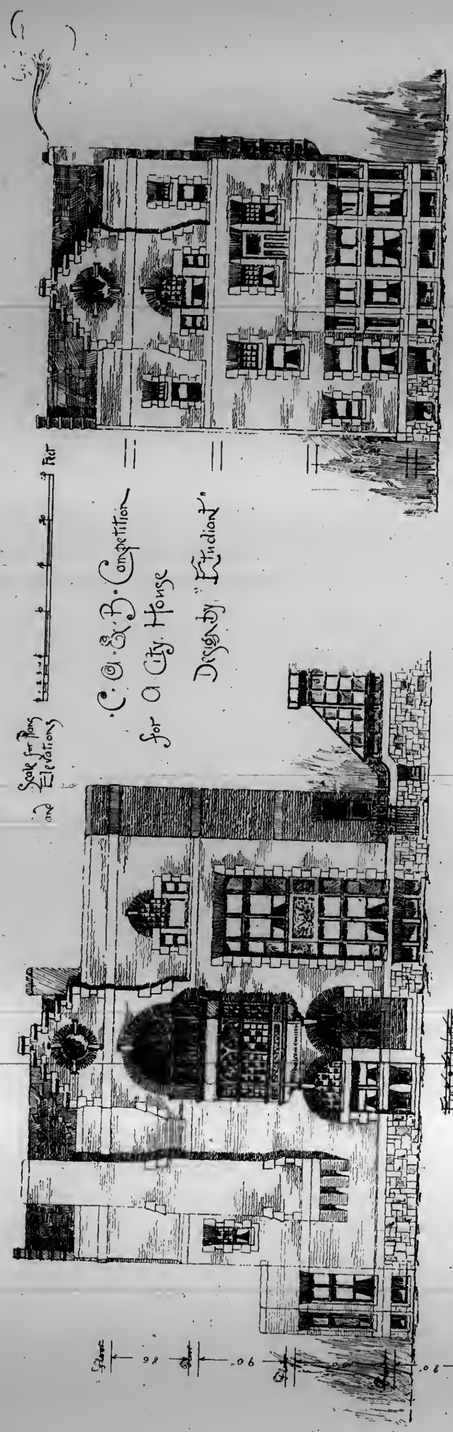


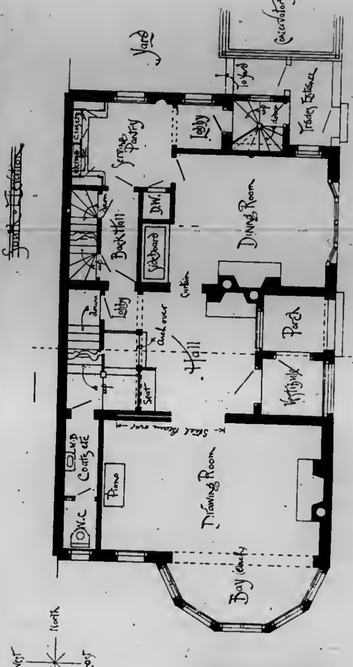


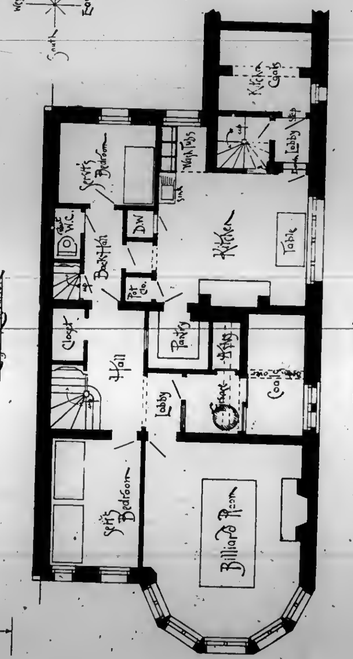


C.C.A.B. Competition for a City House

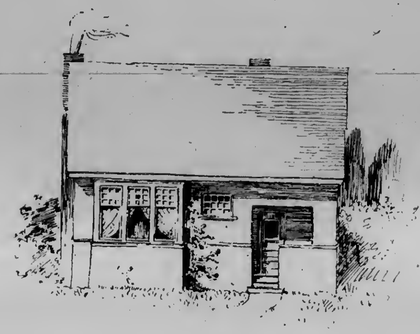
Design by "Eviction"



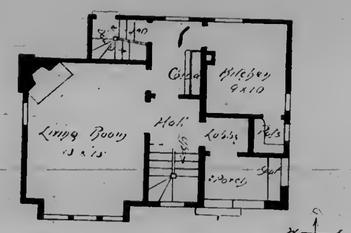




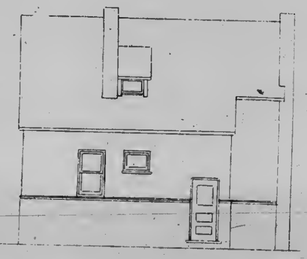
DESIGN FOR AN $800 COTTAGE.



South Elevation

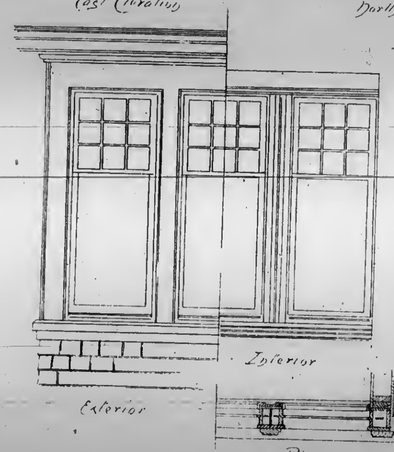


East Elevation



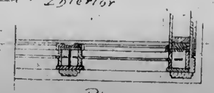
North Elevation

West Elevation

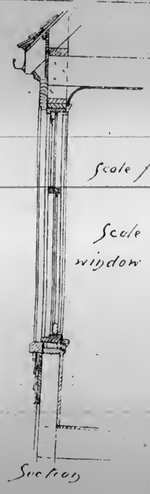


Interior

Exterior



Plan.



Section

Scale for plans

Scale for details of bay window

CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—No. III. TORONTO AND MONTREAL, CANADA, MARCH, 1893. { PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
64 TEMPLE BUILDING, - - MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	D. B. DICK, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	JOHN E. BELCHER, Peterboro'.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

FRANK DARLING,	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
W. A. EDWARDS	Hamilton.
S. G. CURRY	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	V. ROY, Montreal.
1ST VICE-PRESIDENT	J. NELSON, Montreal.
2ND VICE-PRESIDENT	H. STAVELEY, Quebec.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
J. J. BROWNE	Montreal.
J. HAYNES	Montreal.
D. OUELLET	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
GEO. MOIR, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. J. HILL.
JOHN ALDRIDGE.
JAS. CRANG.
J. LISTER NICHOLLS.
WM. BOOTH.
JAS. ISAAC.
JOHN LOGAN.
WM. PARK.
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

THE celebration of the two-hundred and fiftieth anniversary of the founding of the city of Montreal is to take place on June 24th and four following days. The inauguration of the National Monument Building on St. Lawrence Main street will take place on that occasion.

WE hope it will not be regarded as a reflection upon the work of Hamilton plasterers that the vibration caused by the running of the trolley cars through the streets is said to have caused the plaster to fall off the walls of the buildings of that city.

MR. T. C. Keefer, the celebrated engineer, who was the Canadian Commissioner at the Paris Exposition, thinks that a very striking exhibit of Canadian Engineering as manifested in the great public works of Canada, should be shown at the Columbian Exhibition at Chicago.

IN this age of keen competition it is refreshing to come across a trade that needs not to advertise, but is advertised for. Mr. George Johnson, Dominion statistician, of Ottawa, has received a letter from Georgetown, Demerara, asking for the names of firms able to supply ready-made houses. If any of our readers are able to fill such orders, they may, by communicating with Mr. Johnson, find an opening for doing business in this line.

THE designs submitted in the final competition for the proposed Government buildings at Victoria, B. C., have been forwarded to Montreal, where they were examined by the experts, Messrs. Curry and Taylor. Mr. Curry has gone to Victoria, taking with him the drawings. After conferring with the commissioner of Lands and Works, of British Columbia, the final decision of the competition will be made. We hope to be able to publish full particulars regarding the result in our April issue.

OUR New York contemporary, *Metal*, alludes to the deceptive practice of Canadian hardware dealers in branding their goods with fictitious names of United States manufacturers. Whatever cause for complaint Americans may find in this practice, Canadian manufacturers and Canadians generally should protest against it on the ground that it implies the inferiority of Canadian manufactured goods, and perpetuates the false notion, already too prevalent, that a foreign made article is necessarily superior to a domestic one.

MUCH interest has been awakened by the publication in the ARCHITECT AND BUILDER for February of the results of the series of tests of building stones conducted at the School of Science, Toronto, under the direction of the Ontario Association of Architects. The tests included samples of both native and foreign stones. the excellent showing made by the former should be a matter of satisfaction to the quarry owners, and to architects and builders desirous of assisting to develop Canadian resources by using native material whenever its quality can be shown to be equal to that of foreign productions.

OUR esteemed Indianapolis contemporary, *Stone*, discusses in a recent issue the subject of continental union, and reaches the conclusion that such a union would mean to the United States "a distinct commercial gain unequalled in the annals of the world." Following this comes the somewhat paradoxical statement that "it would be better that formal action be taken first by Canada, the country realy most interested." In other words Canadians

are told that they should sue for the privilege of conferring upon the United States a distinct commercial gain which is declared to be unequalled in history. Canadians will appreciate our contemporary's humor.

THE architect for the new city and county buildings in Toronto, in which so much interest has centered since the disagreement with and dismissal of the contractor, has issued an advertisement inviting tenders for the completion of the contract. We are pleased to see this course taken in preference to an attempt to complete the work by day labor, for reasons previously stated, and we hope that the result will be a satisfactory arrangement under which this important undertaking may be brought with reasonable dispatch to perfect completion.

THE unsightly condition of Queen's Avenue, Toronto, has more than once been the subject of comment in these columns. It is gratifying to observe, that during the present year something is likely to be done towards its improvement. The Ontario Government propose to beautify the portion of Queen's Park in front of the new legislative buildings, which would serve to accentuate the unsightly appearance of the avenue leading thereto. The Government has been asked to join with the city in improving the avenue in a manner to harmonize with the portion of the park to which it leads. This the Government seems willing to do. We hope to see the natural beauties of the avenue supplemented to an extent which will make it a feature of pride to the citizens.

A BILL has passed the House of Representatives and the Senate of the United States, providing that in future the designing of Government buildings shall be done by private architects of recognized ability instead of under the direction of the supervising architect of the Government. The extent of this work is such that when attempted to be done in one office, it necessitates it being turned out at machine speed, and we might add, with the marks of machine manufacture upon it. Under such conditions there is no time for careful thought, with consequently the public architecture of the country, which should afford examples of the best architectural talent, is greatly inferior to the domestic work. Under the bill to which we have referred, the standard of such architecture will doubtless be greatly elevated, and with it the standard of public taste.

THE *Northwestern Architect* relates an amusing incident of an American architect who, having secured a commission from Canada, was coming into the Dominion via Suspension Bridge with the necessary plans for the carrying out of the work in his posession, when he fell into the hands of a confidence man in the form of a customs officer, who, after having extracted from him, under friendly guize, the necessary information as to the value of the drawings, etc., compelled him to pay one hundred dollars duty upon them. The architect in question was evidently what in western parlance would be termed a "tenderfoot," or in other words, one who is unfamiliar with the business of evading payment of customs duties. We would advise him to study the methods of certain architects in the eastern border cities, who, while taking out of Canada large sums in the form of commissions, have never been known to contribute a dollar in customs duties to Her Majesty's exchequer.

ADVICES from the principal cities and towns throughout Canada indicate that the volume of building operations during the season which is about to open, will probably be in excess of that of last year. In Montreal the indications point to a busy season, and in a modified sense the same can be said of Hamilton. The outlook in Toronto has considerably improved since the beginning of February, at which time it appeared exceedingly gloomy. While it is yet too early to speak with definiteness, there are prospects that a fair season's business will be forthcoming. There is great cause to hope that these prospects may be realized, as the condition of things in the city for many months past has been exceedingly trying to architects, builders and material dealers. The scarcity of work has had the effect of intensifying competition and further depressing prices which had previously reached far too low a standard.

THE interior of the Toronto public library building was recently remodelled, and is in consequence much better adapted than formerly for its purpose. In view of the expense which has been put upon the building for the purpose of increasing its attractiveness and usefulness, it is to be regretted that the means have not been discovered to prevent the public reading room from being used as a place of shelter in winter by persons of the dissipated class, whose presence in some cases is so offensive as to make the atmosphere unendurable beyond a short period. Rather than be brought in contact with persons of this class and be obliged to inhale the impure atmosphere due to their presence, the respectable reading public is forced to forego to a large extent the advantages to be derived from frequent visits to the public reading room. We can quite understand the difficulty which may be experienced in attempting to exclude the undesirable class of persons to whom we have referred, but it ought not to be an impossible task, and in the interests of the reading community it should be done.

THE importance of trifles in a contractor's business is not as fully realized as it should be, notwithstanding that if neglected they cause ruin, and if looked after will make a fortune. A brick merchant may not be particular about his bricks being one-eighth of an inch below the regular thickness, but to the builder this means he will want a considerable number more bricks to complete his job, for it will take 1125 bricks to fill the space usually occupied by 1000. Again what time can be lost by unpunctuality. A contractor employing 50 hands will lose fifteen hours per week by the loss of one minute each time of beginning work. In no trade is a good and accurate system of book-keeping so requisite as in that of building, on account of the various and multitudinous features of the business, the men and materials not unfrequently, being not under the employer's eye, and other minor matters. Whether it be a large or small business, every hour worked and all materials used should be charged to some account, and every sack, cask and package hired should be returned. The cost of every contract should be known to a fraction in order to see how the matter came out, and for guidance in future work. Attention to these matters together with great case in estimating for jobs, will prevent contractors much inconvenience and loss.

MUCH valuable information for architects and builders is contained in the paper which we publish in the present number entitled "Some Observations for Fireproof Building in New York," by Mr. J. C. B. Horwood. Canadian architects and builders have already been called upon to deal to some extent with the problems attendant upon this form of construction, and in the future may expect to be confronted with others of greater magnitude. The knowledge of this fact, is leading them to enquire extensively into the subject, and Mr. Horwood's timely contribution will be very much appreciated, more especially as it is known to be the result of the observation of one who has had exceptional opportunities for the acquirement of knowledge in this line, and who is known to be a painstaking student. In this connection it is said to be the intention of capitalists in Ottawa, Toronto and Montreal to erect iron frame structures approaching to some extent in height those in the large American cities. We regret to observe that it is declared to be the intention of the projectors of some of these buildings to employ American architects to design them and supervise their erection. Such action would be an unjust reflection upon the competency of Canadian architects, many of whom are undoubtedly as able to carry out work of this character to successful completion as any foreign architect who might be imported for the purpose.

THE recent accident at the Odd Fellows' Hall, Weston, is an instance of the foolishness of carrying out alterations to buildings without professional aid. About a year ago the members of the society decided, without the opinion of anybody who had any knowledge in such matters, to remove certain wooden posts from the room on the ground floor, which was 25×36. These posts supported two beams (10×10 each) which carried the ceiling joists, the beams being 25 feet long and resting on the posts (6×8 each) of the framed buildings by tenons only 2×8. As a substitute for the supports removed, a local blacksmith was called in to fix a 1¼ inch iron rod under each beam, joined by nuts and washers to the posts on each side of the building. These rods supported two 2½ inch iron struts about 12 inches long, set at equal distances under the beams. On the evening of the accident it appears that the people present assembled altogether in one part of the room upstairs directly over one of these beams. The iron rod beneath snapped close to one of its washers at the side of the hall, and the whole floor gave way. There was no flaw in the iron as reported, but the weight on the rod was excessive. As the upper room was not half filled at the time, the accident was plainly the result of ignorance on the part of those who carried out the alterations in the building. Fortunately the results were not so serious as they might have been. We trust the accident will serve as a lesson to those who have to do with altering existing buildings or erecting new ones.

THE Canadian Society of Civil Engineers took a very important step at its last meeting in adopting a resolution moved by Mr. Alan Macdougall, asking for a committee to consider the present status of the profession. This points to an ultimate closer bond amongst the members, and the formation of what will be practically a close profession. From the tenor of Mr. Macdougall's remarks at the meeting, the intention seems to be to have one society for the whole Dominion rather than provincial societies such as now exist in our medical, legal and land surveyors' and other corporations in the several provinces. This subject will be found to be surrounded by many obstacles which will require the most careful attention and deliberation. The interests of practitioners who are not now members of that society, although belonging to English and American, must be carefully weighed. Provision must be made to acknowledge those who are now enjoying a well earned and honorable rest; and considerations granted in view of necessity arising for the consultation of engineers on special subjects who may not be residents of the Dominion. The idea which prevails that this movement is aimed at making every engineer pass an examination, or to admit to practice only such men as now belong to the society, and as soon as they fall into arrears cut off their license, is we are confident, erroneous. We doubt not it will be to the advantage of employer and employed to have a code of professional ethics, and if the members will respond heartily to the circular which has been addressed to them, the object will likely be attained.

ILLUSTRATIONS.

SHOPS AND OFFICES, CHAPEL LANE, BRADFORD, ENG.; RESIDENCE AT BRADFORD, ENG.—F. M. RATTENBURY, ARCHITECT, VANCOUVER, B. C.

The large building is erected of fine warm buff sandstone, and is so designed that the fine detail of the whole building is observable from the street. The residence is built of stone and brick, with cement and half timber work introduced.

ILLUSTRATIONS ACCOMPANYING PAPER ON "SOME OBSERVATIONS ON FIREPROOF BUILDING IN NEW YORK," BY J. C. B. HORWOOD, IN THIS NUMBER.

ROAD AND CLUB HOUSE FOR THE HAMILTON JOCKEY CLUB.—JAS. BALFOUR, ARCHITECT, HAMILTON.

PORTRAITS OF OFFICERS OF THE TORONTO BUILDERS' EXCHANGE.

LEGAL DECISIONS.

It has been held in England that a barbed-wire fence next to the public way is a nuisance and the owner of same is liable for any damage happening to the public.

The master in ordinary at Toronto has given a judgment holding that where a mortgagee sells under power of sale subsequent lien holders are shut out.

An appeal has been dismissed against the judgment of Mr. Justice Rose, who held that a corporation was not liable for damages for injuries caused through a horse becoming frightened at a hammer of a pile driver used by their contractor on the highway.

It has been held in a recent lien case tried in the Toronto courts that if at the time of registration of the lien nothing is due to the contractor, there can be no lien, and that giving priority to a lien is not equivalent to enacting that the owner shall pay it whether the percentage has become payable or not.

CORRESPONDENCE.

[Letters are invited for this department on subjects relatde to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

DECORATION OF THE LEGISLATIVE CHAMBER AT TORONTO.

TORONTO, March 10, 1893.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—I have recently had an opportunity of inspecting one of the most ambitious pieces of decorative work yet attempted in Canada. I refer to the legislative chamber of the new Parliament Buildings in this city. While I cannot but admire the courage which prompted a departure from orthodox methods, it nevertheless appears to me that the idea of boldness of coloring has in this instance been carried a step too far. I would be pleased to know to what extent this opinion is shared by your readers.

STUDENT OF COLOR.

ORGANIZATION OF CANADIAN BUILDERS.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—The views expressed on the above subject by Mr. J. L. Phillips, Secretary of the Toronto Builders' Exchange, in the January number of your paper will, I think, be endorsed by all builders who have the interest and welfare of the craft at heart, the only wonder being that steps have not been taken, ere this, to bring about a closer relationship between the members of the several trades connected with, and incidental to building operations.

Canada is far behind in this matter. No doubt the unsettled state of the trade, and many of the inconveniences which builders are suffering from, would not exist if the several associations in the country relating to this line of business were brought more into touch one with the other and amalgamated under one National or Provincial Association.

Such a step would not only strengthen the trade as a body, but the experience of fellow craftsmen in all parts of the country could be obtained, which would be capable of actual individual application with good results.

The members of the building trades in Canada must be envious of their American friends meeting this month at the twelfth annual convention of the National Association of Builders, which promises so much good to all concerned. There is no doubt that such an Association in Canada, besides bringing about the improvements named by your correspondent would teach the several members of the trade the best methods of securing the establishment of equitable and profitable business conditions and would act as a strong security against unfair legislation and undesirable workmen, whether employers or employees.

It is hoped that now the subject is brought forward it will not be allowed to drop, but that the several Associations interested will come forward with their views and some steps be taken which will bring about a unity in this important department of business that will strengthen its position and place it on a more satisfactory and promising footing.

Yours truly,

AN INTERESTED BUILDER.

PUBLICATIONS.

The *Cosmopolitan* Magazine offers fifteen hundred dollars, in four prizes of one thousand dollars, three hundred dollars, two hundred dollars, and one hundred dollars, respectively, for the water colors which shall be chosen by a committee from such drawings as may be submitted by the artists of the United States or Europe on or before twelve o'clock on the first day of December, eighteen hundred and ninty-three. The subjects are to be selected from the life of Christ, taking those scenes which teach in the highest forms the lessons of love, patience, humility and forbearance, with fidelity, as far as may be, to the actual surroundings and conditions of the period. The treatment should be calculated for single page reproduction in the *Cosmopolitan*, in size five by eight inches. The subjects to be suitable, as far as possible, for use in stained glassfor church orcathedral. The originals for which prizes are awarded will become the property of The *Cosmopoliton*.

FIREPROOF PAINT.—Seventy pounds of zinc white, 39 lbs. of air slaked lime, 50 lbs. of white lead, 10 lbs of sulphate of zinc. Mix the zinc white and lime together and grind in elastic oil, then add one gallon 35° water glass, then the white lead and sulphate of zinc. Stir well. This will make white paint. If a shade is required add the necessary color.

SOME OBSERVATIONS ON FIREPROOF BUILDING IN NEW YORK.*

By John C. B. Horwood.

[The illustrations accompanying this paper may be found elsewhere in this paper upon a separate sheet.]

The law in New York city requires all buildings to be fireproof when the top of the deck roof beams (half way up the rafter for pitch roof) are over 85 ft. above the pavement.

In all iron construction, as in slow-burning mill work, I find that the most straightforward and rational method of laying out the framing scheme is the best, avoiding trimming as much as possible, and keeping heavy weights from such position as necessitates carrying them in lateral directions to find their bearing on the continuous line of supports to the foundation.

Cast iron is the principal material used here for supports, except in very lofty buildings, such as the *World*, and the 12 storey Havemeyer office building now nearing completion; though the Columbia office building on Broadway, which has some 13 floors above the basement (3 of which are in a pitch roof) has cast-iron posts. Another building now going up, adjoining the Mutual Life building on Nassau street, has about 12 stories of frame in position, the posts being cast iron.

The *Herald* newspaper building being erected in an open plot of ground at the intersection of Broadway, 6th ave. and 34th st., is but two or three stories in height (similar in idea to the Bank of Montreal in Toronto) and has all the columns wrought and riveted (fig. 1) but this is the exception in such a low building.

In a very narrow, high building there will of necessity be a certain amount of play at the bolted connections of cast iron work, which is avoided in rivetted wrought columns.

If rolled sections only are intended to be used, the spans of girders and beams must be laid out to keep within the limits of the loads to be carried, whereas the spans may be greatly increased by substituting plate girders.

Whatever scheme of construction may be used for a fireproof building, the interior framing remains practically the same; so that it becomes merely a problem of treating the external wall in its relation to the adjoining floor. There are three ways of doing this, which are optional as far as the law is concerned: 1st. By making the masonry walls and piers of sufficient strength to carry their own weight plus that of the floors, roof and contents of the building. 2nd. By making the walls and piers of only sufficient strength to carry their own weight, and framing all the floors so that their weight shall be entirely carried by iron supports or columns extending from the foundation to the roof, the columns if necessary being somewhat recessed in the walls. 3rd. By making a frame of columns and girders to completely carry the outer walls as well as the adjoining floor construction.

The first method was used in a 10 storey warehouse on Bleecker street erected about two years ago. I noticed, before it was finished, that a considerable quantity of the outer brick facing on the lower stories had been crushed by the great weight above, necessitating cutting out and replacing. The second scheme is the one most generally adopted. The last method is adopted where the utmost economy of floor space is desired; and of the three, I think it is the cheapest. A comparison of the relative cost may be easily estimated from rough sketches of each scheme, by taking (as we do) cast columns at 3½c. to 4c. per lb. and beams framed (and I presume wrought columns also) at 5c. per lb.

When the third method is adopted, the "curtain walls," if carried on girders at every story, may be 12" thick, but if on girders at every second storey, and the intermediate floor braced by metal ties, the wall must be 16" thick. The former method is the most usual—in fact, I have seen no case of the latter.

Before the building law was revised last year, the columns were allowed to project inside these walls without masonry protection (fig. 2) but now a 4" casing of brickwork is required (fig. 3).

The two following sketches (figs. 4 and 5) are copied from the Building Law, illustrating this method. Fig. 4 is the one usually adopted; I do not remember having seen No. 5 employed.

The flanges of the girders carrying the curtain walls are brought to within 2" of the outer face of the wall, the mason work being cut to fit them (fig. 6), making the masonry at the level of the girders a mere filling, resting partly upon the lower flanges of the girders, and partly upon the wall below. These girders may, of course, be of rolled sections instead of built as shown on sketch, though it is the latter that I have seen used for that purpose.

I heard the foreman of one of the largest iron firms say, that up to 20" it is just as cheap to use rolled sections—beyond that the built ones are more economical. The above sketch (fig. 6) of girders at floor level applies to all floors, as the girders over each other will be the same size unless in special cases where some extra load may necessitate greater depth and strength. The only variation is in the size of the columns at each storey, thus making the brackets and lugs larger as the sizes of the columns diminish.

The columns are usually footed as shown in fig. 7, the footing beneath being of sufficient spread to give about 4 tons weight to the superficial foot of soil. A building is being at present erected which has footings of an unusual character. The structure will evidently have an iron frame supporting the outer walls; upon the concrete bed are now being laid footings of rivetted plate girders. Immediately beneath the columns (which are of cast iron) there is a cast iron base plate the width of the column by about 4 ft. long in the direction of the girder footing. The latter is composed of two upright thicknesses of 1" metal (forming one web) about 30" deep and some 15 ft. long, with a top plate about 14" wide and a bottom one some 30" to 36" in width. These are connected to the web by angle irons and triangular-shaped stiffeners about ⅜" thick. The elevation and sections are somewhat as figs. 8 and 9. The whole of this built portion is coated with tar, and the last column, which is on the end of one of the footing plates is secured from sinking by having its footing girder rivetted to the adjoining one by means of a very thick plate about 6 ft. long on top of the upper plate (fig. 10). Method No. 2 is the most complicated one in dealing with footings, as the footings of the walls and columns usually overlap each other, making it difficult at times to get a good unified bearing beneath both—in a pier, for instance, six or eight feet long, where sometimes, of necessity the iron post is placed near one end.

With regard to interior framing, we usually make trial schemes in order to get the least amount of metal to accomplish the desired end, as this means a saving in cost as well as somewhat less weight upon the foundations. The deeper the beams and wider the span for filling gives the stiffest floor as well as the cheapest. The Pioneer Fireproof Construction Co., of Chicago, has a catalogue which gives some interesting information and experiments on this point.

The heavy printing office building which is being erected near N.Y. City Hall is calculated for 400 lbs. per sq. ft. of floor space. The beams are about 5 ft. apart and 14' 6" long, resting upon plate girders 22 ft. between the bearing. The webs of the latter are 30" deep. The former are 10" beams. The general scheme is as per fig. 11. Where a beam is connected with a circular column it is the practice to mould the latter so as to allow the beam to butt against it with a square end (fig. 13). Fig. 12 is a section through the beams looking towards girders. Fig. 13 is a section through C. C. (fig. 12) looking towards beams, and the scored section indicates the bracket to which the double girders are bolted, and which is moulded to fit the shape of the girders. Fig. 14 is a section at A. A. fig. 12 looking down, and the plates (shown square) are sometimes made circular. Fig. 15 is a section at B B, fig. 13 looking down. The above four sketches are of instances where the bottom of the beams rest upon the top of the girders. Where a heavy girder is bolted to a square column, an interior web is cast to unite the two sides, so that the pull of the top connection or the pressure of the supporting brackets will not rupture the flat sides of the columns (figs. 16 and 17). Fig. 16 is a side elevation looking towards girder, and fig. 17 a horizontal section at level of girder.

Fig. 18 shows the manner in which the brackettings on the columns of the "Columbia" building were arranged, where the columns were about 18" square at the bottom, and connected with a wide lattice girder on the inside, which carried the floor beams. As the columns diminished in size towards the top, these supporting brackets were naturally made larger to [illegible] sizes of the girders which did not alter in size, as the [illegible]y carried were the same at each floor. Fig. 18 [illegible]ion through the outer wall at level of supporting girders, and fig. 19 a horizontal section at level of lattice girder carrying floor beams.

* Paper read for the author by Mr. E. Burke at the third annual meeting of the Ontario Association of Architects.

The following extracts are from the N. Y. Building Law, and may be of interest:

"Every building used as a store, factory, warehouse, or any other manufacturing or commercial purpose, shall be of sufficient strength in all its parts to bear safely upon every superficial foot of its surface one hundred and fifty pounds in addition to the weight of the materials composing the said floor.

Good, solid, natural earth shall be deemed to safely sustain a load of 4 tons to the superficial foot, or as otherwise determined by the superintendent of buildings. The width of the footing courses shall be at least sufficient to meet this requirement.

The safe bearing load to apply to good brick work shall be taken at:—

Eight tons per superficial foot when good lime mortar is used; eleven and one-half tons per superficial foot when good lime and cement mortar mixed is used; fifteen tons per superficial foot when cement mortar is used.

All cast iron, wrought iron or rolled steel columns shall be made true and smooth at both ends, and shall rest on iron or steel bed plates, and have iron or steel cap plates, which shall also be made true. All iron or steel trimmer beams, headers and tail beams, shall be suitably framed together, and the iron girders, columns, beams, trusses, and all other iron work of all floors and roofs shall be strapped, bolted, anchored and connected together and to the walls, in a strong and substantial manner. Where beams are framed into headers, the angle irons which are bolted to the tail beams, shall have at least two bolts for all beams over 7" in depth, and three bolts for all beams 12" and over in depth, and these bolts shall not be less than ¾" in diameter. Each one of such angles or knees, when bolted to girders, shall have the same number of bolts as stated for the other leg. The angle iron in no case shall be less in thickness than the header or trimmer to which it is bolted; and the width of the angle in no case shall be less than ⅛ the depth of beam, excepting that no angle knee shall be less than 2½" wide, nor required to be more than 6" wide.

All wrought iron or rolled steel beams 8" deep and under shall have bearings equal to their depth if resting on a wall; 9" to 12" beams shall have a bearing 10", and all beams more than 12" in depth shall have bearings of not less than 12" if resting on a wall. Where beams rest on iron supports, and are properly tied to the same, no greater bearings shall be required than ⅓ the depth of the beams.

Iron or steel floor beams shall be so arranged as to spacing and length of beams that the load to be supported by them, together with the weights of the materials used in the construction of the said floor, shall not cause a deflection of the said floor beams of more than one-thirtieth of an inch per linear foot of span; and they shall be tied together at intervals of not more than 8 times the depth of the beams.

Under the end of all iron or steel beams where they rest on the walls, a stone or cast-iron template shall be built into walls. Said templates shall be 8" wide in 12" walls, and in all walls of greater thickness, said template shall be 12" wide, and such template, if of stone, shall not be in any case less than 2⅓" in thickness (the thickness of a brick—J.C.B.H.) and no template shall be less than 12" long.

All brick or stone arches placed between iron or steel floor beams shall be at least 4" thick and have a rise of at least 1¼" to each foot of span between the beams. Arches over 5 ft. span shall be properly increased in thickness as required by the Superintendent of buildings; or the space between the beams may be filled in with sectional hollow brick of hard burned clay, porous terra cotta, or some equally good fireproof material, having a depth of not less than 1¼" to each foot of span, a variable distance being allowed of not over 6" in the span between the beams. The said brick arches shall be laid to a line on centres, with close joints, and the bricks shall be wet, and the joints filled with cement mortar, in proportions of not more than two of sand to one of cement by measure. The arches shall be well grouted and pinned, or chinked with slate and keyed.

The bottom flanges of all wrought iron or rolled-steel floor beams, and all exposed portions of such beams below the abutments of the floor arches, shall be entirely encased with hard burnt clay or porous terra-cotta; or with wire or metal lath properly secured and plastered on the underside.

The exposed sides and bottom plates or flanges of wrought-iron or rolled-steel girders supporting iron steel or wooden floor beams, or supporting floor arches or floors, shall be entirely encased in the same manner."

Staircases must be of uninflammable material. They are usually made with slate or marble treads in good buildings, and cast iron in the cheaper ones. The strings are often of cast iron, and sometimes wrought iron with cast-iron brackets bolted on to make a bearing for the treads.

Shop front frames are made of cast iron, and over the breast-summer is often placed a protection of cast iron, fig. 20: attached to it by means of lugs screwed to both the covering and the girders.

Fig. 22 is a section through the first storey opening of a large building which has sills and strings of terra cotta. The soffit is formed with a wrought-iron plate bolted to the two small beams and painted. This method is quite common here, but if so desired these beams and plate may be kept up to make room for a soffit of terra cotta slabs suspended from the wrought-iron plate which supports the terra cotta architrave on the face of the walls. The frame of the opening is of cast iron, also the sash.

In referring to the new law regarding "skeleton structures," I omitted to say that no floor beams may rest upon the walls if 16" or less in thickness. The law reads thus:—"Curtain walls built of brick, built in between iron or steel columns and supported wholly or in part on iron or steel girders shall not be less than 12" thick for 50 ft. of the uppermost height thereof (fig. 21), or to the nearest tier of beams to that measurement, in every building so constructed, and every lower section of 50 ft. or to the nearest tier of beams to such vertical measurement or part thereof, shall have a thickness of 4" more than is required for the section next above it down to the tier of beams nearest to the curb level; and then downwardly the thickness of walls shall increase in the ratio prescribed for other foundation walls. When the curtain walls are *20" or more* in thickness and rest directly on the foundation walls, the ends of the floor beams may be placed directly thereon, but at or near the floor line of each storey ties of iron or steel, encased in brick work, shall rigidly connect the columns together."

Fig. 23 is a section of the terra cotta cornice of the St. Bartholomew Mission Building, 42nd street, N. Y. Few cornices are more elaborate. The I beams resting upon the wall are placed over each console. The terra-cotta facia and outer edge of moulded soffit are hung upon the flanges of the beams running parallel to the walls. The projecting beams are anchored well down the back of wall, sufficient to give at least 33% of weight of brickwork in excess of the weight of the overhanging cornice.

[Note.—It is but fair to Mr. Horwood to state that the foregoing remarks were not prepared for public reading or publication, but were sent in the shape of a letter to a friend. He kindly consented to their being read at the convention to fill a gap caused by the failure of a member to present a promised paper.—E. Burke.]

Discussion.

Mr. Paull said the Association was much indebted to Mr. Horwood for sending such a very interesting paper to be read at the Convention, and he had much pleasure in moving that a vote of thanks be accorded to that gentleman. After expressing a hope that the paper and accompanying drawings would be reproduced in the Canadian Architect and Builder, Mr. Paull pointed out as a difficulty in regard to these very high buildings, which did not seem fully explained, that, although there might be no trouble about the foundation for its support so long as you were not cramped for room, if a building 100 feet square were erected closely adjoining another property where you could not go beyond the limit of your own ground, it would not be possible to to get that proper support for the angles which could be secured when there was a large area of ground surrounding it, and the base could be extended to a considerable distance. Regarding the craze for lofty buildings which was characteristic of American cities, notably Chicago, he thought it had about reached its limit, as regulations were now being enacted to prevent the erection of structures beyond a certain height. He pointed out the danger that existed in these large and lofty buildings, even in themselves fireproof, from the burning of furniture, etc., or being surrounded by other buildings, owing to the difficulty of getting out the large number of occupants who would necessarily be within it. These, he thought, were matters worthy of consideration by architects. He then referred to the developments of recent years in the manufacture of iron for structural purposes, some illustrations of which, by the courtesy of Prof. Galbraith, they had witnessed in the experiments that had taken place this morning, by which it had been shown that inch iron was capable of sustaining a strain of 50,000 lbs.

Mr. Burke said, in regard to the supporting beam, that it was to him a surprise; it seemed to be a very weak method of carrying a column that had no support beyond it. It seemed to him that owing to the joint which was there, everything was dependent upon the plate in the top.

Mr. Belcher thought if the plates and girders were reinforced it was very much stronger than work carried through continuously, because the angle irons at the joint were double.

At the request of the President, Prof. Galbraith then explained, pointing out on the drawings some features of the construction.

Mr. Aylesworth was interested in knowing what was thought

of this combination of construction by other than American architects, as it was purely an American system. He could not but think there were weak points about it, owing to the combination of vertical iron work and masonry, of which the one would settle more or less, and the other would not. Then, in regard to the curtain walls, he noticed there was a twelve inch wall, (brick and a half) carried on a beam, about 15 feet square of masonry; he thought the support for that wall at the beam was insufficient, and did not see what was to prevent it tumbling out. It might be tied more or less, but it seemed to him a weak method of construction; either iron or masonry alone might be all right in themselves, but he did not see that they would always hold together. He had always found weakness in that kind of construction.

Mr. Paull thought the expansion and contraction of the iron under varying temperatures would affect the walls in some degree, and necessarily weaken them.

Mr. Belcher instanced the erection, with which he was connected, of a fireproof building in Liverpool some fifty years ago. It had been thought the effects of the expansion and contraction would be prejudicial, and very careful notes were made. The building had outer walls of cut stone, and brick and cement internally. The walls were supported by eight sectional cast-iron columns, and were five stories in height. The girders were cast iron, trussed with wrought iron, and brick filling springing from the flanges of the girders. The observations did not reveal the slightest appearance of crack due to contraction or expansion. Of course there were not in England the extremes of temperature to be found in this climate.

Mr. Paull said that whereas the variation in temperature in England was not more than 50 degrees, here it would be as much as 120, which must be considered in making any such comparison as Mr. Belcher had instituted.

The Registrar said that from what he had read of iron construction in the United States the objection had been found to exist there, and that iron and brick were not built together now, but the construction was a skeleton of iron entirely.

Mr. Darling said he noticed in the Canada Life building, the walls of which were quite equal to carrying the building unaided, a number of upright iron columns were built into them.

Mr. Burke said the Freehold Loan building was constructed in the same way, and also a new building at the corner of the market (Branch Bank of Commerce).

Mr. Darling questioned the utility of such a practice, and condemned it as bad construction. He thought it distinctly a loss.

Mr. Burke thought it a waste of material.

Mr. Power thought it might be as a horizontal tie.

Mr. Burke said of course that was not the difficulty in the paper under discussion, which gave the different systems. In that case there would be no contraction or expansion in the columns, the carrying power of that would be so slight as to be scarcely appreciable in the joint it would form in the brick work. In the other way, where it was carried independently altogether, then the walls were increased so that they carry their weight; practically there would be no shrinkage in that, but moving up and down inside, there might be a question about that.

Mr. Aylesworth thought the variation in a building 100 feet high would be considerable.

The President said, that as Mr. Burke had stated, what had been read was not a regularly prepared paper, but a letter written to Mr. Burke regarding this system of construction. The system was the outcome of special requirements in American cities, and could not well be compared with work done in Canada or the old country. The growth of American cities rendered necessary the erection of these enormously high buildings, and as a result this steel construction with curtain walls had been developed in New York and Chicago; especially the latter, where, despite its great area, the business centre was somewhat congested. When the development began, it was soon found more economical to run up 13, 14 or 20 storeys. A building which consisted of seven or eight storeys was built, which was found not to pay as large interest as it ought, and it was taken down and replaced by one ten or twelve storeys in height. The first building was a steel construction, with nothing more or less than a 4½ inch casing of pressed brick outside, and a curtain wall of some other brick inside. He remembered seeing those bricks being fastened at intervals with copper wire to upright angle irons, to stay this wall. With regard to the question of temperature affecting iron or steel construction, he did not think that entered into consideration at all, because, in a building the iron work is subject to practically the same temperature all the year round, and there is very little of it exposed to the extremes of heat and cold, as it is nearly all covered. In regard to shrinkage, between the two systems there must be some shrinkage, but it was reduced very considerably by the use of cement instead of the ordinary mortar. He understood there was a shrinkage of ⅝ inch in twelve feet of first-class brick wall; after the building had been up and settled to a limited extent there would be that skrinkage in the course of time. Of course that was considerable, but he was inclined to attribute it entirely to the use of ordinary mortar, and believed where the brick was laid in cement there was practically very little shrinkage. It was evident that whatever shrinkage there was must accommodate itself in some way or other, because the important fact remained that the buildings had not developed any serious defects; and theorizing was of little benefit so long as the practical outcome showed the plan of construction to be serviceable. There had been a great deal of discussion in papers devoted to such matters on this subject, but he could not tell just where to lay his hand on the information at present. The architectural appearance of a building, of course, was another question, but that, as a rule, was not considered in this class of buildings to any great extent; they were required for a certain purpose, and it was incumbent upon the architect to do the best he could under limitations. After all, the buildings were to all intents and purposes, in a sense, the works of engineers rather than architects.

FRENCH DECORATIVE ART.

By W. H. Elliott.

It is interesting to study the different periods of French art in connection with, and as they reflect the scenes and characters intimately associated with them. One might construct a partial history of the time from a careful analysis of the adornments of the palaces and mansions of the chief actors in the stirring scenes of last century in French political life. Passing over the earlier periods of Henri Deux, Francois Premier and Louis Freize, we come to that of Louis Quatorze, a man who united a real desire to revive true art feeling with a debased and voluptuous mind. Progressing with the rise and degradation of his court, one is struck with the gradual development of the renaissance to a high pitch of perfection, and a gradual descent to a florid and meretricious travesty upon it. The reigning beauty in many cases exerted a marked influence on the work executed during her *regime*, and her original station in life might very easily be guessed from the decorations she indulged in. What is remarkable, however, is the originality and attractive character of most of the work. The delicacy of the decorations during the reign of Louis Quinze tells us of advance in refinement and a gradual abandonment of the virile renaissance in favour of the lighter and effeminate Italian styles. There is not apparent the same love of art for art's sake, but instead the gratification of the whims and fancies of a court that existed for the bubble pleasures of the hour. This period of dilletantism gave place to the pure and unaffected family life of Louis Seize, a bright spot of sunshine in French history, around which was hovering the storm of popular frenzy that had been brewed by Louis' profligate predecessors. The decoration shows itself in garlands of flowers, rustic scenes and other pastoral touches, especially in La Petit Trianon, the miniature palace of the unhappy Marie Antoinette. At the fall of the curtain on this tragic period, and following the accession of the great Napoleon, a remarkable change is seen in the houses of the nobility. Military rule produces severity in art as in other things, and we find the style of the First Empire beautiful, chaste, pure—but always severe. To-day there is a great revival of all these periods, and we have the fortunate advantage of choosing the best from each of them.

In working with copper pipe a difficulty is often met where lengths must be jointed to valves or fittings by means of flanges, because the joint between the cast flange and the rolled pipe cannot be made perfect. A device to mitigate this evil recently forms the flange casting with projecting lugs which comes up around the outside of the pipe, and thus increases the surface for the adhesion of the brazing material.

ONTARIO ASSOCIATION OF ARCHITECTS.

Mr. N. B. Dick, the late treasurer of the Association, who was elected to the Presidency of the Association during his absence in Europe and in spite of his expressed wish to be allowed to retire from office altogether for a time, has, since his return recently, written to the Registrar accepting the responsibilities of the position. The proposal to Mr. Dick came from the Council, by whom the constitution of the Association requires the election to be made, but during the discussion which took place in the Convention as to the feasibility of the election of the President being by vote of the convention, Mr. Dick's name was by general consent used in connection with the proposition.

* * *

The second annual examination of students was conducted at the School of Practical Science from Tuesday to Saturday, March 7th to 11th. The time of holding examinations was changed from April, in which the examinations were held last year, to March, as being more convenient to students who wish also to come up for examinations at the School of Practical Science later in the year. Before notice of the examination results is sent to the students who were examined it is necessary that the Board of Examiners report to the Council of the Association, in whom is vested the control of the examinations. The meeting of the council will be held as early in April as possible.

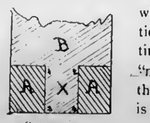
* * *

The Library of the Association has received a valuable addition in a set of *The Brickbuilder* for 1892 which has been presented by the publisher. The volume has been bound and is ready for lending. It is recommended by the Librarian as a practical aid to those who are aiming at good design in brick. The photographic reproductions are all of good subjects and there are many working drawings of standard examples in Europe and of work by the late H. H. Richardson and by well known American architects.

JOINTS IN CARPENTRY.

A most important feature of the manipulative or handicraft part of carpentry is the "joints" to be used in the work, and an accurate and practical knowledge of the principles relating to these is most essential. It is therefore proposed in this article to deal with some of the matters relating to this branch of the ancient calling, treating the subject generally, without going into the extensive question of special joints used in framing partitions or roofs. There are several kinds of joints used, according to the relation of the pieces of timber to each other. The "square joint" is when the pieces are at right angles with one another, and if the one is lying on the ground and the surfaces of the timber are even, a simple way of effecting a junction would be merely to rest or butt the end of the vertical piece upon the lower one, the pressure of material supported by the upper piece being trusted to keep the two together. Although often adopted, this form of joint cannot be relied on unless the pressure mentioned is great, and in a vertical position, that is, parallel to an imaginary line called "the axis" passing through the centre of the vertical piece.

The better method of making a "square joint" is by passing one piece of timber into another by means of a rectangular or square hole; this is well known as "the mortice or tenon joint," of which we give a sketch showing the junction in section. A denotes the piece of timber with an aperture 1234 called the "mortice" to receive the piece X called the "tenon," made in the timber B. This is a very common and useful joint, and in making same it should be remembered that the thickness of the tenon X should be well proportioned and about one-third of the width of the piece to which it belongs, in order that it may have sufficient strength. The depth of the tenon is generally equal to the depth of the piece to which it is joined. The mortice should be of the shape and dimensions of the tenon, smaller if anything, in order that no space be left when the tenon is inserted, and it should never exceed three-quarters of the thickness of the piece out of which it is cut, nor lose more wood than is necessary. When the tenon is sunk, or driven into the mortice the pieces are fastened by means of one or two wooden pins. This adds nothing to its solidity, but helps to keep the joint well together.



Sketch 1.

In order to prevent the possibility of these joints not fitting tightly, several improvements have been made on the simple method described above, as when the tenon is not made rectangular or square, but as shown in sketch 2, which is known as a "dovetail cut." Such mortices are very often not carried right through the entire depth of the timber, which is a good form of a joint to use when the strength of the timber will not allow much cutting away for a mortice. Another way to make a joint of this class is to carry the tenon through the mortice so as to have a piece projecting on the under side sufficient for a hole to be bored and a pin drawn tightly through it, thus keeping the tenon in the mortice without the aid of the pins as mentioned. A very satisfactory and reliable method is to combine the rectangular tenon and the dovetail mortice together, which is done by inserting the tenon and driving up wedges to fill in sides of the dovetail mortice.

Sketch 2.

Having thus far dealt with the "square joint," we will now consider what is known as the "vertical joint," that is, when two pieces of timber are joined, both of which are in the same vertical line. In most cases the joints under this head are practicable for joints between the timbers which are in a horizontal line, except for spanning; these methods not being calculated to be placed under such severe strains. As these joints are chiefly used for lengthening a vertical piece of timber by joining it to another, the principal point to be gained is to keep the jointed ends of the timbers from sliding or being pressed out. The pressure of the upper on the lower piece might be found sufficient to keep them together in a line, but it must be borne in mind that if the lower timber has no good foundation an unequal settlement will be brought about, and the line thrown out of the plumb; therefore vertical joints are very seldom made with merely even surfaces where they join, unless bound together with plates of iron, or bound round with iron hoop and straps securely fastened. A simple form of a vertical joint is made by cutting a groove in the centre of the end of each timber where they join, and a wooden or iron wedge inserted therein which will make it impossible for the lower timber to swerve from the plumb line, if it is securely fixed at its foundation.

It will be found, however, that there are other directions of possible pressure, and in order to provide against these, it is best to cut two grooves at right angles to each other at the end of the lower timber, and make two tenons on the end of the upper piece to join tightly into the grooves. This last form is by far the best, and although more labor is necessary, yet the safety that is secured is worth the extra work.

To join a horizontal to a vertical piece of timber at its extreme end, a good method is found by cutting a tenon in the upper piece and fixing it tightly into a mortice made in the lower piece, but by far the neatest and securest joint for this class of work is what is known as the "mitre joint." This is formed by cutting one piece of timber at an angle of 45° leaving a tenon in the middle, and cutting the other piece of timber at the end to the same angle making a mortice on the angular side to receive tightly the tenon of the other piece. If this work is done correctly it will be seen that the corner made by the two pieces will be at right angles.

The next class of joint it is proposed to refer to is the "horizontal joint," which is used in connecting pieces of timber crossing or meeting at right angles, and the method used is to lay one piece of timber upon the other and secure the two by means of wooden screw nails, but this form should not be used where there is much strain. A more satisfactory way is found by making a groove in the lower timber cut right across the width, and should be a little less in thickness than the section of the upper timber, that this can be tightly driven in. An improvement on this method is made by cutting a groove across the the lower edge of the upper piece and making a mortice to receive the upper piece, leaving a projection to fit into the groove made in the timber inserted. If this system is adopted it is impossible for the timbers to move even in their own directions.

When pieces of timber cross at an angle the method generally used to join same is by cutting a part out of the upper face of the lower piece large enough to receive tightly the upper timber, and these can be further secured by nails or pegs.

THE PLACE OF ARCHITECTURE IN NATIONAL HISTORY.

By G. F. Stalker.

Much greater rapidity marks the progress of history-making events, and greater minuteness and accuracy in chronicling the same, in our own time, than in any previous age. We have constantly "a chiel amang us takin' notes." It would seem as if the minute hand of the modern clock was provided with a fountain pen attachment, and that a faithful record of everything that transpired was most carefully registered for future reference. The daily and weekly newspapers, the monthly and quarterly magazines, the system of conducting the business of cities and countries, provide for the modern historian an abundance of material that is almost appalling. The situation in this respect, to-day, is a complete reversal of the state of things before the invention of printing; or even later than that, before the use of electricity. Old-time historians had a hard task of it, when, from the scanty material at their command, and the slow process of locomotion and intercommunication, they set about collecting and collating the events of their time. Add to this the laborious method of transcribing their tomes, the limited circle who could have access to them, and the most certain feeling that what they had been at so much pains to record would never benefit their own age, and it must be conceded that their occupation had at least none of the outward and visible signs of cheerfulness. And if their reward in their own time was, at the best, the most meagre, it has not, in all cases, been made up to them in the shape of unstinted posthumous fame and honour; for as we have waded through their works at school and college, the probability is we have bestowed upon them more maledictions than benedictions as our recompense for their hard and disinterested labors.

But if there is a law of compensation applicable, as some believe, to all things mundane, it is to this law that we are indebted for the durability of the materials on which the books of the ancients were written. The only perfect code of morals was written on tables of stone. Particular events in the lives of individuals, tribes and nations have been marked by cairns, pillars, obelisks and other memorial erections. Astronomical, mathematical and other discoveries, and historical facts have been cut in everlasting granite, while such writings as required more lengthened space were inscribed with indelible ink on parchments and papyrus prepared to run a race with time. (It is rather a singular coincidence in this connection, that Napier, the inventor of logarithms, worked out his problems on the garden wall of Merchiston Castle, near Edinburgh). And as the world advanced in age, these records became the subjects of study in the school, and were translated and transcribed indefinitely with more or less care. Naturally enough these translations were not free from errors; and the originals being almost inaccessible, and in some cases lost, it has been with great difficulty or altogether impossible that a thorough and accurate revision could be made of them. To this extent, therefore, the world has been a loser; for though nothing that is really good can be altogether lost, it may be shorn of much of its influence and beauty when we possess only a hazy idea of it.

Add to all this the fact that no historian ever yet wrote or could write without a certain bias, and the works of the ancient writers are subject to a considerable discount.

As regards the collection of materials the modern historian is infinitely better circumstanced than his old-time brother. The important occurrences in almost any part of the world may be said to be served up at the breakfast table of every household in civilized countries; and if we confine ourselves to any particular country, the difficulty that confronts the chronicler is not the paucity but the superabundance of matter. No need for him to scour the country in order to obtain data and information from every conceivable and inconceivable source. He has more need for the threshing machine than the reaper. So rapidly do events succeed one another, and so continually is the map of the world being remodelled, that it is no easy matter for the modern historian to keep pace with the times, and to separate the chaff from the wheat, so that what he records will be a faithful delineation of the events which really constitute the life of a nation. This, however, has never been accomplished; neither has it ever been attempted. The impossibility of the thing must be apparent to everyone on the slightest reflection.

To obtain anything like a comprehensive idea of a country we must have recourse to many channels of information. Its political life as a rule is recorded with greater minuteness than any other phase of its existence. And it is right that this should be so; for in those chambers where the nation's business is conducted, its laws are framed, and the multitude of interests affecting its internal and external affairs are brought forward and dealt with; so that, from the manner in which these things are done, we can form a very fair conception of the general character of a people. But though in the political arena there is, or there should be, nothing untouched which properly belongs to a nation's vitality, or which indicates its progress or retrogression, it would be absurd in the extreme to imagine that, within the limits of this one expression of national existence we have a full and complete portrait of the nation itself. The industries of the people, whose name is legion, can only be guessed at or catalogued by the laws which are made affecting them. But their extent, their application, and the manner in which they are conducted, all, in fact, that really constitutes the industries themselves, can only be understood or appreciated by reference to sources outside the political sphere altogether. And it is quite clear that written descriptions of the industries, amusements, and the general pursuits and occupations of a people must, in most cases, be inadequate; and to a stranger to the country, or even to the future generations of the country, such descriptions will inevitably be, to a great extent, cloudy or incomprehensible.

We have proof of this when we call to mind such points in the history of ancient peoples as have only come down to us in the works of contemporary writers. In connection with these we find the savants of our own time in a chronic state of disagreement with one another; and as time goes on the old writings are subjected to a process of re-translation, or the translations of a former age to a process of revision. Albeit, the one desire which animates all the scholars, is to obtain, in modern language, an exact account of the events which took place, and the circumstances connected with them, in ancient times.

In cases, however, where buildings were erected for any specific purpose, we are not dependent upon descriptions. The language of architecture is a universal language, and needs no such translations as are necessary in written documents. The accounts which they record are true and unbiassed, and can, therefore, be in all cases relied upon. This, of itself, is of immense importance, which is greatly enhanced when we keep in view the fact that, in ancient times, special training was prescribed for such as shewed that they had natural endowments or qualifications for making architecture or any of the arts their profession in life. The practice of art was, by the Egyptians particularly, considered as one of the highest religious avocations in which man could be engaged, and without this special training, which consisted chiefly of the study of music and form, no one was allowed to practice it lest they should be guilty of profanity or sacrilege. But even when such a rigorous system was not adopted to ensure its purity and development, architecture has, in all ages, found men of the highest attainments and the purest thoughts and aspirations to devote their lives to its study and practice.

The sentiment which at first induced men to commemorate events by the erection of cairns and pillars prevails to-day, only in a somewhat more pretentious form. It may be said that such erections are not now so monumental as utilitarian. In most cases this is a great advantage. Our memorial halls, institutes, hospitals, fountains and the like, may serve a very useful purpose, while they carry out the same feeling which has from the first animated our race. There is an inseparable, although it may be an indefinable, connection between an intangible historic event and an edifice to commemorate it; so that the milestones of history are being constantly raised all the world over, marking indisputably the progress or the decadence of nations.

But it is not merely works of a monumental character that give to architecture an historical importance. The ordinary everyday life, the business occupations and the amusements of the people are as clearly marked down in the domestic and civic buildings. In these, until we come to the time of the Romans, we have so few remains, that our knowledge is, of necessity, obained from such writings as have come down to us; and to whatever written source we may turn for our information we have to confess that the result is disappointing; whereas, from the Roman era until now, apart from any written descriptions, we are at no loss to understand the manners and customs and the occupations of civilized countries from the buildings which were then erected and are still extant. Our poets have peopled those old and ruined cities with the same old-fashioned, slow-going folk that used to inhabit them; have set them to work at their old occupations and household duties; have put their armies in motion against one another, and given detailed accounts of their methods of attack and defence, and with such minuteness of description that we might as well be reading an account of contemporary events. Even the distinctive racial characteristics are so strongly marked in their buildings that it is not difficult for the student of architecture merely to fix the date of the erection of a building, but also the race of people who erected it. So that the history of architecture is in reality a history of the world, and when compared with the sciences which treat of national or racial affinities, dealing, as it does, with the thoughts and feelings of men in all ages, its sphere is wider and more comprehensive, and its utterances more reliable and conclusive, than those of any other science yet known. To the historian, therefore, a knowledge of architecture is of the utmost importance; and on the other hand, to the architect a large acquaintance with history is almost indispensable. In the one case many of the leading points in history about which contemporary writers may give different and contradictory accounts, can be tested and set at rest, by reference to the inflexible testimony of brick and stone. In the other case the purpose for many features and details of buildings can be explained by hints or more lengthy descriptions of usages and customs which have long since become obsolete.

And as future generations will judge of the position which nations in the present day occupy in the civilization of the world by their architectural achievements, as much as, if not more than any other evidence, a most important responsibility is laid upon the shoulders of every architect. Unfortunately the same spirit which animated the architects in those times when the art was at its best does not seem to exercise dominion in the minds of those of our time. Neither are we influenced by surrounding circumstances to the same extent. We are too much inclined to imitate and reproduce what has already been done before, and that too, unhappily, without any very nice discrimination between what was good and what was bad in old examples. We are sometimes, also, inclined to forget that the design for a building for any particular purpose should have a very close relationship to that purpose and give unmistakeable indications of it. In this respect we are placed at a great disadvantage as compared with the ancients. There is practically no limit to the purposes for which buildings are required; and as in most cases these objects are peculiar to our time, and were never dreamt of in bygone ages, an opportunity is here afforded which should be kept in view.

It is frequently said by men who ought to know better, as they look at the magnificent cathedrals of the middle ages or the temples of a much earlier date, that the architects of to-day could not produce such work. Under present financial circumstances, certainly they could not. People are aghast at the wasteful expenditure of money if a large modern church should cost $50,000 dollars. But this amount has to be multiplied by one hundred before we get into cathedral figures at all. The same holds good in other classes of buildings. And we are not poorer, but much richer than they were, only they did not seem to think there was so much honor in having a long string of figures dangling after their names, as in spending their money for the public good. And the same penuriousness is observable in works of national character, and which are paid for out of the public purse; so that while architects have now a much larger scope for the exercise of their abilities, they are restrained and hampered by the very limited funds usually placed at their disposal.

The outlook, however, is much brighter to-day than it was a quarter of a century ago. There is a tendency among architects to break away from the old lines and to give to their general design and detail a character more in consonance with our own time. The fact also that architects are now expected to erect a very large building for a very small sum of money may not be without its beneficial results. If it forces upon us the observance of simplicity in everything connected with a building, it will have taught us one of the most essential qualities of true art.

SHAVINGS.

Messrs. T. E. Waller and H. G. Downer, plumbers, of Victoria, B. C. have assigned.

The Public Library Board of Toronto abolished the office of consulting architect at their last meeting.

Mr. Samuel Riding has been appointed sanitary-plumbing inspector for the town of Toronto Junction.

The corner stone of the extensive additions to the Collegiate Institute at London was laid on the 7th inst.

The Standard Drain Pipe Co., of St. Johns, Que., are increasing their capital to $500,000, and the new shares are being rapidly taken up.

The Imperial Portland Cement Co., of Montreal, is in liquidation, with liabilities about $70,000, and a poor lookout for the shareholders and creditors.

Large quarries of fine dark free stone exist in the immediate neighbourhood of Calgary. The stone is said to be easy to quarry and hardens by exposure.

Mr. Thomas J. Drummond, of Drummond, McCall & Co., Montreal, has been elected to represent the iron and hardware interests on the Montreal Board of Trade.

A clause providing that eight hours shall constitute a day's labour on all provincial and municipal works was voted down in the British Columbia Legislature recently.

Buildings to the value of $95,450 were erected last year in Berlin, which exceeds the amount of the previous year by $17,012, but in 1890 the sum expended was $103,825.

Mr. T. Hill, builder and contractor, of Truro, Nova Scotia, has taken into partnership Messrs. R. O. McCurdy and N. T. Wilson. The firm will be known as McCurdy, Wilson & Hill.

Messrs. Elliott & Son, of Toronto, have just completed a handsome stained glass window for the Central Presbyterian church, corner of Grosvenor and St. Vincent streets, Toronto.

Perfect cylindrical cores of rock formations overlaid by over 100 fect of water have recently been discovered in obtaining data for the new tunnel between P. E. Island and New Brunswick.

The new court house of Oxford county at Woodstock, cost $109,949. Mr. A. J. Brown, of Toronto, was the contractor, and there is a dispute over his bill of extras, which amount to $16,360.

A company known as the "Pacific Portland Cement Co." has been formed to operate the Portland cement industry near Victoria. Messrs. Travis & Co. are the agents, with A. S. Dumbleton as solicitor.

Messrs. Denis O'Brien & Son, contractors, of Montreal, have assigned, with liabilities amounting to about $17,000. The assets consist of plant and claims against Dominion Government and others for about $3,118.75.

In spite of the strong efforts put forward by Messrs. L. H. Davis, L. L. Beer and Benj. Heartz to obtain money sufficient to build a very necessary hotel on the island of Prince Edward, the scheme has fallen through.

During some boring operations of the piers in connection with some railway works at Brantford recently a valuable strata of marble was struck. A company is to be formed to start a quarry if investigations prove satisfactory.

Among the pictures to be exhibited at the World's Fair by the Canadian Royal Academy the one of Miss Mabel Cawthra, painted by Mr. Greer, and which was on view at the Royal Academy, England, is given the place of honor.

Contractor Webb, of Hamilton, is negotiating with the Board of Works of that city to purchase the quarry at the brow of the mountain. The city engineer and the street commissioner have reported against selling the property.

Mr. Ewart, the superintending architect in the erection of the Canadian building at the World's Fair, has received instructions to carry out the work of designing the enclosures and decorations for the Canadian Courts at the Exposition.

The captain of ships which carry brick have to be very careful. An ordinary brick is capable of absorbing a pint of water. So with a cargo of bricks in the hold, a serious leak may well go undetected, for the water that enters is sucked up as fast as it gets in.—*Clay Record.*

For more than 2000 years, a dressed stone containing 12,9 2 cubic feet—being 71 by 13 feet in size—has rested on pillars in a quarry at Baalbac, in Syria. It was intended for the foundations of the temple of the sun, a mile or more distant, to which four stones nearly as large were actually transported.

At the annual meeting of the Metallic Roofing Company, of Canada, Limited, held on January 16th last, Mr. E. Samuel was re-elected president, Mr. A. D. Benjamin, vice-president, Mr. J. O. Thorn, secretary-treasurer. The company are making arrangements to start a branch factory in Montreal.

A plan, with full information regarding the competition for the proposed memorial to the late Sir John A. Macdonald to be erected at Montreal, has been sent to Toronto for exhibition. Among the Toronto architects who propose taking part in the competition are Messrs. S. Hamilton Townsend, J. Wilson Siddall, Frank Baker and George R. Harper.

The Royal Academy of Arts, Montreal, have elected the following officers:—President, Robert Harris, Montreal; vice president, A. C. Hutchison, Montreal; secretary-treasurer, James Smith, Toronto; academician painter, John Hammond, St. John; academician architect, David B. Dick, Toronto.

A new company, with a capital of $10,000, has been organized in Hamilton to manufacture brick by a new process. Mr. W. A. Freeman, of that city, is said to have secured control of the product of nearly all the local brickmakers. The price of brick is now $6 as against $5 and $5.50 per thousand last season.

A company with a capital stock of $50,000, has been formed in Montreal named the "Bostwick Metal Lath Co.," for the manufacture and sale of laths composed of metal and plaster and other building materials. The company is composed of Mr. W. W. Bostwick, of New York, with Messrs. J. W. Allison, T. A. Morrison, J. H. Kendall and R. A. Mainwaring, of Montreal.

Mr. P. W. St. George, City Surveyor of Montreal, when reporting to his Board on the advisability of allowing steam to be injected into the sewers, stated that this was most injurious to health, for the steam displaced the sewer gases and forced them into the private houses. As there are no doubt connections of this kind existing in Montreal, it is hoped that speedy steps will be taken to remedy the evil.

Mr. J. P. M. LeCourt, architect, of the Department of Public Works at Ottawa, has recently had a romantic wedding in his family. His daughter was married to Mr. J. H. Stranger, of St. Anne de Manitoba. The couple met eleven years ago and never saw each other again until their wedding day, the engagement having been made by letter. The bridegroom's godmother stood in the same capacity to the bride thirty-six years ago.

A novel system of fire protection is in use in Cleveland, Ohio. Four 6 in. mains are laid from Cuyahoga River to the business streets of the city, covering a distance of 700 to 1,000 ft. The mains are provided at intervals with ordinary fire hydrants, and being laid with a fall towards the river they are normally empty. In case of a fire the city fire boat is run to the river end of the main with which one of its nozzles are connected. The pumping engines in the boat are capable of putting on a pressure of 200 lbs. to 250 lbs. per square inch, so a good pressure is available at the hydrants on the mains.

PERSONAL.

Mr. C. H. Rust, assistant city engineer of Toronto, has recently arrived home from a trip to England.

Mr. D. T. McIntosh, for many years with Messrs. Elliott & Son, Toronto, has resigned his position to enter into partnership with his father and brother in the firm of D. McIntosh & Sons, dealers and workers in marble.

The architectural firm of Darling, Curry & Co., Toronto, has been dissolved by mutual consent. Mr. Curry retires. The business will continue to be carried on by Mr. Frank Darling, under the style of Darling, Sproatt & Pearson, at the offices in the *Mail* Building.

We regret to announce the death during the past fortnight of Mr. Charles Gurney of the E. & C. Gurney Co., Hamilton and Toronto. The deceased, who was about 74 years of age, commenced business in a small way with his brother in Hamilton about 50 years ago. By perseverance the business was raised to the high position it now holds. He was a prominent and greatly respected citizen of Hamilton, and his large funeral on the 6th inst. in that city, bore evidence of the high esteem in which he was held among his fellow citizens, and large circle of business and private friends.

A good plan of preventing tools from rusting is the simple preparation employed by Professor Olmstead, of Yale College, for the preservation of scientific apparatus, and which he long ago published for the general good, declining to have it patented. It is made by the slow melting together of six or eight parts of lard to one of resin, stirring till cool. This remains semi-fluid, ready for use, the resin preventing rancidity and supplying an air-tight film. Rubbed on a bright surface ever so thinly it protects and preserves the polish effectually, and it can be wiped off nearly clean, if ever desired, as from a knife blade; or it may be thinned with coal oil or benzine.

QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require on lines consistent with the objects of the paper. The effort will be made to furnish satisfactory answers to all such enquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

W. T. B.:—Can you inform me which is the oldest architectural building of note in Canada?

Ans.—We would like to hear the opinion of some of our readers on this subject.

"CHIP":—What do you consider the best means of joining a principal rafter with a tie-beam?

Ans.—Provide the principal with a butting joint, made at right angles to the line of the principal and let into a notch cut on the edge of the tie-beam.

"OUTSIDER":—How can an architect join the Ontario Association of Architects? Where can I get full information as to cost, etc.?

Ans.—Write to W. A. Langton, Registrar O. A. A., Canada Life Building, Toronto.

C. D.:—What should be the scantlings of a roof covering a span of 54 feet, to be covered with slate?

Ans.—Tie-beam 12×7, queen posts 7×6¼, small queens 6×2¼, principal rafters 6½×7, straining beam 9×6, braces 4¾×2¾, purlins 8¾×5¼ and common rafters 4½×2. The pitch should be 27°, and trusses 10 feet apart.

The firm of Parkes, Reekie & Co., Montreal, mantels, tiles and other building materials, has been succeeded by that of Webster Bros. & Parkes.

OFFICERS OF TORONTO BUILDERS' EXCHANGE.

WE publish in this number, portraits of the officers of the Toronto Builders' Exchange, to the success of which we have referred on several previous occasions. These gentlemen were elected to office for the current year, at the annual meeting of the Exchange, held on the 16th of January last.

The President, Mr. W. Pears, is also Mayor of the town of Toronto Junction, and is connected with the Davisville and Carlton Brick Mfg. Co. He is well and favorably known, having lived the greater part of his life in the vicinity of this city.

Mr. Geo. Moir, the first vice-president, is senior partner in the firm of Moir & McCaul, carpenters and builders. He has for many years been identified with the building interests of Toronto, and is regarded as one of the most capable and reliable men in the ranks of the builders.

Mr. Geo. Oakley, second vice-president, represents the building stone interest, being a member of the firm of Oakley & Holmes, and president of the Master Stone Cutters' Association.

Mr. David Williams, the treasurer, who has been elected a second time to this office, is one of the oldest builders in the city, and a charter member of the Exchange.

The secretary, Mr. John L. Phillips, has served the interests of the Exchange for about a year in this capacity, previous to which time he was engaged in matters connected with the building trades. He has performed the duties of the office with singular courtesy and ability.

We have no doubt that under the capable management of these gentlemen, the Builders' Exchange of Toronto will continue to advance, and render valuable service on behalf of the building interests of the city.

CREDIT VALLEY BROWN STONE

From Carroll & Vick's No. 6 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure.	Height.	Crushing Load.	Crushing Stress per sq. in.	Average Crushing Stress per Square Inch
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	2¾ × 3	2¾	131,000	15,188	
C	2⅛ × 3	2¾	130,000	14,751	
D	3 × 3	2¾	133,000	14,777	14,905

14,905 pounds is the average crushing strength per square inch of our Credit Valley Brown Stone.

The highest standard of test attained by any pure Sandstone in America.

IN confirmation of the facts above stated, we have pleasure in directing your attention to the accompanying table, showing the result of the test of our stone, in connection with the series of tests of building stones conducted in 1892 at the School of Practical Science, Toronto, under the direction of a committee of the Ontario Association of Architects.

By referring to the results of the tests above mentioned, it will be seen that the average crushing stress of the majority of Canadian and American sandstones is far below that of ours, the difference in our favor ranging from 75 to 50 per cent.

The Credit Valley Brown Stone, owing to its modest tone, harmonizes beautifully with red or cream colored brick.

It has been reported that there is difficulty in obtaining Credit Valley Brown Stone. To correct this mistaken notion, we wish to state to architects and the public that we have 40,000 cubic feet of stone ready to ship on the shortest notice, which can be followed up with an unlimited supply. Last year we made extensive additions to our plant and opened up new quarries and mines, and will supply promptly all orders given to us or our agents.

CARROLL, VICK & CO.

Quarries: Credit Forks, Ont. Office: 84 Adelaide St. West, TORONTO.

The Toronto Pressed Brick and Terra Cotta Co.

THE OLDEST AND LARGEST PRESSED BRICK MANUFACTURERS IN CANADA.

THE ORIGINAL

MILTON PRESSED BRICK WORKS

SPECIAL DESIGNS

Made to order for Moulded, Ornamental, and Colored Bricks.

FOR SAMPLES

--- LOOK AT ---

BOARD OF TRADE BUILDING - TORONTO.
CONFEDERATION LIFE BUILDING, - TORONTO.
NEW GLOBE BUILDING, - - TORONTO.
CENTRAL CHAMBERS, - - - OTTAWA.
BANK OF BRITISH COLUMBIA, - VANCOUVER.
MR. MILLEN'S RESIDENCE, - - MONTREAL.

HEAD OFFICE AND SHOW ROOM:

139 YONGE STREET, - TORONTO.

R. C. DANCY, Managing-Director.

Telephone 60.

COLORED

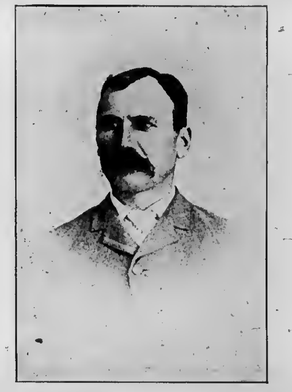
Plain, Moulded, and Ornamental.

RED CREY BUFF BROWN BLACK WHITE

CHAS. SHEPPARD, 402 PARTHENAIS STREET, MONTREAL, Agent for Province of Quebec.

GEORGE MCIR, 1ST VICE-PRES.

GEORGE OAKLEY, 2ND VICE-PRES.



WILLIAM PEARS, PRESIDENT

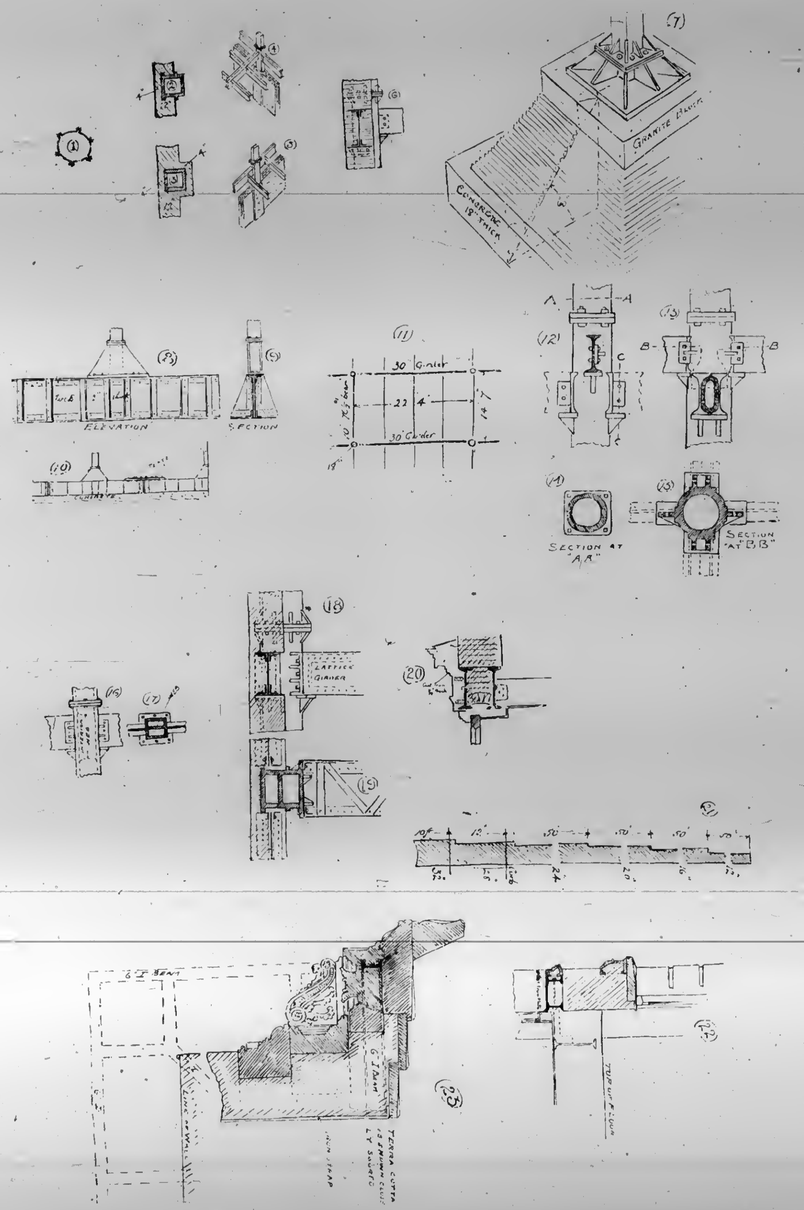
JOHN L. PHILLIPS, SECRETARY

DAVID WILLIAMS, TREASURER

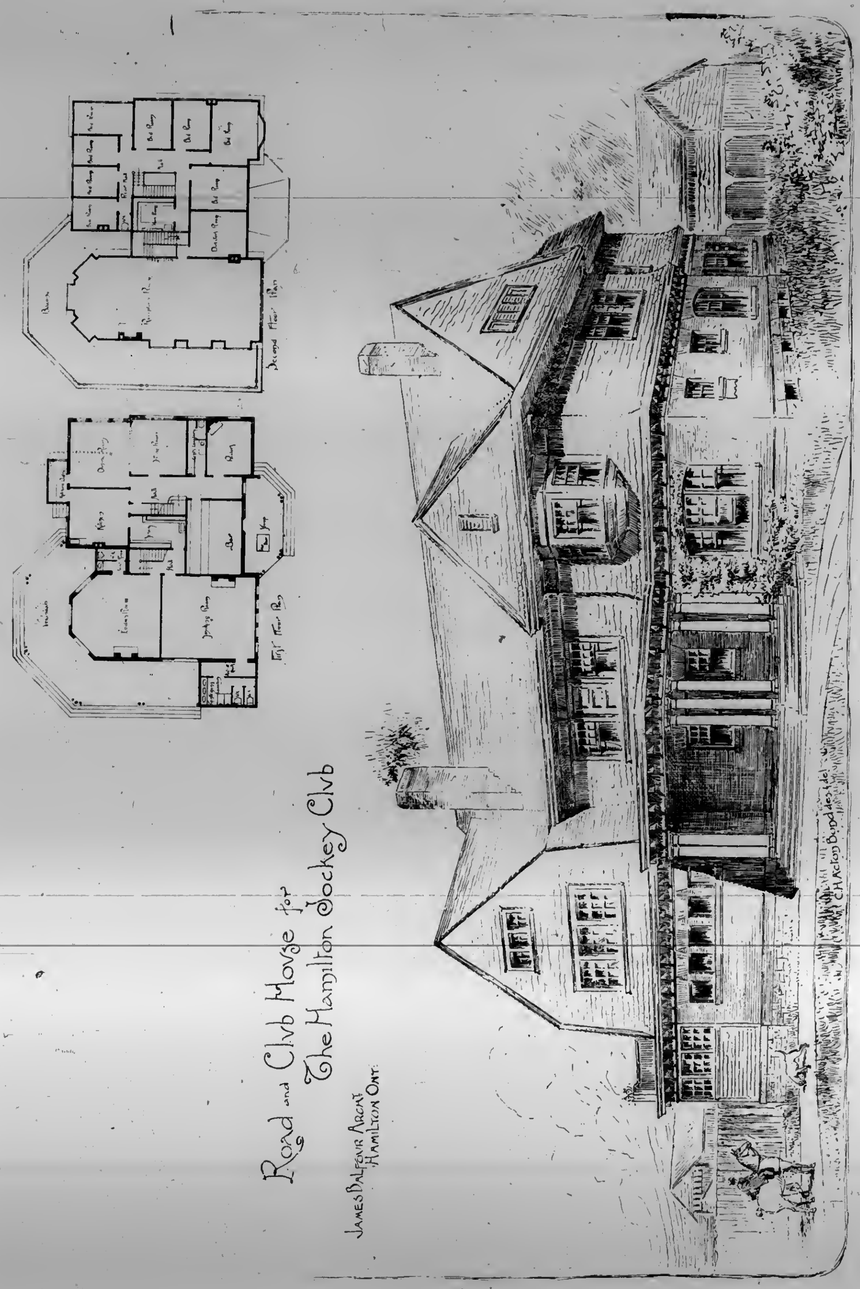
OFFICERS OF THE TORONTO BUILDERS' EXCHANGE, 1893.

Shops and Offices, Chapel Lane, Bradford, Eng.

F. M. Rattenbury, Architect, Vancouver, B.C.



ILLUSTRATIONS ACCOMPANYING PAPER ON "SOME OBSERVATIONS ON FIREPROOF BUILDING IN NEW YORK," BY J. C. B. HORWOOD, IN THIS NUMBER.



RESIDENCE FOR C. J. HOLTANZ, M.R.C.S., UNDERCLIFFE, NEAR BRADFORD, ENG.

F. M. RATTENBURY, ARCHITECT, VANCOUVER, B.C.

CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—NO. IV. TORONTO AND MONTREAL, CANADA, APRIL, 1893. { PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

64 TEMPLE BUILDING, - MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITORS ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	D. B. DICK, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	JOHN E. BELCHER, Peterboro'.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

FRANK DARLING,	Toronto.
DAVID EWART	Ottawa.
S. H. TOWNSEND	Toronto.
W. A. EDWARDS	Hamilton.
S. G. CURRY	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON — Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	V. ROY, Montreal.
1ST VICE-PRESIDENT	J. NELSON, Montreal.
2ND VICE-PRESIDENT	H. STAVELEY, Quebec.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
J. J. BROWNE	Montreal.
J. HAYNES	Montreal.
D. OUELLET	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
GEO. MOIR, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. J. HILL.
JOHN ALDRIDGE.
JAS. CRANG.
J. LISTER NICHOLLS.
WM. BOOTH.
JAS. ISAAC.
JOHN LOGAN.
WM. PARK.
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

THE Association of Building Commissioners and Inspectors of the United States has resolved that buildings for the care of children and invalids should not be more than two stories in height, unless constructed of fire-proof material.

WE have to record another accident, with fatal results, due to the collapse of a derrick. This occurred on the 24th of March in connection with the new Wellington bridge in course of construction by the Dominion Government on the Lachine Canal, Montreal. Two workmen, Michael Owens and Timothy Gallivar, were killed by the falling of the derrick mast. As the result of an inquest to enquire into the circumstances, the jury suggested that the Government should employ more competent men on works of this kind.

IT is pleasing to note from a recent return made by Mr. E. Coatsworth, City Commissioner for Toronto, that there is a marked increase in the value of the buildings, especially dwellings, now being erected. In 1891 it appears from the report that the average cost of 1,100 houses built, was $2,700 each. While in 1892 the number of dwellings erected dropped to 529, the average cost was $3,000. It is a good indication of the thrift and frugality of the people of Toronto when out of the 30,000 dwelling houses now in the city, 50 per cent. of them are owned by the occupiers.

THE Victorian Institute of Architects announces three competitions. One, open to all resident architects in the Australian colonies under the age of 30 years, is for the best design for a school of art and picture galleries. The other two are for probationers and students of the members of the Institute. Additional interest in architectural matters and a more rapid development of architectural taste and skill would be likely to follow a movement of this character on the part of the Councils of the provincial Architectural Associations in Canada. The expense of one or two competitions each year would probably not be deemed sufficient, apart from other considerations, to prevent the attempt being made.

IN December last the Toronto Incandescent Electric Light Co. reduced their price to customers from one cent per hour to eight-tenths of a cent per hour for 16 c. p. lamps. This step, the company state, resulted in almost doubling the volume of their business. Thus encouraged they have announced within the last few days their decision to further reduce the price to six-tenths of a cent per lamp per hour. At this price incandescent electric lighting should displace gas in business establishments at least. It is said to be the intention of the gas company to meet this cut in rates for electric lighting by a corresponding reduction in the price of gas.

IN the matter of the dispute which has arisen in connection with the erection of the new city and county buildings at Toronto, application was made on the 4th inst. by Mr. Neelon (the late contractor) for an injunction to prevent these works being completed other than according to the order granted by the court September 10th last, which, it was contended on behalf of the applicant, allowed the work to be done only by day labor. An arrangement was come to by which the order referred to was enlarged so as to allow the work to proceed by contract and extending the rights of the applicant as relating to his action for damages, if the work was so carried out.

In our correspondence department this month will be found a letter on the subject of "tendering for works." No doubt this is an important question, and it would be well if a remedy could be found which would prevent the acceptance of tenders at figures below actual market prices, and from parties who have not much reputation to lose should they fail to satisfactorily carry out the works. There are difficulties, however, in placing this matter on such a footing as many contractors would prefer, and it is not an easy matter to interfere with the freedom of contract; nevertheless, contractors should be required to furnish good security for the due performance of their work. In this way the competition of incompetent and financially irresponsible contractors might be largely avoided.

The accumulation of snow and ice on the streets of Toronto has been greater during the winter which is about to close, than for many years previous. This, coupled with the fact that the Street Railway Company had barely time to get some of its lines into running order when winter set in, placed them at a serious disadvantage so far as preparation for keeping their tracks clear and maintaining an efficient service were concerned. Many of the citizens, appreciating the unusual difficulties against which the company have had to contend, have been both greatly pleased and astonished at the energy and skillful management by which a first-class service has been provided throughout the winter. It is safe to say that more serious difficulties are never likely to be met with in the future operation of the system.

There has been a substantial increase of late in the price of Canadian lumber, due to an increased demand for the same in the United States market. This should have the effect of increasing considerably the cost of building, but if we are rightly informed such will not be the case so far at least as Toronto is concerned. The greatly reduced volume of building enterprises during the last two years has given rise to excessive competition for such contracts as have been offered, and thus the advance in material is offset by lower tenders. We are informed that stone work is being done at eight dollars per toise, and brickwork, which a few years ago cost fifteen dollars per thousand, costs at present but eleven dollars. And this, notwithstanding that the price of labor has greatly advanced in recent years.

The fire losses in the City of Montreal during the first three months of the current year amount to upwards of half a million dollars. These losses, it is stated, will absorb three-fourths of the insurance companies' premiums for the year. So serious a condition of affairs has led to an investigation of the condition of the fire-protective appliances and of the fire department. As a result, the water pressure is declared to be insufficient, the pumping plant at the waterworks inadequate, and the fire department not up to the standard of efficiency required. The insurance companies have in consequence decided to advance rates 25 to 30 per cent. on certain classes of risks. This will no doubt lead to improvements being made which will lessen the opportunity for such destructive conflagrations as have this year visited the city.

Some architects profess to be able to see no advantages to be derived from connection with the O. A. A., and have withdrawn from membership therein. They appear to have overlooked or underestimated all benefits accruing from the Association to the profession, except such as might be computed in dollars and cents. This view of the subject must be admitted to be a narrow and selfish one. Notwithstanding, we have information which indicates that membership in the Association carries with it a certain monetary value. The Public School Board of a cerlain town in Ontario were about to erect a school building. Two architects sought to secure the work. The question was asked of each of them: "Are you a member of the Ontario Association of Architects?" The reply in one case was in the affirmative; in the other in the negative. The choice turned on this point, the Board at once selecting the architect who was a member of the Association. They required some guarantee as to the competency of the person they would employ to carry out the work, and membership in the O. A. A. was considered sufficient.

It has been universally acknowledged that there is greater economy in machinery as compared with hand labour, but the application of motive power to the various branches of joinery has not been extensively appreciated. It is impossible to overrate the value and importance of machinery in joiners' shops, yet the use of such machinery can be overdone. A proper number of machines is most essential, but four machines will be generally found sufficient, viz: a portable deal frame capable of sawing at one time two deals (14x4) into boards of any required thickness, a self acting saw-bench, a planing machine, and a general joiner which will do all the necessary working tenoning and such work usually executed by hand. These machines can be worked by a 12 horse power steam or electric motor, and, if solidly fixed on stone bases, they can be driven at a great speed without vibration. There seems a general idea that machinery can only pay in very large establishments, and unless a builder can have separate machines for each operation he had better be contented with hand labor. But we are lead to believe that every man having a thriving business would find a great saving could be effected by a moderate outlay on machinery of this description.

It is a frequent subject of complaint on the part of successful architects that features of their designs which have been thought out at the expense of much time and mental effort, are appropriated by persons claiming to be architects, but who are without the ability or disposition to evolve original ideas of their own. An effort was recently made by the Ontario Association of Architects to secure under the Copyright Act protection for the authors of architectural designs, but it was found not to be practicable to do so. Our attention was recently called to a case of pirating which will serve to illustrate the audacity of those engaged in the business. A Toronto architect recently met the officials of a church in a neighboring town, who had under consideration the erection of a new edifice, and was shown another set of drawings which had been submitted. These proved to be an exact tracing from one of his own designs. A copy of the Canadian Architect and Builder in which the design was published a couple of years ago, has since been forwarded to the building committee. It is a satisfaction to know that in this instance at least the pirate has unintentionally played into the hands of the architect the reward of whose labor he sought to reap.

At the recent convention of the National Association of Builders a member introduced a resolution providing that means be taken to secure the affiliation of the Canadian builders' exchanges. The secretary is reported to have moved in amendment that action on the resolution be deferred until after annexation. This, from the Canadian standpoint, will be taken to mean that the question has been shelved

"It may be for years
or it may be forever."

The principal advantage to be derived by Canadian builders from affiliation with the National Association would be the opportunity afforded them to learn the benefits to be secured from a Canadian organization, and the lines upon which it might be successfully conducted. It would be impossible for more than perhaps half a dozen Canadian delegates to attend the conventions of the National Association, and being so few in number, they could not expect to exercise much influence or secure proper consideration of questions affecting the building interests of this country. For this purpose there are required Canadian Associations for the different provinces which should meet semi-annually or annually as do the Architectural Associations of Ontario and Quebec, to consider legislation, forms of contract, prices for labor and other matters of like importance affecting the building interests. The Toronto Builders' Exchange, which is itself an example of the benefits accruing from local organization, might well take the iniatory steps to bring about the formation of a provincial association.

It is said that the City of Toronto has as great an extent of shop fronts as the cities of Buffalo, Detroit and Rochester combined. Toronto is said to have 27 miles of shop fronts, while Buffalo has only 13 miles. Circumstances are at work in Toronto, which will probably largely transform the character of some of the principal thoroughfares, such as King and Yonge

streets. On these streets there are at present a large number of small shops which it is believed will before many years revert to residence purposes. Two principal causes are at work tending to bring about this change. One is the introduction of rapid electric street railway transit, by means of which residents in the outlying districts of the city can be transported to the business centre within an interval of a few minutes. These facilities for dealing at the larger down town establishments is likely to be taken advantage of to the detriment of the smaller business concerns on the less important thoroughfares. The second cause is the recent development of a few large establishments where goods of almost every class are sold under one roof. These concerns will certainly wipe out of existence a very large number of the smaller stores. It is estimated that one such establishment already in existence in Toronto, is doing the trade which formerly was divided amongst 500 small stores. These changes must seriously affect the value of a large amount of property now used for business purposes.

Not more than five or six years have elapsed since the manufacture of pressed bricks was commenced in Canada. In that brief period, however, the manufacturing firms have multiplied from one to half a dozen, and the process has been perfected to a wonderful degree. In point of hardness, closeness of grain and perfection of form, the pressed bricks at present being manufactured in Canada will compare favorably with those in use anywhere on the continent or abroad. They are also being produced in a pleasing variety of color. In view of the success which has been achieved by the manufacturers, it is with much regret that we have observed the otherwise excellent effects obtained by the use of this material, well-nigh destroyed in the case of some important buildings recently erected by the efflorescence or lime-like exudation which, working its way through the pores of the bricks, forms a deposit on the surface. So detrimental is this to the appearance of the building, that unless means can be found to avoid it, architects will no doubt feel compelled to cast about for some other material. We learn that the possibility exists of determining in advance of their use, whether or not bricks will effloresce, and at the royal testing station of building material at Berlin, the test has been applied. The process is described as follows: The bricks are gradually heated to the boiling point in a waterbath, and are then suddenly immersed in cold water. They are boiled for one hour in a 16 per cent. solution of common salt and frequently cooled as before. They are again boiled half an hour in 5 per cent. soda lye. They are further boiled half an hour in the same solution, with the addition of 1 per cent. of ammonium sulphate. They are then boiled half an hour in a solution containing 2 per cent. blue vitriol and 10 per cent. common salt. Fragments of the brick are placed for 75 hours in 3 per cent. hydrochloric acid and for 50 hours more in 5 per cent. hydrochloric acid. By further treatment of the fragments with pure 4 per cent hydrochloric acid a fluid clear as water is formed, which, when treated with barium salts, should not show the presence of sulphates which are the cause of efflorescence. These tests determine the quality of the brick as well, and none which fail to stand the test should be allowed to enter into the construction of a building. We hope that the manufacturers of pressed brick will see the advisability of endeavoring to overcome the objectionable feature of their material to which we have referred.

By order of their leaders seventeen hundred carpenters employed on the construction of the World's Fair buildings have gone on strike. This action was taken because a request for an advance of wages from 35 to 40 cents per hour and the dismissal of all non-union carpenters, met with refusal. The extremity of those upon whom rests the responsibility of getting things in shape for the opening of the Fair, five weeks hence, is regarded as the labor agitators' opportunity, and is taken advantage of to the fullest extent. The utter selfishness which under such circumstances prompts the unions to attempt to snatch a slight advantage at the expense of thousands of exhibitors and others who have large business interests connected with the forthcoming exhibition, deprives them of the sympathy which the public would accord to legitimately conducted efforts for the improvement of the conditions of labor. In this connection, mention may be made of decisions recently given by judges Taft and Ricks of the United States Circuit Court, which are likely to exercise an important bearing upon strikes of workmen employed upon works of a semi-public character. In the case of a dispute between the brotherhoods of locomotive engineers and firemen, and the Toledo, Ann Arbor and Northern Michigan Railway Co., Judge Taft granted an injunction restraining the chiefs of these organizations and the engineers and firemen from in any way, directly or indirectly, endeavoring to persuade or induce any employees of the railway companies whose lines connect with the Ann Arbor not to extend to the said company the same facilities for interchange of interstate traffic as are extended to said companies by other railroads. Eight employees of the company, after the issuing of the injunction, at once resigned their positions on being ordered to take out cars containing Ann Arbor freight. Judge Ricks, on being appealed to, ordered the arrest of these men for contempt of court, and in addressing them said:—"This court does not assume the power to compel you to continue your service to your employers against your will, but it does undertake to compel you to perform your whole duty while such relations continue, and does further claim for the purpose of ascertaining whether its orders have been violated, the right to determine when your relation to your employer legally terminated, and when your obligations to observe this order cease." This decision has caused a commotion in labor circles, mass meetings of unionists having been called in New York and other cities to discuss it. Whether or not the conditions upon which it is based would be held to apply to the World's Fair dispute is as yet an open question.

BRICK PAVING.

This subject has become of great interest in Toronto on account of the City Engineer having recommended that vitrified brick should be used in future for paving the streets of the city. The advantages claimed for this class of pavement are cleanliness, freedom from noise, sanitary perfection through the bricks being non-absorbent, smoothness, with a good foothold for horses, durability, if made with proper materials, and its price, which will compare favorably with other kinds of roadways. A great difficulty in this work is obtaining the necessary uniformity in the hardness of the bricks, which should always be burnt until a homogeneous section is secured throughout each. If this is not done, the first frost will determine the inferior bricks, and the moisture absorbed by such will freeze the bricks and cause crumbling and cracking through expansion.

In the manufacture of bricks for paving purposes the clay to be used is a very important matter. It should be able to withstand a sufficient amount of heat, without fusing, so as to render the bricks hard and impervious to water; but while so much depends upon its refractory nature, reasonable fluxing agents are necessary to make the clay adhesive. It should also be of shale rock nature, so hard in its bed that blasting becomes necessary to remove it. Silica and alumina should constitute the chief refractory parts, but there should not be an excess of the former, as it possesses no binding properties, and bricks made from such clays are rough, and senacious. Potash, soda, lime, magnesia, iron and other elements will be found in small quantities in clays suitable for pavements, and these impurities give a tendency to fusion according to the amount present. Such ingredients should therefore not exist to any large extent; especially is lime to be avoided, as the heat used in firing the bricks will bring about a caustic lime which will absorb moisture when the bricks are laid as a pavement. Iron will make the clay fusible if over 6 to 10 per cent. of the clay is this metal. It is the presence of iron that changes the colour of the brick from that of those made from ordinary clays, and is therefore easily detected. Fineness of clay is most essential, and when this is the case, care only is needed in the manufacturing process to secure good bricks, that is, provided the clay is sufficiently refractory. Coarse clay will require more heat before vitrifying, but the finer the brick earth is ground, the stronger and harder the bricks will become.

The process of manufacture is a difficult problem, and very different from the usual one of brick making. A system that works successfully in one place, will not prove so elsewhere, on account of the diversities of clays. In no case should admixture be employed.

It would be impossible in this short article to describe all the

different methods used in the States to make paving bricks, but a very common one is by using, with modifications, the plant commonly employed for tile making. Taking one case in the United States as a general example: where a brick-maker burns out 1,600 bricks an hour, the system in vogue is along the lines referred to. The clay from the output is delivered to a Blake, when making this kind of brick, and finished with a dry-pan crusher. It then passes to a tempering machine, and is then forced through the desired mold in long lengths, afterwards being cut with a wire by hand to its proper size. The bricks are then removed to a drying house and left until ready for burning. The ordinary kilns are not used, the bricks being packed close together in cylindrical kilns with hemispherical tops giving a down-draught. They are burnt from 70 to 80 hours in a heat sufficient to cause tin to melt and copper to run together. It is here care should be taken that the bricks do not become fusible.

When laid on a good concrete foundation, and the joints well filled in with pitch or tar, a vitrified brick pavement will stand a crushing strain of over 8,000 pounds to the square inch. The result of some tests in the United States from paving laid with bricks, and others laid with ashpaltum blocks, limestone, or granite are very interesting. The samples were weighed before and after being laid and tested, which was carried out by means of a waggon going over the pavements sufficient to amount, it is supposed, to 9½ years traffic. It was found from this performance, that the abrasion of the brick paving was 9%, the asphaltum blocks 14%, limestone, 10%, while on the granite it was hardly noticeable.

Turning to the cost of this pavement, if used in Toronto, we find that unless the Canadian brick merchants can manufacture good material, the cost of obtaining same from the United States, would bring the price far above that of asphalt. But, if the necessary brick can be made here, such paving laid on a proper concrete foundation should not cost more than $2.30 per yard super., and if a sand instead of a concrete foundation is used, then the price should not be above $1.50 per yard super., but this latter class of work cannot be recommended where traffic is heavy. The present price of asphalt is about $2.60, and cedar block paving can be laid for 70c. to 80c. per yard super. The above prices for brick paving therefore compare very favorably with these. As already stated some of the brick merchants in the suburbs of Toronto are putting in the necessary apparatus for making paving bricks, believing that they have the proper clay in their land to turn out good, durable and uniform material. If this is so, and provided the process of manufacture can also be perfected, there is no reason why vitrified bricks should not be largely used throughout Canada for paving purposes.

VAULTING.

It is interesting to trace the methods of vaulting used among masons at different periods in order to meet the requirements of the architecture of their respective times. This is not only a matter of antiquarian interest, but is an essential knowledge to those studying the art of stone cutting, because, where circumstances will allow, the architectural buildings of the present day follow the styles and orders introduced by the ancient architects.

We learn from ruins still existing that the construction of vaulting was known in the earliest periods, vaulted arches being found amongst the ruins of Nineveh. There is no doubt, however, that this class of work was not employed to any great extent before the Roman era, and even in buildings at this time there is no evidence of scientific knowledge of stone cutting. For instance, if two vaults, of the same height at the crown, but of different spans, are to be made to intersect each other, the method now used is to get the profile of the groin by ordinates; this does not however appear to have been practised by the Romans. Their way of carrying out such work was to start the springing of the lesser arch, making the sections of both vaults of different radii, which left the groin a wavering line. The crowns of these arches were always level, and this prevailed until more complex forms of arches were introduced. The early Norman vaulting was carried out on the same principle as those existing at Rome, being distinguished by its semi-circular arches. This changed however with the introduction of rib work, which then consisted of a frame work of light stone ribs, filled in with courses of stones cut to fit the spaces between the ribs. Although this arrangement was in common use at the time, yet some of the buildings of that age show the introduction of the modern method of making the profile of the groin dependent on the form of the principal arch. During the middle ages ribbed vaulting may be said to have been divided into three forms:

(1) Plain ribbed vaulting, which sometimes had ridge ribs, but was frequently without. These arches were often decorated with paintings, and were much used in French and Italian churches of that time.

(2.) Lierne vaulting, in which the ribs were very numerous, and did not always change the direction of the vaulting surface as in the previous class. These arches, often richly decorated, required a thorough knowledge of projection, and although the work at that time was not probably done by any regular geometrical method, yet the natural power the masonic artists had of conceiving in their mind what they wished to carry out, greatly helped them in their work.

(3.) Fan vaulting seems to have been confined entirely to England. The main ribs in this work had all the same curvature, and very often this class of masonry was found alongside lierne vaulting in the same building. The complex forms of this class became so numerous, the panels so small, that it was found better to build all the vaulting by jointed masonry, the panels being sunk into the undersides of the archways instead of being beded on to the ribs. Henry VII Chapel at Westminster Abbey is built entirely in this way.

Stone cutting, as an art, attained its greatest development in the 15th century, but although the work gained as large amount of perfection in Italy as elsewhere, yet the Roman rounded style of vaulting as mentioned, was never entirely superseded. The great master-piece of the Italian work in vaulting is, beyond a doubt, the dome of St. Peters, at Rome, although defective in form in some points. It was built at the close of the 15th century from the designs of Michael Angelo, and the work is an acknowledged specimen of the successful application of stone cutting to domes.

During the building of this cathedral a celebrated French architect, Philip De Lume, published the first book containing a complete system of lines for stone cutting. From the opinion expressed, it appears that ribbed vaulting had fallen into disuse, but he acknowledges the extraordinary evidences of mechanical skill displayed in vaulting executed by the Italian masons, to which subject reference has already been made.

There is little worth noticing in the progress of the history of this art from that time to the present age, most of the works of stone architecture being copies in construction from the old schools. The vaulted roof of St. Paul's Cathedral, London, shows the architect's thorough knowledge of his work, but the building has only a wooden dome, which is merely a picturesque addition to the structure, not an essential part of the construction. Although there were no remarkable changes, yet masonic art became a necessary study for the architects of the day, and geometrical projection formed an important part of education in the profession.

It would not be proper to close this short historical sketch of vaulting without referring to the introduction of oblique arches for skew bridges. They have come to be used only during the last thirty years, and no doubt the development of railways made a necessity for such bridges for before they were introduced, the railway tracks had to be so arranged that all rivers and roads crossed at right angles which meant much unnecessary expense.

To-day, in Canada and elsewhere, the mason does not obtain many opportunities to carry out his art to advantage, but as the country develops and the fine arts become more appreciated and studied, ancient architecture will revive as it has done before; then artistic stone masonry will take its place again among the chief architectural features of our large buildings.

The second copper covered statue of the group of twenty to adorn the new St. Peters cathedral, Montreal, has been completed by Mr. Grattor. It represents St. John the evangelist.

Three large blocks of granite of an aggregated weight of a little over twelve tons have been shipped from one of the up river quarries to Ottawa to form the base of the monument to be erected in the Parliament grounds, Ottawa, to the memory of the late Sir John A. Macdonald.

THE NEW PARLIAMENT BUILDINGS OF ONTARIO.

On the 4th of this month the new Parliament Buildings at Toronto were formally opened. It naturally occurs to us in chronicling the event, to consider what sort of bargain the people of Ontario got for their $1,200,000 odd.

The general scheme seems proper. The Legislative Chamber is in the centre, over the main entrance and approached by the grand staircase. This gives the central motive which, from its singleness of purpose, lends itself to effective composition on the exterior. The offices of the Legislature and of the departments extend on each side of the centre and along wings which return northward, finishing with a stack of lavatories at the end of each. That is the plan in simple, and it seems a straightforward plan in the usual manner of public buildings where a general scheme rules, and rooms are apt to be proportioned by position rather than use. But in the main feature of the interior arrangement there has been a judicious expenditure of space which makes the inside of the building fine, and is worthy of all praise. The grand corridor which runs the entire length of the building from east to west, is made of sufficient width to have on each side of the central portion (where the grand staircase landing intervenes) a space open from the ground floor to a skylight in the roof. The passages of the upper floors thus take the form of galleries at these points, and on the ground floor the corridor has on each side a colonnade which supports these galleries and their arcades. The colonnades, the open space, the light from above, all combine to redeem the corridor from the dark and dreary monotony that is so often all the architectural effect presented by the passages of a great public building.

Thus far we may perhaps assume the architect, but we are afraid it is too obvious that the person with whom we have had to deal for the carrying out of the plan is not so much the architect as the architect's draughtsman. We have no doubt the draughtsman did his best, we would impute to him nothing but righteousness, but surely the architect's commission was sufficient to afford a draughtsman who could design. In this same corridor which we have described, there is but one set of columns to be repeated along the whole colonnade. The detailing was limited, and with a little careful study in the hands of one who knew something might have been carried to perfection and made the whole corridor beautiful where now the details are poor on the ground floor and offensive in the upper storeys. On paper this essay of an apprentice in columnar details would be something to smile at, but that they should be actually erected in an important public building is a matter rather for indignation. The same may be said of the grand staircase. It starts fairly well in iron and slate, but above, where we get to the region of arcades, and what we may suppose to be intended for an ornamental ceiling, the draughtsman's efforts should not have been allowed.

The Assembly Chamber, the grand piece of the design, shows more skill in the designer, but we are afraid cannot be said to satisfy good taste. There is some well executed wood carving on the floor of the House which really gives pleasure and is of the more value as being different in type from the style we have become accustomed to of late years.

Of the exterior we are afraid there is little good to be said beyond praise of the material. It is a fine mass of Credit Valley brown stone and as such cannot but look important.

It is not, however, of meanness we have to complain. The central pavilion with the main entrance, the 16 feet unmullioned windows of the Legislative Chamber above, and the enormous roof which crowns it, is certainly striking. But its proportions are swaggering rather than dignified. Perhaps its self-assertion may be intended to represent the idea of provincial antonomy, but we must confess we should have preferred to have complimented the idea by representing it with a little more of the dignity of beauty.

The roof of this central pavilion is a fine and bold erection, but it seems to us a pity that it was not constructed of iron, so as to save at least the danger of fire originating within its own limits. As it is, being a forest of timber above the highest cast of the hose, its existence is a menace to the public documents below, and the public may perhaps some day wish it were away. As for the other roofs, we must candidly say we wish they were away now, especially the eccentric hipped roofs with glass tops over the main building on each side of the centre. They must form capacious snow traps at the junction with the other roofs. But our discontent is chiefly with the question of beauty of form, and with the draughtsman's apparent indecision as to what pitch to adopt. If the buildings had been planned for a long ridge instead of these pyramidal forms with glass apexes, the front would have been much helped, and the glass might have shown only on the rear—the long suffering but picturesque rear.

But the glass is a friend giving the top lighted corridors within, and we should have been glad to see more of it if the architect had availed himself of it to a greater extent so as to reduce the size of the windows on the facades.

It is these which really spoil the building. They have not even practical advantage to recommend them. The corridors are lighted chiefly from the top, and could be given more light from that quarter and from the rear. For the offices themselves, windows of such a size are a great discomfort. The mere operation of lifting a sheet of glass 9 feet wide is found to be troublesome. In winter the rooms must be pervaded by the sun to a painful extent, and in summer also it will probably be necessary to keep the blinds down and exclude air as well as sun. With windows on a more reasonable scale there is more chance of compact and well arranged planning of the offices, as there is greater freedom offered for the disposition of partitions. The draughtsman too, with more reasonable windows, might have suffered less defeat on the exterior. As it is he has been unable to make anything of it. The conditions were hard, and he does not seem to have been skillful. Where he erred he erred no doubt from ignorance; but this same ignorance, how much has it cost us? Draughtsman is writ large all over our greatest and most costly public building.

ILLUSTRATIONS.

INTERIOR OF SLEEPING COACH TO BE EXHIBITED BY THE C. P. R. CO., AT THE WORLD'S FAIR.

COOK'S CHURCH, TORONTO—HENRY SIMPSON, ARCHITECT.

DESIGN FOR A $3,000 BRICK HOUSE BY "DEMOS."

BETHEL CHAPEL, TORONTO—HENRY SIMPSON, ARCHITECT.

SKETCHES OF WROUGHT IRON WORK.

ONTARIO ASSOCIATION OF ARCHITECTS.

As the meeting of the Council at which the report of the Board of Examiners is presented will not be held until after we go to press, the results of the Association examinations held this month cannot be published in this number.

PERSONAL.

Messrs. Dick & Wickson, architects, Toronto, have removed their offices to No. 34 Canada Life Building.

The widow of the late W. G. Storm, R. C. A., died in the Presbyterian Hospital, New York, on the 28th of March.

Mr. W. E. Doran, architect, of Montreal, is a candidate for the Presidency of the St. Patrick's Society of that city.

We are pleased to record the marriage of Mr. H. J. Powell, architect, of Stratford, to Miss Minnie Venton, of the same city.

Mr. Robert Weddell, contractor, of Trenton, is to contest West Hastings in the interests of the Conservative party at the next provincial election.

Mr. S. G. Curry has returned from British Columbia, having fulfilled his duties as expert in the competition for the Government Buildings at Victoria.

Mr. James Battle, cement manufacturer, of Thorold, is mentioned as a probable candidate for Parliamentary honors, in the Conservative interest.

Mr. D. T. McIntosh, on severing his connection with the firm of Elliott & Son, Toronto, was presented with a handsome piece of bronze statuary by the firm, and a gold-headed cane by his fellow-employees.

Mr. Montague Castle, of Montreal, is a winner of a first and second prize in a competition for the best life drawing open to all American Students in Paris. The prizes were given by the President of the American Artists' Association of Paris.

Messrs. Cassels, Percy Over, and C. H. Acton Bond, well known Toronto draughtsmen, are at present in St. Johns, Nfld., assisting Mr. J. A. Pearson, of the firm of Darling, Sproatt & Pearson, who has a large amount of work under way in that city.

Mr. Coste, Chief Engineer of Public Works, advocates the use of creosote for timber used in crib work and piling. It no doubt is a great preventive of the sea worm eating away the timber. As all the specifications for Government works of this class provide for all piling and crib work to be creosoted, there should be an opening for an enterprise along this line in Canada.

COMPETITION FOR GOVERNMENT BUILDINGS AT VICTORIA, B. C.

The experts in the above competition have given their decision in favor of the design submitted by Mr. F. M. Rattenbury, of Vancouver. The five sets of plans submitted in the final competition were thoroughly analyzed by the experts under the several heads of "Entrances," "Staircases and Passages" "Design and Composition," "Light, Air, Lavatories," "Construction," Detail," "Heating, Ventilation and Drainage"— the principal heads on which the award was based. As the result of this analysis, the designs were placed in the following order of merit :

1—"For our Queen and Province," (F. M. Rattenbury, Vancouver, B.C.)

2—""Spes Labor Levis," (T. C. Sorby, Victoria, B.C).

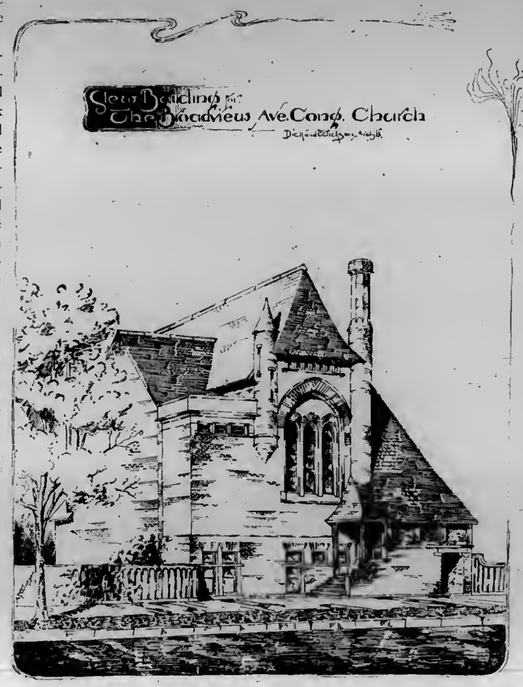
3—"Caractacus," (F. M. Garden, Chicago).

4—"A Red Seal," (J. M. Corner, Boston, and W. P. Skilling, Seattle).

5—"Dieu et Mon Droit," (J. Francis Brown, Toronto.)

The following particulars regarding Mr. Rattenbury's design, which is in the Classic style, are given in the Victoria *Colonist* :

The buildings are arranged in three groups—the centre or principal building comprising six departments so arranged that, whilst each of the three wings will be a perfect and complete building that can be erected independently of the others, they will when completed form a monumental and impressive pile. The grand entrance in the centre of the facade leads into a central octagon hall, terminating in a nobly proportioned dome. From this octogan hall on the ground floor the Minister of Education's department is approached on the left ; the Treasury on the right, and the Lands and Works department in front. On the first floor the same arrangement is repeated with the Provincial Secretary's department on the left, the Attorney-General's department on the right, and the legislative hall and offices in the centre. Thus from this one hall is every department immediately approached, all confusion or perplexity being entirely obviated. And while each department thus forms part of one central scheme, it has nevertheless its own independent entrance, staircases, strong rooms and lavatories, rendering it a perfectly contained and independent block.



The grand entrance is a handsome enriched portal, approached by a grand flight of steps. Through this the visitor enters the dome, which ultimately may be enriched by sculpture, mosaics and decoration. A flood of light is shed down from the cupola at the apex. On special occasions the entrance can be reserved solely for the legislative hall, the departments on either side having their own special entrance as before described. The legislative hall is situated in the centre of the block and has a corridor round it with a belt of rooms for the use of the ministers and members, committee rooms, library, etc.

The hall itself is a spacious and beautiful room. On three sides an arcade is carried round, with galleries for the public, ladies and reporters obtained over the corridor.

On the third floor the Lieutenant-Governor has a suite of rooms in front, facing James Bay and approached by the elevators next the principal entrance.

An unique and ingenious method of protecting the building from fire is adopted. At the approach to the three departments on each floor from the central hall, a system of iron doors or bulkheads is arranged, so that in case a fire might occur it can be isolated to one wing and controlled, without there being any possibility of its spreading. The heating and ventilation are also carefully considered. This is the principal block. Two others, perfectly fireproof, one on each side, are arranged for the Land Registry office, on the right, and the Government Printing office, on the left. The two detached buildings at either side stand somewhat in advance of the principal building—looking on the plan somewhat like the three sides of a square. These are connected to the main structure by a colonnade of columns, forming a covered approach from one to the other.

The winner of this competition is a young man under 30 years of age, who arrived in British Columbia from England about a year ago.

We hope to be able to publish at an early date a reproduction of the accepted design, and also of some of the other designs which were submitted.

TREATING STONES FOR CONSTRUCTION.

ARCHITECTS have lately called attention to the desirability, in the case of stone that is to be used for important purposes, that it be quarried, stored and seasoned for some time before being hewn and placed in the walls, the natural sap being by this means allowed to evaporate and the stone tested as to its quality ; it is admitted that this method would add to the cost, but that the money would be well spent, if this precaution prevented the wasting of such stones by rains, frost or atmospheric influences, which, especially in cities, soon act on the surface of a newly quarried stone. On the other hand, stone that is quarried one day and built in the next is in a green state, and must be considered unfit for use ; that it, it is not in condition—it is at its weakest—its pores are open and ready to absorb not only moisture but the gaseous and disfiguring influences which tend to its destruction. It is well known to every hewer that to get a polished surface on a stone that has lain for some time is very different from what is obtained on one fresh from the quarry—a fact which of itself is regarded as sufficient evidence to warrant the course recommended, namely, to thoroughly season the stone before using.—*Builder and Woodworker.*

The Ottawa Institute of Architects has elected the following officers for the ensuing year : President, D. Ewart, of the department of public works ; vice-president, F. J. Alexander ; sec.-treas., G. M. Bayly ; council, Messrs. J. W. H. Watts, J. G. Grist, K. Arnoldi and M. C. Edey.

The Stonecutters' Section of the Toronto Builders' Exchange, have appointed their officers for the year as follows : President, J. Vick, of the firm of Carroll, Vick & Co.; vice president, Fred. Brown, of the firm of Brown & Love ; treasurer, John Barnard, of the firm of Walker & Barnard ; Secretary, G. L. Phillips ; Auditors, G. Oakley and R. Smart.

QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require on lines consistent with the objects of the paper. Every effort will be made to furnish satisfactory answers to all such inquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

"Country Builder": Do you know where I can get patterns for scroll work ?

Ans.—There are few firms who keep these goods. Messrs. Rice, Lewis & Son, King St. E., Toronto, can supply you.

T. W. B.:—Are there any other builders' exchanges in Canada except those at Toronto and Winnipeg ?

Ans.—We understand there are exchanges at Ottawa, St. Catharines and St. Thomas. Mr. Phillips, Secretary of the Toronto Exchange, might be able to give you further information.

A. B.:—Can you tell me through your columns the best way to stain wood grey ?

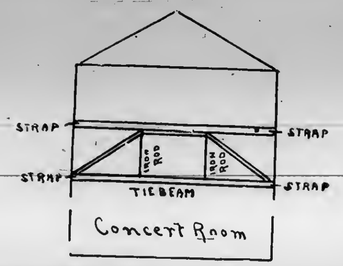
Ans.—Apply a solution of one part silver nitrate in 50 parts of distilled water. Follow this with a coat of solution of ferric acetate until the proper shade is obtained. Do not let this preparation touch the hand.

G. F. S.:—Will you kindly inform me where I may obtain printed instructions and information relating to the competition for designs for the improvement of St. Lawrence Market, Toronto, recently advertised in your weekly edition ?

Ans.—We learn upon enquiry that there exists no printed information for the use of architects in relation to this competition. In fact, as we pointed out on a former occasion, the whole matter is in too hazy and indefinite form to warrant architects in having anything to do with it.

"H. E. Gates, Dartmouth, Nova Scotia" :—I am planning a 3 storey wooden building, the first storey of which is to be used as a concert hall. Please inform me of the best means for supporting the other floors, as I do not wish to use iron columns ? The building is 40 feet wide.

Ans.—You give no data from which we can gather what the upper floors have to carry. But in describing the building as being wooden, you suggest the advisability of spreading the weight of the upper storeys over many points, and that the best form of support would be girders twelve feet on centres or less, as necessary, so that they may be not too deep to form an agreeable beam finish for the ceiling of the concert hall. Another method would be that shown in the accompanying sketch if the partitions on the upper floor will permit.



Unless very carefully done, with a surplus of strength, it is but an undesirable make shift.

"Young Plasterer": From what cause does Plaster of Paris set so firmly when water is applied to it?

Ans.—Plaster of Paris derives its name from the fact that it was first made for commercial uses from a natural deposit of gypsum found near Paris. This substance is a sulphate of calcium, containing two molecules of water in combination. When it is heated to between 300° and 400°, a considerable portion of this combined water is driven off and a friable mass results, which, when ground in suitable mills to a fine powder, forms the plaster of Paris of the trade. The "setting," or hardening, of burnt or calcined plaster of Paris is due to its disposition to reunite with the water of which it has been deprived. When mixed with water, the mass promptly combines with a sufficient portion thereof to make up for that which it has lost, and solidifies to a hard mass, having the composition of the original hydrated sulphate of calcium from which it was made. In undergoing this metamorphosis, the mass expands somewhat, and hence derives one of its most desirable properties for taking casts of objects, as it completely fills the mold and renders a very sharp impression. Care must be observed in burning the plaster not to over-heat it, as by this means a portion of the product becomes completely deprived of its combined water, and the resulting mass loses more or less completely its quality of setting with water.

CORRESPONDENCE.

[Letters are invited for this department on subjects related to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—I want to use metallic ceilings in two school buildings to be built in Deloraine and Melita, and would like to get the address of some Canadian dealer in this material, but see none in your paper. Can you give me the address of any one?

W. T. C. SHILLINGLAW,
Brandon, Man.

[The Metallic Roofing Co. and Messrs. Tucker & Dillon, Toronto, can supply you.—ED. C. A. & B.]

TORONTO ARCHITECTURAL CLUB.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—At the last meeting of the Toronto Architectural Club, a motion to adjourn *sine die* was passed. This brings to a close for the present, at least, the work of this organization. Most of its older members, who were active in the preceding seasons, now devote their energies to the Ontario Association of Architects, while many of its younger members find their evenings fully occupied with the classes held at the Technical School. Thus it is that the attendance at the Club's meetings during the past year has been reduced to a very insignificant number. To many it may seem a pity that circumstances thus force the old Club to retire, but with such a small membership list, and the consequent small financial support, it is impossible to retain proper rooms, etc.

It is a pleasure to note that the Club retires honorably, having paid all its debts, and having a few dollars over, which have been voted to the O.A.A.

As one who has taken a great deal of interest in this Club, and who believes that members of our profession should do what they can to make their work as much a pleasure as possible, may I ask that the architects of Toronto take into their serious consideration the problem of providing suitable club rooms next winter for all classes of the profession, where magazines and papers may be found, and lectures, etc., may be held.

Yours truly,

ALFRED H. GREGG,
President T.A.C.

TENDERING FOR WORK.

Editor CANADIAN ARCHITECT AND BUILDER :

SIR,—Seeing you have started a department for correspondence in your paper, could you find room for these few lines on the present system of tendering for works, which is a subject of vast importance to the contractors of Canada ? It is almost an impossibility for contractors of reputation and ability to compete against the outsiders in the business, who give prices for work far below the actual cost, or the fair estimate of an architect. What is the result ?—the work, if completed, is done in a very defective manner, the architect suffers, the trade is given a bad name, and no one is satisfied.

I believe in fair competition between reliable firms, and although the architect should have "the right not to accept the lowest or any tender," yet it would be better for all parties if he would advise his client to refuse prices that are too low, as well as suggest the non-acceptance of figures that are too high. This may in some cases be a difficult matter, but I think architects could use their influence more in this direction than they sometimes do.

EQUITY.

MANUFACTURES AND MATERIALS

TERRA COTTA : ITS USE AND ABUSE.

Of late there has been a desire to discuss the merits and application of sundry materials in which manufacturers and artists have an interest. Concrete, iron and steel, plaster, and, lately, terracotta, have formed the staple of these discussions, for each of these has its champions and defenders as well as its detractors. Controversial meetings of this kind may not be the most practical or convincing means of promoting the use of any raw material or system, for advocates and producers are naturally prejudiced, while those who come to find fault are generally blind to every merit, as they seek to magnify every defect. We remember the time, however, when the advocates of iron and concrete were in a small minority, and had to bear the brunt of much more powerful opposition than they have now. Red brickwork and terracotta have passed through a similar obloquy and ridicule; and the friend of both materials can now smile on the complete reversal of fortune that has taken place.

With regard to the last named material, we have heard a good deal of late, and the manufacture of terracotta has formed the subject of a series of articles in the *Building News*. Of course like iron, and concrete and brickwork, it has had its opponents, who are generally uncompromising antagonists, able and willing to see nothing in favour of a material which is of a modern introduction, or reintroduction, and which has taken the place of stone to a large extent. Opposition of this kind does good in the long run, because it stimulates manufacturers and architects to make more strenuous efforts to disarm opponents. For example, one of the obstacles to the employment of terracotta has been difficulty in preventing the warping of the clay in drying and the shrinkage in burning. Now this obstacle has been practically removed by the process of manufacture described by Mr. S. H. Leech, of Messrs. Doulton's firm, in a paper read by him at the Institute on "Recent Developments in the Manufacture," and briefly reported in our last issue. The repeated complaints made by architects of "line" and distorted appearance of blocks used in cornices and string-courses, and other horizontal and vertical features like window jambs and pilasters, have to a large degree ceased, for producers of the material have, by increased care in preparing the clay, and in the process of drying and burning, been enabled to turn out blocks and pieces of terracotta of wonderful truthfulness and homogeneity of texture and colour. Another objection to the use of this material made by some architects is that from the nature of the manufacture it encourages repetition of details. Both of these objections no longer hold good. By the system of "direct working" carried out in the new process of manufacture by Messrs. Doulton, the clay is compressed into a state that can be finished in one operation—in fact, manipulated by hand. The block of clay is so nearly solid that it can be treated and finished much in the same manner as a block of stone; the blocks of cellular terracotta do not require to be filled up with concrete, and can be cut to any dimension and shape for fitting round iron stanchions for shafts or other purposes. Being amenable to hand, the compressed clay is capable of being directly worked by the artist instead of being subjected to a process of moulding which destroys all traces of the artists' touch.

These advantages of the "direct method" of working deserve recognition. As Mr. Ingress Bell pointed out in his thoughtful paper on this subject, we must divest our minds of the habit of thinking in stone, in dealing with this material, and until this habit is acquired our terracotta architecture will be a failure. One of the distinctions between working in stone and terracotta is that in the former material the mouldings and ornaments are produced by sinking the field. By a succession of sunken planes the mason produces his cornices, abaci, architraves; every moulding and ornament is sunk in the stone, even the enrichments and foliage of cornices and capitals in Classic as well as in Gothic work were roughly blocked out in the form of a rectangular or splayed projection in the stone, and then the carving was sunk below it. But this principle is not necessary in terracotta; the modeller can superlay and add on to the planes of the block, the moulding can be overlaid with ornament separately modelled, and, in fact, the whole feature can be built up in the clay or manipulated in any imaginable way; so that instead of sinking below the surface of the block to produce the moulding or ornament, the modeller can stick on his foliage or tracery. The effect to the eye of both systems is the same, but the process of production—one by sinking the field, and the other by overlaying it—is different, and seems to suggest that in terracotta, the designer, being less restricted by margins and planes, should have a different motive; in fact, his relief and ornamentation might be more often the *impasto* method. Certainly, stone forms of architecture are not those that should be copied; nor should we like to see revived a meaningless "rococo" style in clay. Both extremes should be avoided. No doubt Mr. Leonard Stokes' attack on terracotta derives much of its sting from the utter disregard of these principles rather than from any deeper cause. He sees rightly enough its abuse in the hands of men who have taken to it because it is fashionable, and cheaper than stone. That it can be called a "miserable mockery composed of mimic masonry" only proves the proposition we have advanced, and does not in the least damage the material in the eyes of the real artist with independent motives for doing better. Many objections can be urged against the application of this material. The concrete filling to terracotta blocks is no doubt open to the objection of sometimes causing fracture of the block by the inequality of the strains induced in the mass; for this reason the "cellular" plan is an advantage, because a greater substance can be given to the blocks. As a casing material for iron columns, fronts of shops, and the like, terracotta offers advantages over stone and even brickwork. Of course such an example as the church piers and arcade mentioned by Mr. Stokes, embedded in which iron stanchions are used with a girder over the tops of the arches to carry the clerestory, is an abuse of the material altogether. If small piers are required, why should not small solid blocks of terracotta be used like moulded bricks? and why should not the arches be solidly constructed in the same manner? But all the objections urged against it constructively and artistically are avoidable. The arguments against its durability, its colour, and its dreariness apply with more force against many kinds of stone which become dull and monotonous in the extreme. Can we look with any satisfaction on the black and furred appearance of many of our London smoke-begrimmed facades? —*The Building News.*

Mr. W. B. Malcolm is enlarging his business premises on Church street, Toronto, and is fitting up new offices and show rooms.

The Standard Drain Pipe Co., of St. Johns, Que., are sending out an attractively printed illustrated price list of their products.

A company with a capital stock of $250,000 is being formed to take over the business of Messrs. C. B. Wright & Sons, cement manufacturers, at Hull, Que.

The Toronto Vitrified Paving Brick and Stone Company, is being organized at Toronto with a capital stock of $500,000. Mr. R. W. Prittie is provisional director.

Messrs. Lefebore & Nelson are exhibiting in the Imperial Building, St. James street, Montreal, a display of metallic ore blocks used for facing old or new buildings. It is proposed to establish large works for the manufacture of these goods.

The Toronto and Orillia Stone Co., Ltd., has lately been organized. The Company own a limestone quarry 45 acres in extent at Longford, Ont. The officers of the Company are: President, Andrew Tait, Orillia; vice-president, Jos. Tait, M.P.P., Toronto; secretary, E. C. Wainwright, Orillia.

The Dominion Sanitary Pottery Company, of St. Johns, P.Q., is forwarding to the Chicago Exposition, sixty handsome specimens of closets, their own manufacture. The Artistic Decorating Co., of St. Johns, executed the decorations, which are most elaborate. The make and finish of the goods will compare well with the products of the great potteries of other countries.

Major Trotter, of the Standard Drain Pipe Co., has invented an ingenious contrivance for saving coal in potteries. The heat of one kiln, after passing through the pipes, instead of going to waste, is made to go through a second and third kiln. By this means three kilns are fired at the cost of two, or a saving of one-third of the amount of fuel used in the present system. The invention is to be patented in Canada and the United States.

The Fuller & Warren Company's system of heating and ventilation, which is in extensive use in the United States, is now being introduced into Canada by the Robb Engineering Co., of Amherst, Nova Scotia, having been installed during the past few months in new school buildings in three towns in Nova Scotia: Amherst, Yarmouth and Wolfville. It speaks very highly for this system that it is in use in a large number of the best schools in Massachusetts, where legal enactments have made it imperative to comply with the highest attainable sanitation.

We regret to have to announce that the manufacturing department of the St. Johns Stone Chinaware Company's works at St. Johns, Que., was destroyed by fire on the 4th of March. The proprietors had recently completed extensive improvements, including new machinery costing $25,000. Their loss is placed at $100,000, against which there is insurance to the amount of $54,000. The works gave employment to 225 persons. The company will at once put into operation the Dakin pottery recently acquired by them, and it is expected will proceed as soon as possible to rebuild and re-furnish the works which have been destroyed.

Messrs. Richardson, Walker & Co., of Portland, Maine, who are extensive wholesale and retail dealers in southern pitch pine and cypress timber and lumber, write us that they have lately shipped some large orders into Canada, and believe that there will soon be a large demand in this country for southern woods. Cypress approaches most nearly in quality to white pine, which is becoming increasingly scarce, and is claimed to be in some respects superior to the latter, as being firmer, less subject to contraction and expansion, capable of better finish, proof against insects, etc. Messrs. Richardson, Walker & Co. through our advertisement pages invite correspondence from Canadian architects, engineers, builders, etc.

Many architects and builders consider that Longleaf pine that has been bled and tapped for turpentine suffers in strength by virtue of same and they restrict the use of it in construction, but by recent tests made by the forestry department at Washington, it has been proved that the timber does not suffer from such tappings. On the contrary it exhibited if anything greater strength, which may be accounted for by the fact that turpentine orchards are located mostly on sites which produce better quality timber and larger yields of turpentine. The reasons of the wood not suffering from these operations is because the older resins of the heartwood being non-fluid, the turpentine flow is confined to the sap wood. No difference is discernible in the appearance of tapped and untapped trees, and in spite of specifications calling for unbled timber of this kind, such wood is often pparded without being discovered.

SHAVINGS.

The Dominion Government have granted the sum of $1,000 towards a national art gallery.

Mr. G. Wilson, builder of St. Catherines, is using electric power for operating the machinery of his works.

Good material for making sewer pipes can be found at Weston. There is also a material in the neighborhood suitable for painting purposes.

Mr. E. Colonna, of Montreal, has been awarded the prize of $100 offered by the Architectural League of New York for the best design of a loving cup.

Mr. R. Forsyth, of Montreal, has entered an action against the Canadian Granite Co. to recover royalty on granolithic pavement used by them, and asks for an injunction on the execution of more contracts.

Mr. Hunt, an American architect, has been awarded the gold medal given annually by the Queen through the Royal Institute of British Architects.

The first meeting of the Hamilton Sanitary Association was held recently in the Board of Trade building of that city under the presidency of Mr. A. G. Ramsey. An account of the working of the Montreal Sanitary Association was given by Mr. W. Hopkins, and a committee composed of Messrs. A. G. Ramsey, Adam Brown, A. Turner, Major McLaren, G. Roach and D. Rennie was appointed to nominate a council. Evidence of the interest being taken in the Association was shown by the large number of citizens at the meeting.

An organization has been formed in Canada to regulate the trade and maintain a uniform scale of prices in the building paper line. At a recent meeting the following scale of prices was adopted: Tram straw board, 60 cents per roll; Tarred straw board, 70 cents per roll; Fibre paper not less than above prices; O. K. or I X L. paper, 70 cents per roll; Tarred felt, $30 per ton. Terms —Four months, 3 per cent. off cash 30 days. Mr. E. G. Burke, of Campbellford, is president of the association, W. T. Miller, of Trenton, vice president, and C. T. Williams, of the firm of George W. Reid, secretary.

An asphaltic-concrete material for floors is described in "Indian Engineering," under the name of "bastard asphalt flooring." It consists of a 6-in. layer of 1-in. broken stone boiled in tar, with an upper ½-in. layer of coarse gravel or small stone chips, and slaked lime (2 parts of the former to 1 part of the latter), boiled in a mixture of coal tar and pitch. Both layers to be rolled, and the upper one finished with a top dressing of sand ¼ in. thick, and again rolled. This description of flooring has been used for freight shed platforms, etc., and found to be durable and satisfactory when not exposed to the sun. For the floors of ordinary buildings a thickness of 3 ins. is sufficient. The tar must be well boiled.

The loss of property from fire during 1892, in Toronto, amounted to $210,115, while in Montreal, which is not much larger than this city, the damage amounted to $775,000.

The Woodstock Court House Committee have settled the differences with their contractor, Mr. Brown. The account was reduced from $16,400 to $13,300, which amount was accepted in settlement.

A new coat of arms for the Berlin court house weighing over 300 pounds recently arrived from England, where it was made.

Mr. C. F. Mitchell, of 168 Borden street, Toronto, has entered an action against the trustees of the College street Presbyterian church to recover $683.71 a balance alleged to be due to him under his contract for the erection of a school room for the church.

WE

know many people who think it wise to buy an article because it is cheap. That is poor policy. We

SELL

the highest grade of mortar known in the trade, and anyone who has used Adamant will back up this statement. Use Adamant and get full value for your

MONEY.

AD ...G. CO. OF AMERICA,
...NADE EAST,
- TORONTO.

ARTISTIC · WALL · HANGINGS

Sole Wholesale Agents in CANADA for Lincrusta Walton

Over 75 Stock Patterns in this the best of Relief Decorations, comprising Dadoes, Hangings, Friezes, Ceilings, Mouldings and Art Panels.

...CATALOGUE AND PRICE LIST ON APPLICATION...

Wall Papers, Room Mouldings and Window Shades

M. Staunton & Co.
... TORONTO ...

THE
Oneida Quarry Co.
LIMITED
..... PRODUCERS OF .....
SANDSTONE, MARBLE LIMESTONE AND LIME

For all descriptions of Building and Monumental Work.

Quarries situated in the County of Haldimand. Shipping Station, Nelles' Corners. Head Office: BRANTFORD, ONT.

WRITE FOR PRICES BEFORE ORDERING ELSEWHERE.

PORTLAND CEMENTS

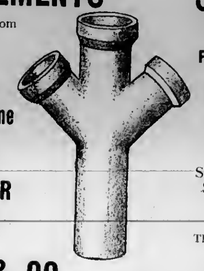
All the best known brands at from $1.80 per cask.

ROMAN CEMENT

KEENE'S Coarse, Superfine and Parian CEMENT.

CALCINED PLASTER

We are Agents for the best Nova Scotia makers.



SEWER PIPES

Standard and Scotch.

FIRE BRICKS
FIRE CLAY
FLUE COVERS
CHIMNEY LININGS AND TOPS

Scotch Derricks, Building Sandstones, and all kinds of Builders' and Contractors' Supplies.

The largest stock in Canada of these Goods, and at bottom prices.

W. McNALLY & CO. - MONTREAL.

FRANCIS HYDE & CO.
DIRECT IMPORTERS AND DEALERS IN
SCOTCH FIRE CLAY BRICK, DRAIN AND WATER PIPES, ETC.

Double Strength Fire Clay Pipes For railway culverts. Unglazed Fire Clay, Flue Lining, Sewer Bottoms or Invert Blocks, Stable Paving, Bricks and Tiles, *English and Scotch Sandstone*, Glazed and Enamelled Bricks and Tiles for internal lining of baths and walls, English Art Tiles, Floor Tiles, Sanitary Earthenware etc. Special quotations for Cupola Kilns, Retorts and Blocks.

NOTE.—Only pure, SCOTCH, unglazed Fire Clay Linings will be kept instock—any other quality is worthless for resisting heat. Correspondence invited. Quotations promptly furnished.

Office: 31 WELLINGTON STREET, MONTREAL.

USEFUL HINTS.

PITCH pine beams will shrink in thickness from 18¾ inches to 18¼ ; spruce, from 8½ to 8¼ ; white pine, from 12 inches to 11⅞ ; yellow pine, a trifle less. Cedar beams will shrink from a width of 14 inches to 13¼ ; elm, from 11 to 10¾, and oak from 12 to 11⅜ inches.

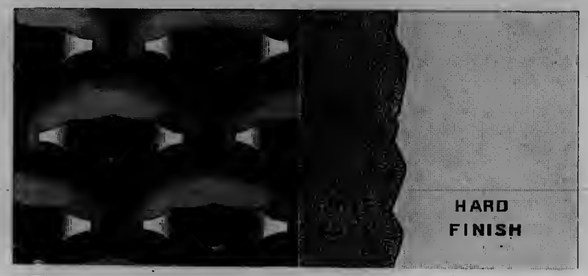
GLASS FROSTING.—Dissolve Rochelle salts in gum-arabic water ; let it stand over night, and after cleaning off the glass well, flow the solution on so that it will not run ; lay the glass flat, if convenient, and when it commences to set take a pointed stick and dot it in rows to suit the taste ; put the dots about 1½ inches apart. If you wish it colored use anilines—red, blue or green and gamboge for yellow or gold color, then flow on a thin coat of damar varnish, and it is finished.

NAMES OF NEW COLORS.—"Angelique" is a pale apple green. "Beige," really a beige drab. "Caster," a dark beige. "Castile," a bright buff yellow. "Coquelicot," a bright brick red. "Diavolo," a bright cinnamon. "Emeralde," a brilliant emerald green. "Floxine," a brilliant light crimson. "Geranium," a pale geranium red. "Mascot," a medium moss green. "Murier," an indefinite moss green. "Paradise," a bird of paradise yellow. "Bivoine," a deep metallic scarlet. "Vareche," a dark moss green.

A GOOD CEMENT.—Dissolve 8 ounces of sugar in 24 ounces of water in a glass flask on a water bath, and to the thin syrup add 2 ounces of slacked lime, keep the mixture at a temperature of about 160° to 165° Fah. for three days, shaking frequently ; then cool, and decant the clear liquor. Dilute 6½ ounces of this liquor with as much water, and in the mixture steep 16 ounces of fine gelatine for three hours after heating to effect solution. Finally add to the mixture 1½ ounces of glacial acetic acid and 15 grains of pure carbolic acid.

ELECTRIC push buttons should be clearly visible on the front door, and the more conspicuous they can be made without offending good taste the better. The practice of placing such push buttons in some obscure place, hidden in the shadows of the moulding of the door jamb, where they can neither be seen nor found in the dark, is a poor one, causing much annoyance which might easily be avoided. The first purpose of a push button is to be useful and this purpose is best served when it is plainly visible and accessible to those desiring to enter the house.—*Southern Architect.*

Hayes' Patent Steel Lath



The tenacity of the bond and other features are unequalled.

Now being used in the "Grand Seminaire," Montreal.

... WE ALSO MANUFACTURE ...

Copper, Galvanized Iron and Painted Steel Shingles and Tiles,

Sheet Steel Pressed Brick and other Siding Plates,

Galvanized and Painted Pressed Corrugated Iron.

CORRESPONDENCE SOLICITED.

METALLIC ROOFING CO., LIMITED.

Factories: MONTREAL AND TORONTO.

... ADDRESS ...

30 St. Francois-Xavier St., Montreal, *or* 84 Yonge Street, Toronto.

CREDIT VALLEY BROWN STONE

From Carroll & Vick's No. 6 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure	Height.	Crushing Load.	Crushing Stress per sq. in.	Average Crushing Stress per Square Inch
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	2¾ × 3	2⅞	131,000	15,188	
C	2⅛ × 3	2⅞	130,000	14,751	
D	3 × 3	2⅞	133,000	14,777	14,905

14,905 pounds is the average crushing strength per square inch of our Credit Valley Brown Stone.

The highest standard of test attained by any pure Sandstone in America.

IN confirmation of the facts above stated, we have pleasure in directing your attention to the accompanying table, showing the result of the test of our stone, in connection with the series of tests of building stones conducted in 1892 at the School of Practical Science, Toronto, under the direction of a committee of the Ontario Association of Architects.

By referring to the results of the tests above mentioned, it will be seen that the average crushing stress of the majority of Canadian and American sandstones is far below that of ours, the difference in our favor ranging from 75 to 50 per cent.

The Credit Valley Brown Stone, owing to its modest tone, harmonizes beautifully with red or cream colored brick.

It has been reported that there is difficulty in obtaining Credit Valley Brown Stone. To correct this mistaken notion, we wish to state to architects and the public that we have 40,000 cubic feet of stone ready to ship on the shortest notice, which can be followed up with an unlimited supply. Last year we made extensive additions to our plant and opened up new quarries and mines, and will supply promptly all orders given to us or our agents.

CARROLL, VICK & CO.

Quarries : Credit Forks, Ont. Office : 84 Adelaide St. West, TORONTO.

A GREAT LOSS!

IF you have any pipes or boilers uncovered, you are losing on same at the rate of 80 cents every year on each square foot of surface exposed. By having them covered with our ***Mineral Wool Sectional Covering*** you will save 85% of this loss. The saving [illegible] effected in fuel will in one year more than pay th[illegible] of covering, which we guarantee to last as [illegible]rees, and in [illegible]ld, such wood is [illegible] pipes. Our covering is the best fuel saver [illegible]

MONTREAL AGENT:
GEO. A. COWAN,
Room 23, 204 St. James Street.

CANADIAN MINERAL WOOL CO., Ltd.
122 Bay Street,

USEFUL HINTS.

PITCH pine beams will shrink in thickness from 18⅜ inches to 18¼ ; spruce, from 8½ to 8¼ ; white pine, from 12 inches to 11⅞ ; yellow pine, a trifle less. Cedar beams will shrink from a width of 13 inches to 13¼ ; elm, from 11 to 10¾, and oak from 12 to 11⅜ inches.

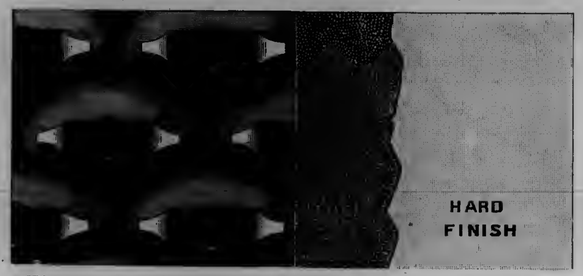
GLASS FROSTING.—Dissolve Rochelle salts in gum-arabic water ; let it stand over night, and after cleaning off the glass well, flow the solution on so that it will not run ; lay the glass flat, if convenient, and when it commences to set take a pointed stick and dot it in rows to suit the taste ; put the dots about 1½ inches apart. If you wish it colored use anilines—red, blue or green and gamboge for yellow or gold color, then flow on a thin coat of damar varnish, and it is finished.

NAMES OF NEW COLORS.—"Angelique" is a pale apple green. "Beige," really a beige drab. "Caster," a dark beige. "Castile," a bright buff yellow. "Coquelicot," a bright brick red. "Diavolo," a bright cinnamon. "Emeralde," a brilliant emerald green. "Floxine," a brilliant light crimson. "Geranium," a pale geranium red. "Mascot," a medium moss green. "Murier," an indefinite moss green. "Paradise," a bird of paradise yellow. "Bivoine," a deep metallic scarlet. "Vareche," a dark moss green.

A GOOD CEMENT.—Dissolve 8 ounces of sugar in 24 ounces of water in a glass flask on a water bath, and to the thin syrup add 2 ounces of slacked lime, keep the mixture at a temperature of about 160° to 165° Fah. for three days, shaking frequently ; then cool, and decant the clear liquor. Dilute 6½ ounces of this liquor with as much water, and in the mixture steep 16 ounces of fine gelatine for three hours after heating to effect solution. Finally add to the mixture 1½ ounces of glacial acetic acid and 15 grains of pure carbolic acid.

ELECTRIC push buttons should be clearly visible on the front door, and the more conspicuous they can be made without offending good taste the better. The practice of placing such push buttons in some obscure place, hidden in the shadows of the moulding of the door jamb, where they can neither be seen nor found in the dark, is a poor one, causing much annoyance which might easily be avoided. The first purpose of a push button is to be useful and this purpose is best served when it is plainly visible and accessible to those desiring to enter the house.—*Southern Architect.*

Hayes' Patent Steel Lath



The tenacity of the bond and other features are unequalled.

Now being used in the "Grand Seminaire," Montreal.

...WE ALSO MANUFACTURE...

Copper, Galvanized Iron and Painted Steel Shingles and Tiles,

Sheet Steel Pressed Brick and other Siding Plates,

Galvanized and Painted Pressed Corrugated Iron.

CORRESPONDENCE SOLICITED.

METALLIC ROOFING CO., LIMITED.

Factories: MONTREAL AND TORONTO.

...ADDRESS...

30 St. Francois-Xavier St., Montreal, *or* 84 Yonge Street, Toronto.

CREDIT VALLEY BROWN STONE

From Carroll & Vick's No. 6 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure	Height.	Crushing Load.	Crushing Stress per sq. in.	Average Crushing Stress per Square Inch
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	2⅞ × 3	2⅞	131,000	15,188	
C	2⅛ × 3	2⅞	130,000	14,751	
D	3 × 3	2⅞	133,000	14,777	14,905

14,905 pounds is the average crushing strength per square inch of our Credit Valley Brown Stone.

The highest standard of test attained by any pure Sandstone in America.

IN confirmation of the facts above stated, we have pleasure in directing your attention to the accompanying table, showing the result of the test of our stone, in connection with the series of tests of building stones conducted in 1892 at the School of Practical Science, Toronto, under the direction of a committee of the Ontario Association of Architects.

By referring to the results of the tests above mentioned, it will be seen that the average crushing stress of the majority of Canadian and American sandstones is far below that of ours, the difference in our favor ranging from 75 to 50 per cent.

The Credit Valley Brown Stone, owing to its modest tone, harmonizes beautifully with red or cream colored brick.

It has been reported that there is difficulty in obtaining Credit Valley Brown Stone. To correct this mistaken notion, we wish to state to architects and the public that we have 40,000 cubic feet of stone ready to ship on the shortest notice, which can be followed up with an unlimited supply. Last year we made extensive additions to our plant and opened up new quarries and mines, and will supply promptly all orders given to us or our agents.

CARROLL, VICK & CO.

Quarries : Credit Forks, Ont. Office : 84 Adelaide St. West, TORONTO.

A GREAT LOSS!

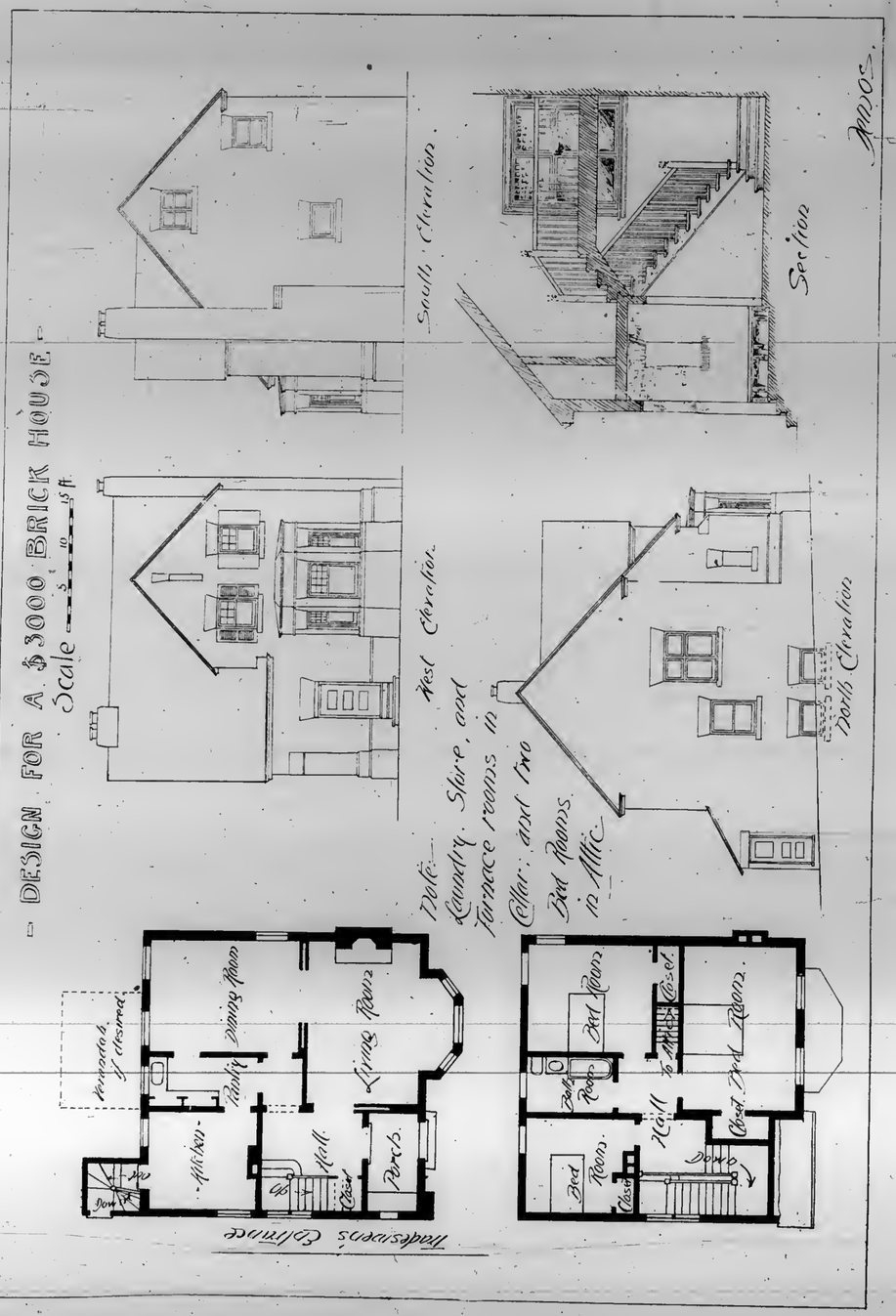
IF you have any pipes or boilers uncovered, you are losing on same at the rate of 80 cents every year on each square foot of surface exposed. By having them covered with our ***Mineral Wool Sectional Covering*** you will save 85% of this loss. The saving effected in fuel will in one year more than pay the cost of covering, which we guarantee to last as long as the pipes. No dirt. Our covering is the best fuel saver and, such wood is.

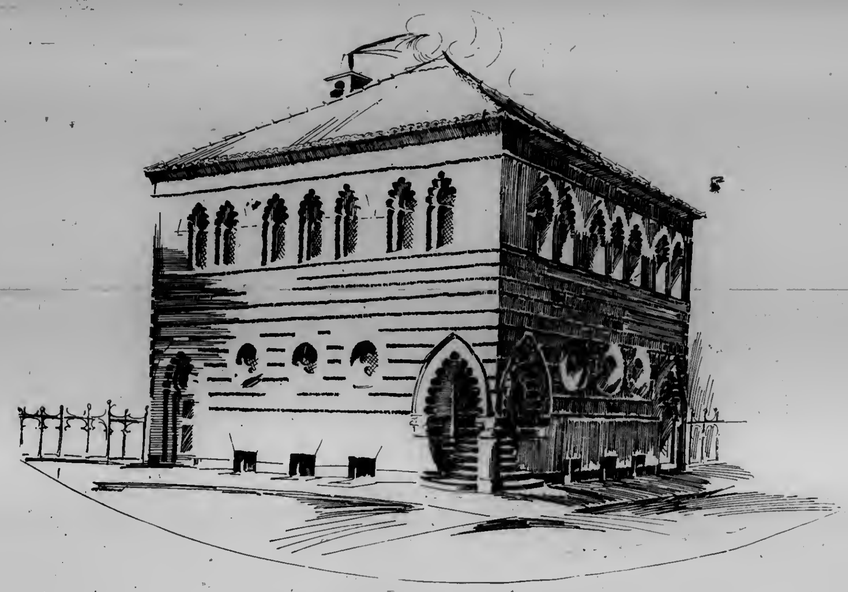
MONTREAL AGENT:
GEO. A. COWAN,
Room 23, 204 St. James Street.

CANADIAN MINERAL WOOL CO., LTD.
122 Bay Street,

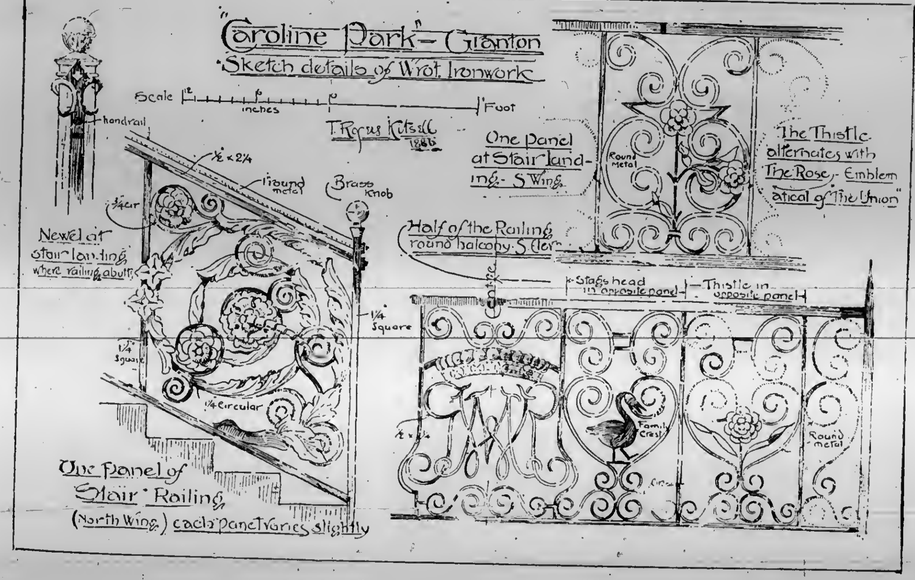
Interior of Sleeping Coach to be Exhibited by the Canadian Pacific Railway Co. at the World's Fair.

E. Colonna, Architect, Montreal.

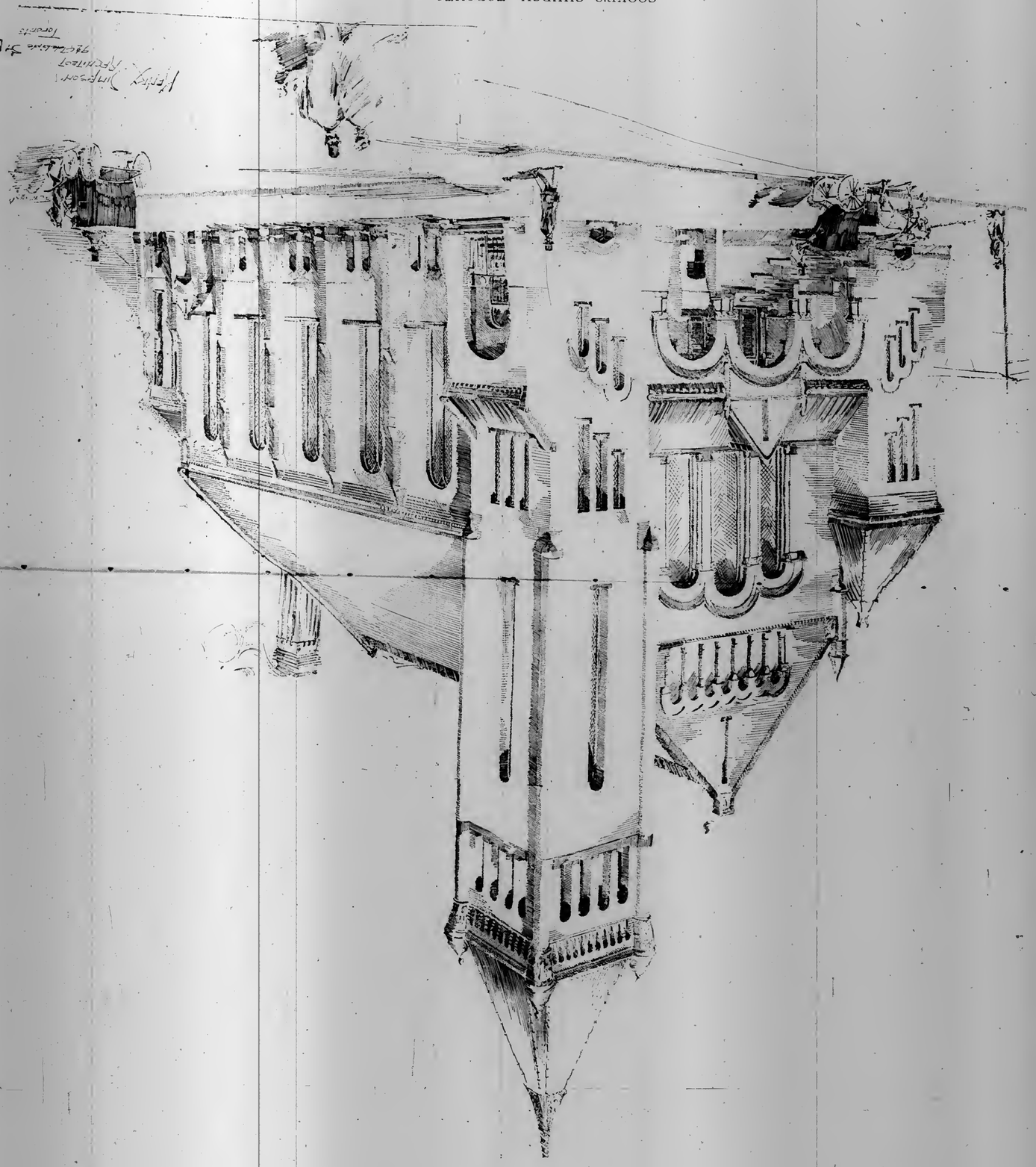




BETHEL CHAPEL, UNIVERSITY ST., TORONTO.
HENRY SIMPSON, ARCHITECT.



COOKE'S CHURCH, TORONTO.



CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—No. V. TORONTO AND MONTREAL, CANADA, MAY, 1893. PRICE 20 CENTS. $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

64 TEMPLE BUILDING, - MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	D. B. DICK, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	JOHN E. BELCHER, Peterboro'.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

DAVID EWART	Ottawa.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
FRANK DARLING,	Toronto.
W. A. EDWARDS	Hamilton.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	V. ROY, Montreal.
1ST VICE-PRESIDENT	J. NELSON, Montreal.
2ND VICE-PRESIDET	H. STAVELEY, Quebec.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
J. J. BROWNE	Montreal.
J. HAYNES	Montreal.
D. OUELLET	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
GEO. MOIR, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. J. HILL.
JOHN ALDRIDGE.
JAS. CRANG.
J. LISTER NICHOLLS.
WM. BOOTH.
JAS. ISAAC.
JOHN LOGAN.
WM. PARK.
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

In a recent letter to the city in reference to the court house question, Messrs. Neelon & Co.'s solicitors state that labor and materials are very perceptibly lower at the present time than they were in 1888. This is incorrect, in fact the movement is the other way. Stone-cutters who received 38 cents per hour in that year are now getting the high wage of 43 cents, and bricklayers now receive 35 against 33½ cents per hour in 1888. The material market also shows some prices to have risen, and stone, the material more particularly referred to, is 20 per cent. dearer than at that time.

WE had the pleasure of presenting to our readers some months since a brief paper on "The Doorway," originally presented by Mr. Gemmell for the consideration of the members of the Toronto Architectural Guild. It was intended to serve as the introduction to a series of brief papers by members of the Guild on the subject of house design. It will be a matter of regret to our readers to be informed that the further consideration by the Guild of this interesting subject was conducted orally, and the results are consequently in a measure lost.

THERE is room for much improvement in the efficiency of electric door bells as in many instances they are fitted up. It is not an infrequent thing to see posted above the push button beside a residence door, the intimation: "Bell out of order; please knock!" It sometimes happens, as in the case of a prominent Toronto merchant, recently, that considerable time elapses before the inmates of the house become aware that the door bell is failing to discharge its duty. The merchant's friends in vain had been pushing the button for a week or more. When at last the discovery was made that the bell was not working, the owner went down town and expended $3.50 in repairs. What was his regret at having done so when the first person to demand admittance after the bell had been put in order was a policeman bearing a warrant summoning him to the police court to show cause why he had not removed the snow from the sidewalk in front of his premises.

THE Ministers of Finance and Customs are at present receiving deputations representing the various important manufacturing and commercial interests of the country for the purpose of learning what readjustment of the existing tariff is required. The present may therefore not be an inopportune time to mention that architects have reasonable ground for complaint in this connection. Few if any of their supplies are or ever will be manufactured in Canada. Even the United States has thus far been able to produce only the cheaper grades of drawing paper and instruments. In view of these conditions, the duty of 25 to 35 per cent. imposed upon these materials when imported into this country from Europe must be considered unnecessarily burdensome. It might very properly be reduced by at least 50 per cent. Canadian architects at present find themselves in the unfortunate position of being highly taxed on everything they require to use, while virtually the tariff does not protect them from the competition of foreign architects.

In the construction of elevator shafts and the fitting up of elevators, architects would do well to see that a space of five to seven feet at least is provided between the top of the elevator when it reaches its highest point of travel and the roof of the shaft. The necessity for such a requirement was brought to our attention by an accident which happened recently. The automatic regulating device connected with an electric elevator failed to operate when the current was turned on, and the car shot up the shaft. Fortunately it was empty, and more fortunately still, two attendants who a moment before were on the top of the car for the purpose of oiling the slides, had made their exit from the shaft. If the accident had occurred one minute earlier these men must have been crushed to death at the top of the shaft, as the stopping point of the car is only two or three feet below the roof. This is not the first occurrence of the kind that has come to our notice. In addition to the necessary provision above mentioned, the safety of passengers demands that the controlling devices be made more effective.

THE York Pioneers have taken in hand the erection of a monument to Governor Simcoe, and the Ontario Government will be asked to grant a suitable site for the same in Queen's Park, Toronto. It is very desirable that the memory of the man who founded the Queen City of Canada and caused it to be made the seat of legislation for Ontario, should be perpetuated in the manner proposed. The time also is most appropriate, as the present month marks the centennial of the founding of the city. If a suitable site be granted, as we have no doubt will be the case, the York Pioneers will make every effort to erect a statue which shall be recognized as a work of art, and a deserving memorial of one of the greatest pioneers of Canadian civilization.

AN international congress of architects is to be held in Chicago under the auspices of the World's Congress Auxiliary, during the week commencing July 31st. The object is stated to be to bring together the eminent architects of all countries for friendly intercourse, comparison of methods and results, and the promotion of their mutual interests in the profession. The following subjects have been selected for consideration at this congress:—Workingmen's Houses; Modern Department Houses; Ancient Department Houses; Laundries in Houses, Health Effect; Modern Stables, large and small; Responsibility of Architects in Constructional Matters; Responsibility of Architects as to Plans; Responsibility of Architects in Decorative Matters; Sculpture and Architecture; Painting and Architecture; The Client's Right to Service, as to Drawings; Ownership of Same, Specifications and Details, as to Supervision, etc.; Mechanical Engineering in Architecture, and the Architect's Responsibility Therefor; Modern Steel Construction; Fire-Proofing of Buildings to Date.

THE public works department at Ottawa are evidently anxious to protect themselves from a class of undesirable contractors, and in order to do this have issued new regulations regarding Government contracts. In future the deposited cheque is to be to instead of 5 per cent. on the amount of contract, and only 80 in place of 90 per cent. will be paid on progress estimates. This new arrangement may be the means of keeping smaller contractors from competing for the work, but if a contractor has the confidence of his employer there is no reason why restrictions of any large amount should be placed on his progress certificates. During the erection of the Ontario Parliament Buildings payments on account to the contractors were made to the amount of 90 per cent. on the value of the work executed, and the work financially has been carried out in a satisfactory manner. Larger amounts than 20 per cent. are often kept back by architects upon progress certificates, but it has often been the means of retarding the progress of works even in the hands of honest contractors.

WE had occasion recently to refer to the unfair treatment accorded by the Toronto city council to Mr. Alex. Gartshore, of Hamilton, whose tender for water pipe, being the lowest, was rejected in favor of a higher tender by a local firm. The sequel to this piece of injustice now appears in Mr. Gartshore's refusal to again submit a tender for material required by the city of Toronto when invited to do so. In consequence of this refusal only a single tender was received. It is a short-sighted policy for corporations to exclude the competition of outside contractors. By doing so they are compelled to pay higher prices for work and material, and as gradually the impression gets abroad that no outsider need apply, the local contractors are enabled to combine and have things all their own way. In the case to which we have refered, however, outside contractors were led to submit tenders on invitation of the Board of Works in the belief that the Council would deal with the same impartially and on their merits. Their confidence in this regard having been disappointed, as honorable men they very properly refuse to again be made dupes of.

IT was not without a feeling of regret that we read the letter of Mr. Gregg, in our last issue, announcing the dissolution of the Toronto Architectural Club, formerly the Toronto Architectural Sketch Club. This regret will be shared by many of our readers who have themselves been benefited by connection with the Club, or who are familiar with the work it achieved. The many valuable papers read by specialists on various subjects at the Club meetings during the last four or five years, were instructive not only to the members, but also through their subsequent publication in these columns, to a large constituency outside. Several competitions took place each season with results which were creditable to those taking part and highly beneficial to students and others both in and out of the Club's membership. It is most desirable that the good work of this organization should by some means be perpetuated. The existence of several local associations with objects more or less common, no doubt proved a source of weakness to all. From the elements of these organizations it should now be possible to form, as Mr. Gregg suggests, a new one which would secure a large membership and be efficient in promoting the interests of architecture and of architects both young and old in the city of Toronto.

THE appropriation of $60,000 passed by the Legislature of British Columbia for the erection of new Government buildings at Victoria, is meeting with vigorous opposition from the residents on the mainland. The Governor-General-in-Council has been memoralized to disallow the act of the Legislature. The area of the mainland portion of British Columbia is 366,300 square miles and the population 61,406, as compared with an area of 16,002 square miles and a popultion of 36,767 on the island of Vancouver. This is given as a reason why the proposed expenditure on new Parliament buildings should rather be applied to public improvements on the mainland. Another argument in support of this contention is that the people of the mainland contribute over two-thirds of the provincial revenue. It is further urged that the estimated yearly expenditure of the province will exceed the total revenue by about $200,000, and that therefore the revenue cannot sustain the charge which the proposed expenditure would entail. There is likewise the contention that the capital of the province should be removed to the mainland on account of the majority of the of the population being resident there, and because of the inconvenience and expense imposed upon those who have to transact business with the Government at Victoria. The residents of the mainland recognize in the proposal to erect new buildings at Victoria a determination to fix the seat of Government there, hence the opposition which is being manifested. It is by no means likely that the authorities at Ottawa will disallow the act of the provincial legislature, therefore the only way in which the erection of the proposed new buildings is likely to be prevented is by the defeat of the existing government at the polls. Meanwhile preparations are actively going forward for the commencement of building operations.

THE London *Lancet* of the 8th of April contains the result of a very thorough enquiry concerning the water supply and general sanitary condition of the city of Chicago. This enquiry, the *Lancet* states, was undertaken by members of its staff for the benefit of Europeans who may visit the World's Fair. As proportionately a larger number of Canadians than Europeans are likely to visit Chicago during the next six months, the result of this enquiry may very properly be stated for their benefit. The Chicago river is declared to be in a "disgusting condition," especially in the vicinity of the stockyards, not far from the Southern Branch Pumping Station, where the filthy conditions are said to be such as to defy description. This condition is induced by animal refuse, indiscriminately mixed with sewage, being dumped into the river, in consequence of which the air of the locality is alleged to be charged with nauseating odors which cannot but be highly injurious to health. The domestic supply of water, which is drawn from Lake Michigan, is found to be in respect of color, total solid matter, hardness, chlorine and oxygen required to oxidize organic matter, superior to the choicest of London's supply. It contains, however, low forms of vegetable life and matter in suspension. The probability of these finding their way through the mains is such that visitors are counselled to use nothing but boiled or filtered water. Another source of danger is shown to exist in the custom of using ice in drinking water. A sample of water which had passed through a filter, upon being analyzed was found to contain low forms of vegetable life due to the melting therein of impure ice subsequent to filtration. Thus by the use of ice the good effects of filtration are nullified. In the light of the result of the above enquiry Canadian visitors to Chicago should keep as far as possible away from the neighborhood of the Chicago river, should insist upon the water they drink being boiled or filtered, and should avoid the use of ice.

THE safe resistance of floors in public buildings and other places where dense crowds are likely to congregate is a question of vital importance. From recent experiments it would appear that architects do not work on safe calculations regarding this matter. It is generally understood that a crowd of people when densely packed together cannot impose more weight than ninety pounds per square foot. The tests referred to, however, show that the dead load should far exceed that amount. Mr. C. H. C. Wright, lecturer in architecture at the School of Science, Toronto, in some experiments last March with thirty-two of his students, found that when they were placed close together in an area of 33:46 square feet, there was a load of 139 lbs. to the square foot. Their aggregate weight was 4,656 lbs., which shows the average weight to be 145.5 lbs. Mr. Bindon B. Stoney, the distinguished authority on bridges and roofs, has also conducted two experiments along this line. He packed a crowd of fifty-six laborers on the deck house of a ship, giving a total weight of 8,404 lbs., or an average of 145 lbs. As the area covered was 57 square feet, each man had a little less than one square foot of standing room, and gave a load of 147.4 lbs. per square foot. On another occasion he collected 73 laborers on the floor of a hut having an area of 77 square feet. Their aggregate weight was 10,948 lbs., an average weight of 150 lbs. to each. The result gave 142 lbs. to each square foot, and there was a possibility that two or three more men could have been squeezed in. Professor Kernot, of Victoria, tried a similar test with his class of engineering students. He packed 16 of them weighing 2,455 lbs., within an area of 18 square feet, which shows an average of 153.4 lbs. to each man. The weight per unit of area was therefore 134.7, and there still remained unoccupied space. From these figures it would appear that the resistance of floors which are likely to carry heavy weights should not be less than three hundred pounds to the square foot, for as the average dead weight comes close upon 150 lbs. per square foot, double that strain should be allowed as a provision against sudden movements in a crowd, as in the case of a panic.

THE condition of the sanitary arrangements in the buildings of our towns and cities is of the utmost importance at the present time in view of the threatened cholera epidemic. It is therefore pleasing to note that Montreal and Hamilton are taking special steps to have such appliances in their respective cities as complete and sound as possible. This example should be followed by sanitary authorities in other places. It is most essential that plumbing work should be perfectly executed, as the least defect reveals itself by its unpleasant and unhealthy consequences. One of the chief requirements which very often does not receive sufficient attention, is the ventilation of the work in order to prevent any foul air being water-bound. There should always be a free escape provided for the air displaced by flushing, which otherwise would bubble up through the water by which it is supposed to be hermetically confined. Every soil pipe should have a ventilating pipe from the top carried above the eaves to the roof of the building, by which means all foul vapours escape to the open air. In places where the electric cars are in operation, there is another strong reason why a general inspection of plumbing work should be made; this is the discovery of electrolysis to metals caused by earth currents of electricity. In Hamilton, for instance, seven service pipes in the vicinity of the street railway power house were found to have been eaten out from this cause. The chemical decomposition to metals from electricity in the way mentioned is a serious matter, and one which should have the attention of everyone interested in the sanitary welfare of towns and cities.

WHILE minor matters are engaging the attention of the mayor and aldermen of the city of Toronto, the all-important subject of a pure water supply and an improved method of sewage disposal, are apparently receiving but scant consideration. There seems to exist no determination in the mind of the Council to grapple with the problem and stay with it until its proper solution shall have been discovered and carried out. Theories, reasonable and unreasonable, are from time to time advanced, but nothing is done. We are told that the effort to conduct the pure water of the lake through the sewage laden waters of the bay to the pumping station and thence through the city mains to the homes of the citizens, is contrary to common sense and will never succeed. This may in a measure be true. We would like to point out, however, that the chance of obtaining a pure supply of water by the present means would be vastly increased if an intercepting sewer were constructed which would carry the city sewage along the esplanade to a point where it could be safely discharged into the lake. After the bay had thus ceased to be the receptacle for filth from the city sewers, it might be cleansed of the deposits which at present it contains, and the water rendered comparatively pure by continual contact with the water of the lake, for the bringing in of which means could easily be devised. Such a method of procedure would be going to the root of the difficulty instead of trying to find means to mitigate its effects, while the cause is allowed to remain undisturbed. It may be a very good thing to know that by the application of chemicals the germ-laden deposits of sewage in the slips at which the pleasure boats of Toronto embark and disembark their passengers can be rendered less dangerous, but it would be much more satisfactory to know that the deposits did not exist. Toronto certainly is in need of public parks, to the securing of which the attention of the Mayor has lately been directed, but infinitely greater is the need of a pure water supply and a trunk sewer for the proper disposal of the sewage of the city, both of which we commend to his prompt and most serious attention.

THE second session of the Toronto Technical School has recently closed. It is a pleasure to learn that the results of the two sessions have greatly exceeded the anticipations of the promoters of the movement. During the session which has just closed the students numbered about three hundred. The attendance of this large number of students is said to have been regular and their progress most satisfactory. In view of the eagerness which has been displayed in taking advantage of the facilities offered for the acquirement of instruction in the various departments of knowledge required by artizans, we may look forward with confidence to the continued growth and increased usefulness of this new department of education. Indeed we shall not be surprised to see at no distant day technical instruction and manual training made a part of our system of public instruction. Such a movement has already taken place in some American cities, notably St. Paul, Minn., where there are in operation what are known as manual training high schools. The value of these schools is regarded as such that when recently the proposal was made to abolish them on the ground of expense, the Chamber of Commerce in a report on the subject said: "Destroy all the schools if you must, but leave us the manual training high schools." The fact is apparent that our educational system does not as it should attempt to instruct the pupil in those subjects which are likely to be of most advantage to him in his future life. Notwithstanding that one pupil is foreordained by circumstances to earn his living by means of his hands and another by means of his head, our public school system assigns to each exactly the same studies. This is manifestly wrong, and the effect may be seen in the dislike which many youths manifest to forms of employment in which skilled hand labor is required. It may likewise be observed in the overcrowded ranks of the professions and what are known as genteel employments. What is needed to ensure a higher average of comfort among all classes and a higher condition of prosperity for the country is an increase of properly trained agricultural and artizan producers.

DURING the last five years architects, reputable builders and supply merchants have alike suffered from the doings of irresponsible and incompetent contractors. How to get rid of this undesirable class is problem to some extent an unsolved, although the quiet condition of the building market during the past year has been the means of breaking up many so-called "firms" whose members have returned to the ranks of journeymen, which they should never have left, or have sought pastures new in other lands. Some of the labor unions, especially the bricklayers, have also to a certain extent prevented by their by-laws a continuance of a competition farce. As far as the merchants are concerned, they are to a large extent responsible for their own loss; so long as they are willing to supply such customers with materials, so long may it be expected that they will continue to build at other people's expense. We are pleased to observe that merchants are learning by sad experience that this class of trade is better left alone. The trade in Chicago have originated a plan which to a large extent will eliminate these difficulties, and which is worthy of the consideration of Canadian contractors and supply firms. A mercantile agency has been incorporated by which reliable members, contractors and merchants, are protected. This agency keeps a perfect record of the financial responsibility of every building contractor in Chicago, compiled from opinions received from every person who has had business transactions with him. Stockholders alone are allowed to use this information, and they must be manufacturers of builders' supplies, approved of by a board of directors comprised of seven men appointed from the different interested industries. The collection department is a special feature of the concern. Parties temporarily embarrassed have every opportunity, afforded them to make favorable settlement, while legal means are used to make those pay who are able but will not. There is also a system of arbitration in connection with the agency for the adjustment of disputed accounts. Should this scheme work out in practice as well as it looks in theory, contractors and material merchants in Canada would do well to take some steps along this line not only to improve their present condition but to prevent the disreputable contractors forced out of Chicago by the means described from coming into Canada.

IN another column we refer to the proposed act to protect the rights of wage earners as introduced by Sir Oliver Mowat in the Ontario Legislature. We also give a report of the visit of the deputation from the Builders' Exchange of Toronto to the Government asking for amendments to the bill. Should this bill become law without some modification, a great obstacle will be placed in the way of the building trade of Ontario. The object of the act itself is good, for journeymen have occasionally suffered from loss of their wages through dishonest and speculative builders, but if the third section of the act be passed as it now stands, the proposed remedy would be the means of crippling the operations of contractors to a large extent. It is also a question whether the section would reach those for whom it is intended. Taking the contractors as a body, we cannot help thinking there is only a small minority who would willingly keep any of their journeymen from what is justly due to them for wages. Therefore it is not reasonable to place such severe obligations upon the whole body of contractors with a view of overcoming the possible wrong-doing of the few. The President of the Toronto Builders' Exchange stated, when before the Government, that during the existence of that institution he had not heard of any of its members being guilty of such unjust action. As the membership of the Exchange contains most of the building contractors of any note in the city this statement should be regarded as a strong argument against unnecessary restrictions. The other clauses in the act do not propose any radical change in the existing Lien Act, but one cannot understand why a contractor should be required to produce his receipted pay list, as well as make a declaration stating that all wages have been paid to date, when applying for a progress certificate, while a mortgagor who is often himself the builder need only make the declaration referred to, when asking the mortgagee for an advance. It would appear from this, that the veracity of the contractor, working under ordinary progress certificates, is not considered by the promoters of the bill to be as reliable as that of builders who find it necessary to mortage their land before commencing to build. We think also that sub-contractors should come under all the provisions of the bill, for if the principal contractor is held respon-

sible for all payments to the journeymen on a building, he should have some protection against any contractors to whom it is necessary to sub-let part of the work. The members of the Government, who heard the delegation, promised that the objections raised by the delegation to the measure in its present form would have their best consideration, and from the remarks that fell from them during the interview there is reason to believe that the bill will be modified in the direction of their wishes.

ILLUSTRATIONS.

CARVED STONE MANTEL IN THE RESIDENCE OF MRS. CAMERON, CARLTON STREET, TORONTO—DARLING, SPROATT & PEARSON, ARCHITECTS—EXECUTED BY HOLBROOK & MOLLINGTON.

PRIZE COMPETITION DESIGN FOR A $2,000 BRICK HOUSE—FROM "THE BRICKBUILDER."

ST. BARNABAS CHURCH, ST. CATHARINES, ONT.—C. J. GIBSON, ARCHITECT, TORONTO.

ACCEPTED COMPETITIVE DESIGN FOR PROPOSED NEW GOVERNMENT BUILDINGS AT VICTORIA, B. C.—F. M. RATTENBURY, ARCHITECT.

The time of the architect being taken up with the preparation of the working drawings, he was not able to do more than send for publication a rough tracing of the perspective drawing of his

ST. BARNABAS CHURCH, ST. CATHARINES, ONT.—C. J. GIBSON, ARCHITECT, TORONTO.

design and of the block plan, showing the grouping. A description of the design, as published in the Victoria *Colonist*, appeared in the CANADIAN ARCHITECT AND BUILDER for April. The site is an extremely beautiful one, well laid out with trees and grass and with James Bay in the foreground divided only from the grounds by a road.

ONTARIO ASSOCIATION OF ARCHITECTS.

A MEETING of the Council was held on May 2nd to consider the report of the Board of Examiners upon the recent examinations of the Association. The following are the returns:

FINAL EXAMINATION.

Passed—S. G. Beckett, Wm. Fingland. Conditioned—T. A. Harvey; Wm. Rae.

SECOND INTERMEDIATE EXAMINATION.

Passed—W. F. Howland, W. A. D. Graham, W. P. Over. Conditioned—C. J. Read.

FIRST INTERMEDIATE EXAMINATION.

Passed—A. Baker, J. P. MacLaren. Conditioned—F. W. Langley.

Candidates who are conditioned will be allowed to take a supplemental examination in the subjects in which they have failed. This examination will be held in the autumn. When the date is fixed notice of it will be sent to each candidate entitled to come up for the examination.

CUT VERSUS WIRE NAILS.

There are over three hundred varieties of nails in existence, deriving their names chiefly from the shape of their heads and points, or according to the purpose for which they are generally used. Two of the classes in most common use are those known as cut nails and wire nails. The former are cut by machinery out of sheets of iron and have their angles sharp but rough; the latter are known also as French nails (a pointes de Paris) are round, very tough, and are supposed to possess the good quality of not splitting the wood when properly used. In some recent experiments in the United States to ascertain the relative holding powers of these two classes of nails some interesting facts were developed. In the 58 series of tests, comprising ten pairs of cut and wire nails, of one size and weight, driven into spruce wood, 7160 nails were used, varying in length from 1⅛ to 6 inches, and in each case the cut nails showed superior holding power. An analysis of the several tests is as follows:

In spruce wood in 9 series of tests, comprising 9 sizes of common nails (longest 6 inches, shortest 1⅛ in.) the cut nails showed an average superiority of 47.51 per cent.

In spruce wood in 6 series of tests, comprising six sizes of light common nails (longest 6 inches, shortest 1⅛ in.) the cut nails showed an average superiority of 47.40 per cent.

In spruce wood, in 16 series of tests, comprising 15 sizes of finishing nails (longest 4 inches, shortest 1⅛ in.) the cut nails showed an average superiority of 72.22 per cent.

In spruce wood, in six series of tests, comprising 6 sizes of box nails (longest 4 inches, shortest 1¼ in.) the cut nails showed an average superiority of 50.88 per cent.

In spruce wood, in 4 series of tests, comprising 4 sizes of floor nails (longest 4 inches, shortest 2 in.) the cut nails showed an average superiority of 80.03 per cent.

In spruce wood, in above 40 series of tests, comprising 40 sizes of nails (longest 6 inches, shortest 1⅛ in.) the cut nails showed an average superiority of 60.50 per cent.

VALUE OF ADVERTISEMENTS.

WE have no patience with those mistaken minded members of the architectural profession who look at the advertising pages of their periodicals as useless, burdensome material, to be torn off without a second thought and consigned to the waste basket. These men are always behind the times, opinionated to the last degree, and lacking that knowledge of improvements in building materials and appliances which they owe to their clients. They do not realize that through the advertising columns of the professional journals there is set forth the record up to date of the inventions and discoveries that are enabling us to build better, more quickly, more cheaply. The manufacturer, introducing a new form of building material, or some patented appliance, seeks to reach the architects through what seems to him the most natural, the most legitimate channels,—the advertising columns of the architectural press.—*The Brickbuilder.*

CORRESPONDENCE.

[Letters are invited for this department on subjects related to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

COPYRIGHT OF PLANS.

Editor CANADIAN ARCHITECT AND BUILDER. May 5th, 1893.

SIR: Re the complaint of piracy practised by parties claiming to be architects, in the April number of the CANADIAN ARCHITECT AND BUILDER, permit me to say that in the United States a copyright can be obtained for a design, map, drawing, etc. This, however, must be done before publication of the article. Two complete copies of the work must be sent prepaid, or under the free labels furnished by the librarian, to perfect the copyright. Without the copies above required, the copyright is void, and a penalty is incurred. No copyright is valid unless notice is given by inserting in each copy, "Entered according to Act of Congress, in the year —— by ——— in the office of the Librarian of Congress at Washington."

The copyright secures the exclusive right of publishing the article copyrighted for the term of 28 years. Is not this the practice in Canada? Then why can't those who feel injured by the piracy of so-called architects, as you call them, get redress?

Respectfully,

VOX POPULI.

A CONTRADICTION.

OTTAWA, April 24th, 1893.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR: In your April number we find a paragraph stating that Mr. Forsyth, of Montreal, has entered suit against us "to recover royalty on granolithic pavement," and that he "asks for an injunction on the execution of our contracts.'

These statements are absolutely untrue. Mr. Forsyth has not entered an action against this Company for the above or any other cause.

Yours truly,

CANADIAN GRANITE CO. (LTD.),
Per A. MacLean, Pres.

[The paragraph in question was based upon uncontradicted statements which appeared in the daily press, and was published in good faith. In view of the above contradiction, however, we desire to express our regret that it should have appeared in this journal.]

COMPETITIONS.

Competitive designs for a new City Hall for the City of New York are invited by the City Board of Commissioners until the first of September. Printed instructions regarding this competition may be obtained on application to the Comptroller, 280 Broadway, New York city.

The competition for designs for a memorial monument to the late Sir John A. Macdonald, to be erected in Toronto, has been decided in favor of Mr. Hamilton McCarthy, of Toronto, Mr. P. Heber and Mr. J. Dunbar, respectively. The statue will cost $10,000.

PERSONAL.

The death is announced at Adolphustown, Ont., on April 19th, of Mr. Thos. Gibbs, one of the oldest provincial land surveyors of Ontario.

Mr. S. G. Curry, ex-president of the A. O. A., has of late been temporarily residing at Port Hope, Ont., where he has several commissions to execute.

Mr. T. A. Morrison, of Montreal, lately spent a couple of weeks in Toronto and the west, in behalf of the business interests with which he is identified.

Mr. J. R. Rhind, and Mr. Edward Maxwell, architects, Montreal, have removed their offices to the new Board of Trade Building. Mr. H. Austin Jones, architect, of the same city has removed to No. 204 St. James street. Messrs. Cox & Amos, architects, have removed to Temple Building.

Mr. J. C. A. Heriot has entered the office of Mr. A. F. Dunlop, R. C. A. architect, Montreal, as junior partner. Mr. Heriot was a former pupil of Mr. Dunlop, and after passing successfully through a course of architecture at Cornell University entered the office of Mr. Perry, the supervising architect of the New York State Capital, at Albany, N. Y., where he remained for two years, leaving there to further his studies in New York City, where he held positions for two years in the offices of Robt. H. Robertson and Bremner & Tryon. Mr. Robertson, associated with Mr. Potter, was one of the firms selected for the final competition for the Cathedral of St. John the Divine. Mr. Pope will also lend his valuable services to the firm as assistant superintending architect, being thoroughly qualified for this branch of the work.

A pleasing event took place on the 10th inst. at the monthly business meeting of the Stonecutters' Section of the Toronto Builders' Exchange when their late treasurer, Mr. George Walker, was presented with a handsome gold-headed snake wood cane with his name engraved upon it, as a token of the high esteem in which he was held by his fellow members and as an expression of their good wishes on his entering into private life. Mr. John Vick, president of the Section, made the presentation in an eloquent and suitable manner, to which the recipient replied in appropriate terms. Mr. Walker has been connected with the Stonecutters' Association since its establishment about 15 years ago, holding the office of treasurer, which he resigns on retiring from an active and successful business career. Mr. John Barnard, his late partner, succeeds him in the office of treasurer to the association.

QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require on lines consistent with the objects of the paper. Every effort will be made to furnish satisfactory answers to all such inquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

"BUILDER" writes: How can you find the pitch of a roof by multiplication?

Ans.—If ½ pitch is required multiply span by 71; if ¼ pitch by 556; if ⅓ pitch, by 6; if ⅜ pitch, by 625, and if ⅝ pitch, by 8.

T. N.: How many nails are required for 1000 laths, and how many yards of plastering will cover this number?

Ans.—Eleven pounds of lath nails and 70 yards of plastering may be estimated.

ART MAXIMS.

THE following verses, kindly sent to us by a correspondent, are from the poems of William Watson, who wrote the best ode on the death of Tennyson, and it was thought might succeed him:

Often ornateness
Goes with greatness;
Oftener felicity
Comes of simplicity.

Talent that's cheapest
Affects singularity;
Thoughts that dive deepest
Rise radiant in clarity.

Life is rough;
Sing smoothly, O Bard!
Enough, enough,
To have *found* life hard.

No record Art keeps
Of her travail and throes.
There is toil on the steeps,—
On the summits, repose.

LEGAL DECISIONS.

At the Hamilton assizes a labourer brought an action for $1,500 damages against Mr. Joseph Kent, contractor, of that city, under the Workmen's Compensation Act. It appears that the plaintiff was employed in building a sewer in November last, and while removing some boards the side of the trench caved in and the plaintiff was seriously hurt. It was claimed by him that the trench was improperly shored up. The defendant, however, gained a verdict in his favor.

In Cook v. Belshaw the question is raised whether a mortgage, registered before a lien but not made until after the attaching of the lien, can be considered a prior mortgage of such a nature that the lien-holder could avail himself of the benefit of the provisions of the Lien Acts, giving him priority for the amount to which the selling value of the land was increased by the lien-holder's work or materials. The Master-in-Ordinary held it was a prior mortgage in this sense, but his decision has been appealed against.

Caldwell v. Mills was an action under the Workmen's Compensation Act brought by J. Caldwell against Geo. E. Mills, contractor, of Hamilton, for $2,000 damages for injuries. The plaintiff, it appears, was carrying scaffolding across a plank when the plank broke and he fell into a cellar, breaking three of his ribs. It was alleged the plank was rotten, but the defence was that the plank broke by another workman throwing a heavy piece of scantling on it when the plaintiff was crossing. Verdict for the plaintiff, $75; the question of costs being reserved.

JONES v. TORONTO SCHOOL BOARD.—The plaintiff carried out certain works for the defendants under a contract which contained the usual clause to the effect that no extras would be allowed unless the work was executed under the written authority of the architect. Certain extra work was carried out without such authority, but the architect allowed a certain sum for same, and when the job was completed the plaintiff accepted in full of all claims a cheque setting out the amount of contract, the claim for extras and the amount allowed for such by the architect. After the lapse of two years the plaintiff brought the present suit claiming the balance of the extras as charged by him. The case was heard by Chief Justice Armour, who dismissed the action without calling upon defendants, because plaintiff could not produce any written authority for the extra work as called for by the terms of his contract.

EVANS v. COWAN (two cases.)—In this case the plaintiff invited tenders separately for the stone foundation, brickwork and carpentry to a large building to be erected in Montreal for a skating rink. The defendant's price for the brickwork was accepted, and a contract was entered into upon the usual terms. When the foundation work was finished, the brickwork to the walls was started by Cowan, but after constructing a part serious defects showed themselves in the work which the defendant alleged was due to the bad construction of the foundation. Evans ordered the work to be pulled down which Cowan did, but refused to rebuild. After protests and counter protests between the parties Cowan took action in the Supreme Court, asking to have his contract declared at an end, that the plaintiff be condemned to pay him $1,000 damages, and allow him to remove all his building materials. About the same time Evans entered a suit against Cowan for $3,850 damages for non-completion of his contract. The two actions were heard together before Mr. Justice Matthew, who gave judgment in favor of Cowan in both cases, on the grounds that the evidence showed the foundation to be defective, and, as Evans provided that work, Cowan was not obliged to accept and build upon it. Appeals were taken against both judgments and the higher Court decided in favor of Evans in both suits, holding that there was no clear evidence that defects existed in the foundations for which Evans was responsible.

A committee has been formed in Toronto, with Mr. A. M. Cosby, 66 King E. as secretary, to raise $2,000 by subscriptions for enlarging the dials of the clock in the tower of St. James Cathedral to a diameter of 15 feet, and lighting same by electricity.

THE PROPOSED AMENDMENT TO THE LIEN LAW.

SIR Oliver Mowat has introduced in the Ontario Legislature, a bill entitled "An Act to further Facilitate the Enforcement of the Just Rights of Wage-earners and Sub-contractors." Its principal clauses read as follows:

1. Every device by any owner or contractor which shall be adopted in order to defeat the priority of wage-earners for their wages under the several Acts relating to mechanics' liens shall, as respects such wage-earners, be null and void.

2. In case an owner chooses to make payments to the mechanics, labourers, or other persons referred to in the 4th section of the revised *Mechanics' Lien Act*, for or on account of just debts due to them for work done or materials or machinery placed or furnished as therein mentioned, without the proceedings mentioned in sections 11 to 14 of the said Act, and shall within three days afterwards give by letter or otherwise, written notice of such payment to the contractor or his agent, such payment shall, as between the owner and the contractor, be deemed to be a payment to the contractor on the contract generally, but not so as to affect the percentage to be retained by the owner as provided by the sections 7, 8 and 9 of the said *Mechanics' Lien Act* as amended by the Act passed in the 53rd year of Her Majesty's reign, intituled *An Act to amend The Mechanics' Lien Act.*

3—(1) Before a contractor shall be entitled to receive a payment on his contract, it shall be his duty to produce to and leave with the owner, his pay list or a duplicate of his pay list, containing the receipts of the persons mentioned for the wages due to them up to and including the day before the intended payment, and an affidavit or statutory declaration by the contractor, (or in his absence by his agent competent from personal knowledge to speak to the facts), verifying such pay list and receipts, and stating that the said pay list names all persons employed on the work, and that all persons who up to that time have been employed on the work and entitled to wages, have been paid in full; and an affidavit or a statutory declaration to the same effect by the architect or superintendent of the work (if any), unless he has made the like affidavit or statutory declaration under the provision aforesaid as to an agent. The said affidavits or statutory declarations may be to the effect set forth in the schedule to this Act, and marked A.

(2) The said pay list so receipted and the said affidavits shall be conclusive evidence in favour of the owner making the payment unless at or before making the payment he had actual and express notice of any fraud on the part of the contractor in obtaining the signatures and receipts of the persons named in the pay list or others.

(3) Any payment made on the contract without having received such receipted pay list and affidavits, or with actual and express notice of unpaid wages, shall not be a valid payment as against persons whose wages are unpaid at the time of the payment on the contract.

4. The lien of wage-earners for thirty days' wages, or for a balance equal to thirty days' wages, provided for by section 9 of the *Mechanics' Lien Act*, as amended by section 2 of the said Act intituled *An act to amend the Mechanics' Lien Act*, shall not be defeated or impaired by any attachment issued subsequently to the contract, or by any garnishment subsequently had, or by any execution subsequently issued, or by reason of the work contracted for being unfinished, or of the price for that or any other reason not being payable to the contractor.

5. In case of the contract not having been completely fulfilled when the lien is claimed by wage-earners, the percentage aforesaid shall be calculated on the work done or materials furnished by the contractor.

6. Where a mortgage is given to secure an intended loan of money which is to be made thereafter according or with reference to the progress of work done, or materials or machinery placed or furnished as aforesaid, on the land mortgaged, no advance thereafter made by the mortgagee shall have priority over the claims of mechanics, labourers, or other persons referred to in section 4 of *The Mechanics' Lien Act* as aforesaid if the mortgagee at or before the time of such advance has actual and express notice that there are any such claims as aforesaid unpaid; nor unless at the time of the advance he shall require and receive from the mortgagor an affidavit or statutory declaration stating that all such persons as aforesaid have been paid in full up to the time of the advance; and an affidavit or statutory declaration by the architect or superintendent of the work (if any), speaking to the best of his knowledge and belief to the same effect. The said affidavits or statutory declarations may be to the effect set forth in the schedule to this Act, marked "B."

7. In case of the sale or mortgage of an unfinished house or building, with or without the land on which the same stands, if its being an unfinished house or building is such as to be apparent to an ordinary observer, the purchaser, before paying his purchase money, or giving a mortgage or other value or security for any balance of such purchase money, or the mortgagee before advancing any money on the security of a mortgage or otherwise, shall require from the vendor (in the case of a sale) or from the mortgagor (in the case of a mortgage) similar affidavits or statutory declarations of the payment of all claims as are provided for in section 6 of this Act; and the purchaser or mortgagee shall not be entitled to priority in respect of such claims, if at or before the time aforesaid he had actual and express notice that there were such claims as aforesaid unpaid, nor unless he shall have received such affidavits and statutory declarations aforesaid.

8. Where in the case of a prior mortgage or other charge, the selling value of the land is increased by the construction alteration, or repairs of the building, or by the erection or placing of the materials or machinery on the said land, the said prior mortgage or other charge shall retain its priority to the extent of the value or amount for which such prior mortgage or other charge is a security before such construction, alterations or repairs of such building, or before the placing of such materials or machinery on the said land; and the lien given by the said Acts shall be entitled to rank upon the increased value given to such land by the said improvements in priority to such mortgage or other charge (see R. S. O. c. 126, s. 5, sub-sec. 3, and *Kennedy* v. *Haddon*, 19 Ont., R. 240; *Richards* v. *Chamberlain*, 35 Grant 402, and *West* v. *Sinclair*, 28 Canada Law Jour. 119.)

9. Where any proceeding is taken to enforce a lien under the *Mechanics' Lien Acts*, in case a mortgagee of the land is served with a written notice of such proceeding being had, he shall thereafter be entitled to attend the proceedings: and in such case he shall not, without the leave hereafter mentioned, take any proceeding for sale or foreclosure, nor proceed to exercise any power of sale until the proceedings to enforce the lien have terminated; but he may without leave serve any notices required to be served in order to the due exercise of the power. The leave aforesaid may be granted by the county judge, master or official referee, before whom the lien proceedings are pending, and shall only be granted by consent, or (if without consent) on a reasonable consideration of all the circumstances in view of what would be just to both parties.

Clause to to the end of the act deals with provisions for legal proceedings. They give the Division Court and City Magistrate jurisdiction in matters relating to the payment of wages, and any order made by the latter can be made a judgment in the Division Court and enforced as such.

On the 8th inst. a deputation from the Toronto Builders' Exchange, consisting of Messrs. John Aldridge, David Williams, M. Murphy, William Park, Wm. Pears, George Moir, M. Vokes and James Tennant, with Messrs. G. Ritchie and Frank Denton as legal advisers, waited upon the Ontario Government with regard to the above act. The deputation was introduced by D. Gilmour, M.P.P., and received by Sir Oliver Mowat, Hon. A. S. Hardy, C. F. Fraser, John Dryden and G. W. Ross. Mr. Pears, President of the Exchange, in speaking on behalf of the delegation, said that the bill as it stood would adversely affect legitimate business to a greater degree than it would remedy an injustice supposed to exist affecting wage-earners. He referred to certain amendments which the association he represented desired to see made to the bill before it became law, and said as regards section 1 he thought it should read so as to apply to the same parties mentioned in section 4 of the "Mechanics' Lien Act" viz: every mechanic, machinist, builder, miner, labourer, contractor, or other persons doing work upon or furnishing materials to be used in the construction of a building. He considered the supply merchant had as much right to be protected from devices to defeat payment for materials as workmen for their wages. Section 2 he found no fault with, but section 3 he considered embodied the chief weak point of the bill. It was almost impracticable, and should be struck out as absolutely unnecessary, while section 6 remained. It did not even reach the parties it was intended to, and would greatly hamper the business of a legitimate builder. He believed that any workman who had lost wages could show that it was not because the contractor had received his money and had not paid off his workmen, but because the latter had not been able to get his money from the building owner, and the section would not reach this man. These were the cases where workmen lost their wages, or when the builder and owner were the same person. He could honestly say he had never heard of a man not being paid by a contractor when the contractor had received what was due to him. Section 4 was considered just, but section 5 should include the same parties suggested for section 1. He would also propose that the percentage retained on a contract should be applied to the liquidation of liens before being used for completing the building. The objects which it was hoped section 3 would attain he thought, as already suggested, would be amply provided for by section 6, and therefore this and the following section should stand while section 3 should be expunged. With regard to section 8, he considered an amendment should be added to the effect that the value of improvements referred to should be estimated at 50 per cent. of their actual cost; thus while 50 per cent. would go to the mortgagee, there would be also 50 per cent. of their value available to satisfy any existing liens upon the building. With regard to the jurisdiction of matters under the act, he thought that the Division Court should be the legal tribunal for liens, even those now provided for in the High Courts by the "Mechanics' Lien Act," and he asked that the Bill be allowed to cover this ground. In conclusion he wished it to be understood that the object of the delegation was not to prevent justice being done to the wage-earner, but that both classes should be placed on a fair and equal footing in their business connection.

Mr. John Aldridge also pointed out that section 3 which was aimed at speculative builders, would not touch that class to any extent, as such men were generally building owner and builder combined. If the clause was allowed to stand as at present it would only be the means of hampering the work of legitimate contractors. He doubted very much whether it would be possible to produce receipts for all wages paid, as they were not always obtainable.

Sir Oliver Mowat asked if this clause would meet the views of the deputation if it was altered so as simply to provide for the production of an affidavit when an advance was required declaring that all wages due say a fortnight previous to that date had been paid.

Mr. Aldridge in reply thought that the trade would be satisfied with any arrangement as long as they were not hampered in their business, but as the clause would not reach the parties intended he did not see the necessity of it being in the Act.

Mr. Ritchie strongly urged that in clause 5 it should be made quite clear that lien holders had to be satisfied before any of the percentage held by the building owner could be devoted to completing the building.

Sir Oliver Mowat thought the clause was clear on that point.

Mr. Ritchie also drew attention to the fact that no provision was made in cases where a builder purchased land simply on the terms of a building agreement. He therefore suggested a clause should be inserted to the following effect: "In case a purchaser of any land shall make default in carrying out the terms of an agreement for the purchase thereof, a lien shall not be defeated by such default, but shall be attached to the estate or interest of the person to whom the land shall revert by reason of such default." He also thought that claims under the lien laws for wages and materials should be transferred to the Division Court from the higher Courts, as he had often found in his experience that costs prevented the bringing of actions for small amounts.

Mr. Denton agreed that clause 6 in the Act accomplished all that clause 3 attempted to, and therefore there was no necessity to binder legitimate business.

Mr. Aldridge received no answer to his question whether there was a law calling upon a workman to give a receipt for wages, and he again urged it would be impossible to obtain receipts in some cases.

In reply to Mr. Hardy, who stated that the journeymen complained of the loss of large amounts of wages, Mr. Vokes pointed out that these cases probably arose from men working under an agreement very common among small builders, which provided that the wages for the work be paid when the building was completed and sold. If it was not disposed of the workman did not get his wages, and he probably considered it was a hardship overlooking the fact that he undertook the work with a clear understanding of the risk. After some further remarks from Mr. Hardy the deputation withdrew, having received a promise that the questions raised should receive every consideration.

CONSTRUCTION OF HARDWOOD DOORS.

IN constructing the modern hardwood door, a series of operations are gone through by the cabinetmaker which are extremely interesting and of value to those who desire to know something of the methods of construction employed in completing this now universal detail, writes Owen B. Maginnis to the *Building Monthly*. These operations embody a number of systems of proceeding, each aiding to a final end, and are as follows:

The first process is to glue the cores or grounds together. These generally consist of kiln dried white or yellow pine, say 1⅛ inches thick for an 1¾-inch veneered door, the veneers being ⅛ inch thick. The cores are generally got out full enough to allow for facing and thicknessing on the jointer and in the planer. The number of pieces in the cores depends on the desired width of the stile or rail, as, for instance, a 6-inch would require a ¾-inch band of the necessary hardwood, ash, oak or walnut, as specified, and four 1¾-inch pieces of pine.

In glueing these cores together they are carefully jointed with the plane and scratched, then heated in the hot box and at once glued, being pressed tightly together with large hand screws, in order to squeeze out the superfluous glue and close the joints.

In making joints in veneered work the surface of the joint must in all cases be (a little shaving) hollow, for the purpose of allowing the outer arises to come close together. Of course, all the cores should be long enough to make the necessary height, as 7 feet 8 inches long for a 7 feet 4 inches door, and so on as needed, always allowing enough to round over the bottom ends, so that the veneer will not be torn off when moving the door. When the glue is set the surfaces are scraped off clean, and they are faced up perfectly out of wind of the jointer and afterwards tried up true with the try plane. This being done the stiles and rails, which are built up in the same manner, are brought to the planer or planing machine and there thicknessed. The stuff cores are then brought back to the bench, where they are surfaced as before with the try plane (to remove all lumps) and scratched with the scratch plane to form a keying for the veneer. All knot holes or flaws which might be liable to cause a defect in the veneer are carefully filled up to insure good veneering. This being done, it is usual to prepare the veneer after it has been ripped to its necessary width and crosscut to its length—that is, the different pieces for the stiles, rails, muntins, etc.

It is usually prepared by smoothing the poor side (being very careful that it is entirely free from spots or shakes, little knots or other flaws) and scratching it thoroughly to insure a firm keying for the glue. All the pieces (which generally run from ⅛ thick up to ½) are placed between strips edgeways in the hot box, and allowed to become thoroughly impregnated with the heat so as to keep the glue from cooling too quickly, besides opening the pores of the wood to admit it. While the veneers are in the box the cores are placed (the stiles first, in pairs) on the glueing horses and the big handscrews set ready for applying, keeping the jams wide enough apart to take in two pairs of 2-inch stiles, or eight inches, or six inches, for one pair of 3-inch, and so on as required. When the veneers are sufficiently heated the flat faces of the cores are glued both sides and turned up on their edges (hardwood strip side up) slightly apart, and the veneers are dropped between.

Be sure, however, to have the points of the grain up, to have the grain running up, and to have the grain so that they will pair alike. This should always be done before placing the veneers in the box. Having placed the cores of the stiles on the edges to which the hard wood strips is affixed the woodworker takes his veneer and after carefully matching the grains places them grain points up with the scratched side towards the glued faces of the cores resting on the horses so that the edges of the veneers and cores will come fair. He will then place a veneer on each of the right and left outer faces of the cores. Having done this he places a cawl or piece of 1¼-inch stuff on each outside to press the outer veneers against their ground, and takes the big hand screws which have been set to span the combined width of cores and veneers. He places one at either end about two inches from the end spaces, the rest eight or ten inches apart, applying each screw from opposite sides. He screws the inner throat screw till it grips on the edge, and then turns the outer lever screw solidly down on the cawls, thus pressing the surfaces tightly together and forcing the glue into the scratches, at the same time driving out that which is superfluous. Before the screws are permanently screwed tight, the whole mass is turned up to see that the veneers completely cover the whole width of the surfaces and if they do not they must be driven to their places with a block, taking care not to bruise or break the edges. Be certain, too, that the screws are all tight and the veneers pressed to a perfectly close joint.

It is best for two to veneer, for one can regulate the veneers while the other is applying the screws, and both can act together on the screws afterward, giving more power. The glued stiles or mullions are then left in the screws about five hours to allow the glue to set.

Let me here impress the fact that the stuff must in all cases be thoroughly heated, and the glue perfect glue (about one-third water and two thirds glue) laid on quickly with a large soft brush from a large pot, also that the operation be rapidly done before the stuff has time to cool.

The cawl must be only the exact width of the stuff and no wider. It is advisable that the jaws of the hand screws be also wide enough to reach across the width.

SCARFED BEAMS.

Where neatness is more essential than strength, scarfed joints are prefrred to any arrangement of "fishing," because a beam united by scarfs and bolts is of the same breadth and depth at the joints as at other parts. In order that the bolts may not be screwed through the timber and to increase the clamping surface, it is advisable to add a plate of iron on the faces of the beam where the heads and nuts of the bolts pass through. The ends of these plates may be turned into the wood to give greater grip. But it is desirable to avoid depending solely upon bolts for the strength of a scarf, owing to the effect of the shrinking of the timber and the liability of the bolts to be, in consequence of their small dimensions, pressed into the wood. Keys or wedges can be often used to keep the upper and lower parts in their places. Varieties may be almost infinitely multiplied by increasing the number of the faces, whether oblique or square, and uniting the parts either by tabling, keying or a combination of the two; but in most cases, the greater simplicity should be aimed at, in order that the parts may the more readily be made to fit each other with accuracy. Very complicated scarfs have been used by some old carpenters, respecting which Robinson observes that "many seem to aim at making the beam stronger than if it were one piece," an absurdity too manifest to need refutation. When a scarfed beam is exposed to transverse strains, the joint should be varied from the ordinary form. When a piece of timber, subject to compression in the direction

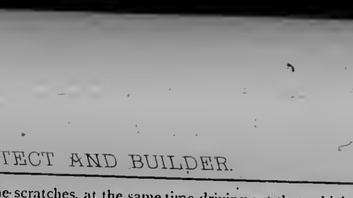


FIG. 2. Showing Joints, Track &c.

of its length, has been scarfed, oblique faces should be avoided because of their tendency to slide upon each other.

Though bolts are commonly used to secure scarfed joints, iron hoops or straps, driven on tightly, have been recommended in their stead and posess the advantage of not weakening the timber. In joints that depend wholly on bolts, Tredgold recommends that the sum of their areas should never be less than two-tenths of the area of the section of the beam. He has also given the following rules for the length of scarfs: In oak, ash or elm, the whole length of the scarf should be six times the depth or thickness of the beam, where there are no bolts. In fir without bolts, twelve times the depth. The whole length of a scarf dependent wholly upon the bolts, should be for oak, ash or elm about three, and in fir, six times the depth of the beam. When bolts and indents are used together, the length of the scarf may be in hard wood twice, and soft wood four times the depth.—*The Architect.*

New buildings to the value of nearly $2,000,000 are said to be in course of construction at Winnipeg.

TESTS OF WHITE PINE.—Some tests of the tranverse strength of small pieces of pine made by Mr. James W. Woodman, of the Minneapolis Building Inspector's force, and published below, indicate the wide variation existing in the strength of different samples of that wood. All but two pieces were from different boards, and as they were taken from the refuse of a large factory there is small chance that any two except those mentioned above were from the same tree. All were as carefully gauged and squared as possible with joiner's tools, and the loads were applied slowly. Thirteen pieces one inch by one-inch, twelve inches between bearings and loaded at center, broke as follows?

1,420 pounds	4,464 pounds	7,795 pounds	10,540 pounds
2,580 pounds	5,610 pounds	8,280 pounds	11,370 pounds
3,450 pounds	6,530 pounds	9,295 pounds	12,420 pounds

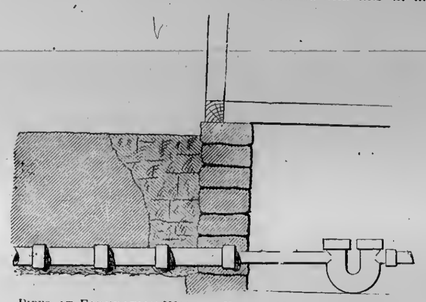
13,210 pounds

The average breaking strength being 420 pounds.

SANITATION AND HEATING

EARTHEN PIPES AT FOUNDATION WALLS.

THERE is frequently asked a question in regard to stopping earthen pipes outside the foundation walls which is now always answered in a satisfactory manner. A man laying earthen pipe, unless he has strict orders to the contrary, is inclined to carry it to the inside face of the foundation. When left in this condition, the plumber carries his house drain into the earthen sewer, covers the joint with a good supply of cement (which in a great many cases only covers the upper half of the pipe), and the work is considered complete. Then follows the mason who points up the opening made in the stone work, very much as we have shown in Fig 1. There is no fault to be found with this at the



PIPES AT FOUNDATION WALLS. FIG. 1.—UNSAFE CONNECTION.

time of construction, provided the plumber has succeeded in making a tight joint between the earthen and iron pipe.

If the house has an area, as shown in Fig 2, the earthen pipe or house sewer is usually brought inside the area wall and left nearly flush with the outside wall of the foundation. The concrete of the area is laid down over the earthen pipe, and the area wall is pointed up. This is, like the former, a good job while it is new, but it is very objectionable when carried out in the way shown for this reason: The excavation is always made somewhat larger than the wall, and the wall itself, sitting on fresh soil, is liable to settle. Even the light area walls have considerable movement. In addition to this, the dirt behind them (as shown in the figures) is loose, and after rains usually goes down sometimes to the extent of several inches. The walls being cemented close around the earthen pipe, go down with the dirt, and the result is either the cement around one of the joints of the house sewer is spit or broken or the pipe itself breaks. This break being on top is not readily discovered, but at the most dangerous place in the whole house it permits the entrance of foul gases into the basement of the building from which they will be carried by the natural currents into all parts of the house. In case there is an area the danger is usually quite as great, because the area wall is built with less care, and

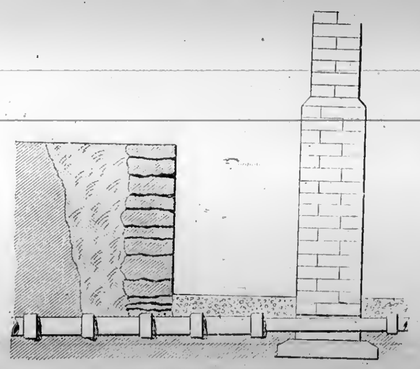


FIG. 2.—ANOTHER UNSAFE CONNECTION.

settlements under the action of frost and rain are much more common than in foundations. These settlements are also greater in extent. It was probably for this reason that the New York city plumbing rule calls for the iron pipe to extend two feet outside of the outside face of foundation or area walls through which the pipe passes.

In cities where earthen house drains, as well as earthen sewers are allowed, the trouble from settlement is just as great as in the two cases mentioned. But it is possible to overcome this difficulty if proper precautions are taken. These precautions are simple and not at all costly. If the pipe passes through an opening so arranged that the settlement of the wall cannot affect the pipe, the object is accomplished. If, as in Fig 3, at the foot of the foundation wall a flag stone, or other foot stone is arranged, so as to support the wall, at the same time leaving an opening for the pipe to pass through, the settlement will be provided for without throwing any pressure upon the pipe at one

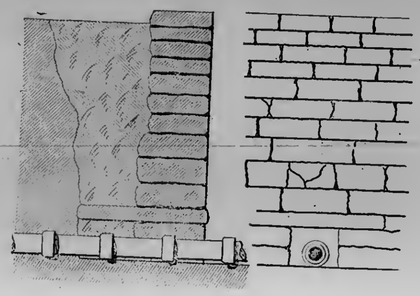


FIG. 3.—A SAFER METHOD.

point, and the pipe, not being disturbed, will be safe. This precaution can be taken at area walls equally well, and the result is the safety of the pipe at a critical point. When pointing it must be kept in mind when carrying the pipe through a wall in this way, that is, if the hole where the pipe comes through is cemented up solidly, as is sometimes done, the advantage of having an opening or arch which might be used instead of the flat stone, all the advantages will be destroyed. Hence this opening should be filled up loosely and only the very face of the wall closed with cement in sufficient quantity merely to keep out vermin.—*Metal.*

INSANITARY CONDITIONS IN MONTREAL.

MR. R. P. Fleming, speaking as to the sanitary conditions in Montreal, says that the serious defects found in houses examined for the first time reaches 83 per cent. The inspection referred to was among large houses in the best part of the city, so that this gives no idea of what may exist among smaller properties where the inhabitants have to depend upoo the owners and authorities for a proper condition of things. In his report to the Montreal Sanitary Association on this subject, Mr. Fleming particularizes cases of defects of various characters, such as bad plumbing and pipe laying, but in almost all the cases sewer gas has direct access to the interior of the houses. It is surprising that such a state of things could possibly exist in a city like Montreal. In a large house in the best part of the city the soil pipes were found simply laid in without any jointing of any kind, and one two-inch pipe, perfectly open at the end, was discharging volumes of sewer gas into the house. Besides this the cess pool was situated directly under the kitchen where the servants lived, worked and cooked. The report closes by calling upon the association to take further steps to urge the City Council to provide proper inspection and supervision of all sanitary arrangements. It is hoped the petition which the Sanitary Association have prepared, when presented to the Council, will be acted upon.

PUBLICATIONS.

A number of the best designs submitted in the recent Presbyterian church competition, accompanied by descriptions, essays on church architecture, etc., will be published shortly in pamphlet form.

We have received from Mr. Samuel Cabot, the well known manufacturer of shingle stains, an artistically colored lithographic view of his factory in Boston, Mass., which is described as being the largest establishment of its kind in the world.

The *Cosmopolitan Magazine* scores a success in producing in its May number, almost simultaneously with the daily papers, an elaborate description of Professor Gray's marvellous invention, the Telautograph, which reproduces the handwriting, or the work of the artist, simultaneously, thousands of miles distant from the place where the writer or artist is sitting.

The Sunshine Publishing Company of 402 Race street, Philadelphia, have published a work entitled the "History of the Master Builders' Exchange of the city of Philadelphia." The work is compiled for the historical committee of the Exchange by Clem. H. Congdon, and gives an interesting and concise account of the institution since its organization in 1886. The leaves of the book are interseeted with over 50 illustrations dealing not only with matters relating to the Exchange, but also by a series of good cuts taken from photos of models exhibited at the Paris Exhibition in 1889, showing the different class of habitations in the principal countries of the world. The book should be in the reading room of every Builders' Exchange.

At the recent examinations of the Toronto Technical School, Messrs. W. D. Wilkinson, G. R. Groth, R. W. Ferguson, L. Johnson, D. Eagle, E. Sauton, E. Cannon, E. H. Richards, and F. R. Love were successful in the subject of Architectural Drawing, and Messrs. W. E. McMullen and G. R. Groth, in Perspective Drawing.

MANUFACTURES AND MATERIALS

LIME AND CEMENT.

THE powder produced from pure and impure limestone by means of heat is called lime or cement, and, as materials used in the masons' and builders' art, they are classified as common or fat lime, hydraulic lime and hydraulic cement. Good lime is in hard lumps, free from cinders, clinkers, much dust, and should form a very smooth paste when slacked. The limestone from which common lime is obtainable is very seldom pure, and contains magnesia, alumina, silica, and similar impurities to the amount of from 3 to 10 per cent. The paste it makes is greasy, from which fact it is known as "fat." It is sometimes called "air-lime," as it will not harden unless it is exposed to the air, and, if mixed with water, it can be kept for an indefinite period without loss of its qualities, provided it is kept from contact with the atmosphere.

Hydraulic lime differs from common lime in that it will harden under water, which is on account of its clayey or flinty nature. When burnt it becomes a caustic lime, and on being brought into contact with water is hardened, its hydraulicity being produced by the crystalizing elements of the clay and flint in the lime. This lime is imported in large quantities from France, but an artificial material of this class can be made by mixing unburnt clay with common lime or a powdered limestone, burning in the shape of bricks by means of a common kiln, slacking the material in the ordinary way, care being taken that there are no lumps of clay still unburnt.

Hydraulic cements are of three kinds, viz.: Portland, Rosendale, and Pozzuolana, but the last named is seldom used, as the strength of the cement is much less than others of this class. It, however, is an ancient cement, being used prior to the Roman age, and it was the first cement known to possess the property of hydraulicity. Its name is taken from the place where it was first found, viz, Pozzuoli, in Italy.

Rosendale cement, sometimes called "natural" or "American," is found and largely used in the United States. The natural bed of limestones from which this cement is made covers about one-third of the State of New York and other parts of the country, and is of a clayey, magnesium nature, light and quick setting.

Portland cement obtains its name from its resemblance when made in a hardened mortar to stone found on the isle of Portland, off the south of England. It was first made in that country in 1843, and in America in 1874, and is heavy, slow setting and of great ultimate strength. The natural stone from which the original Portland cement is made contains 20 to 22 per cent. of clay and 78 to 80 per cent. of carbonate of lime, and its superiority is increased by the intensity and duration of the heat employed in burning, which is almost to the limit of vitrification. Artificial Portland cement is very largely used, and about nine out of every ten of this class of cement now in the market are not the genuine article. Some of these cements, however, are equal to the best imported Portland, and with proper care a still better cement might be obtained. It is generally made by mixing in proper proportions clay and chalk, marl or compact limestone, and burning them at a high heat.

The testing of cements is an important matter, as their values vary to a large extent, and the natural properties of one portion of a cement are liable to differ from another portion, although of the same brand. Particular attention should be paid to the soundness, fineness and strength of a cement. It should be sound, so as not to expand or contract in setting, which is caused by active lime or magnesia being in the material. The presence of such impurities can be proved by immersing in water some cement mortar with very thin edges, and on examination after say two days, the material will be found contorted and cracked at the edges. The magnesia is more harmful than the cement, for the latter can be slacked by exposure to the air. Many defects in masonry buildings of recent years have been caused by the hydration of magnesia in the cement. It is well to remember in testing the soundness of cements that the trial should extend over considerable time, for some defective material will stand for a period, and then lose its unity and fall to pieces.

Fineness in cement is essential from a point of economy, for the finer the cement the greater will be the surface it will cover. It should also be borne in mind that cement will not crystallize by the addition of water unless it is ground, because the coarse particles have no binding power. In order to determine the fineness of the material; sieves are employed with a certain number of meshes to the square inch—one with 50 is considered a good test, and the cement that passes through is of a recommendable fineness.

The strength of cement is usually determined by submitting a specimen in solid form to a tensile strain, for should it pass this test the compression will also, as this material is not so strong in tension as in compression. The committee of the American Engineering Society recommend that the tensile stress applied should increase at the rate of 400 lbs. per minute.

There are other properties, such as color and weight, which are often tested when determining the value of cements, but they are not of so much importance as the matters already referred to. Color indicates the difference in the character of the rock and amount of burning. Gray or greenish is considered a good color, while bluish gray indicates a probable excess of lime, and brown the presence of much clay. American cements are peculiar in respect of color, they generally being of a light or dark brown shade.

Weight of cement varies according to the heat given in burning, fineness in grinding and density of packing. The harder a material of this class is burnt the more it weighs. The time a cement takes to set may be also considered a test as to its quality, and one that sets in 30 minutes or fails to commence to do so within three hours, reckoned from the time the water is poured upon the cement, should not be used.

DUTY ON CEMENT.

Deputations representing the manufacturers of Canadian cement and the Canadian importers of foreign cement have recently waited upon the Government with reference to the import duty of 40 cents per barrel. It is the desire of the former that the duty be allowed to remain as at present, while the latter urge that cement be placed on the free list. The imports of cement into Canada last year amounted to 185,000 barrels, while the amount produced in Canada reached 45,000 barrels. The Canadian manufacturers say that if the duty is retained they will soon be able to supply entirely the Canadian market.

Messrs Carroll, Vick & Co., of Toronto, having discovered in abundance on their property at the Forks of the Credit the materials necessary to the production of fire and paving bricks, will shortly enter into these lines of manufacture.

A manufacturer of British Columbia shingles who has recently made a tour of Manitoba, Eastern Canada, and the new England States is quoted as having said that in Ontario people have not yet discovered that it is cheaper to pay a little more for British Columbia shingles and have a good roof for years, than to buy cheap pine shingles, and have to repair continually. A considerable disparity in price as compared with the product of eastern mills is unavoidable so long as the cost of freight remains as high as at present. On the other hand British Columbia shingles are being sold at slaughter prices in Winnipeg and throughout Manitoba, while the American duty is such as to render it impossible to compete with United States mills in the American market.

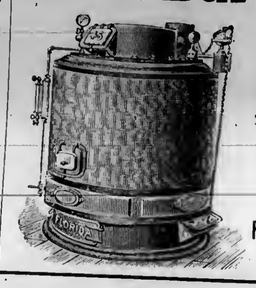
Builders and contractors of Niagara Falls, N. Y., are endeavouring to prevent Canadian contractors from securing contracts on their side of the river.

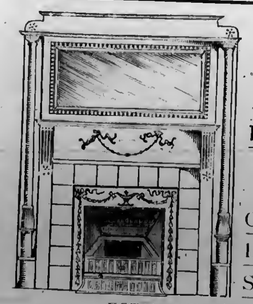
Messrs. Taylor Bros. of the Don Valley Pressed Brick Works, Toronto, have sent two car loads of their brick to Chicago, to be used in constructing a building in the Canadian Department of the World's Fair.

GILMOR & CASEY.
House and Sign Painters,
Telephone 149. 749 VICTORIA STREET.

Douglas Bros.,
SLATE, TILE AND METAL ROOFERS.
Sheet Metal Work, Metallic Ceilings, Skylights, etc.
124 Adelaide Street West, - TORONTO.
Telephone 360.

W. J. Burroughes & Co.
. . . CONTRACTORS . . .
FOR
Steam and Hot Water
Heating and Plumbing
. . . AGENTS FOR THE . . .
FLORIDA STEAM AND HOT WATER BOILERS
353 Queen Street West, Toronto.





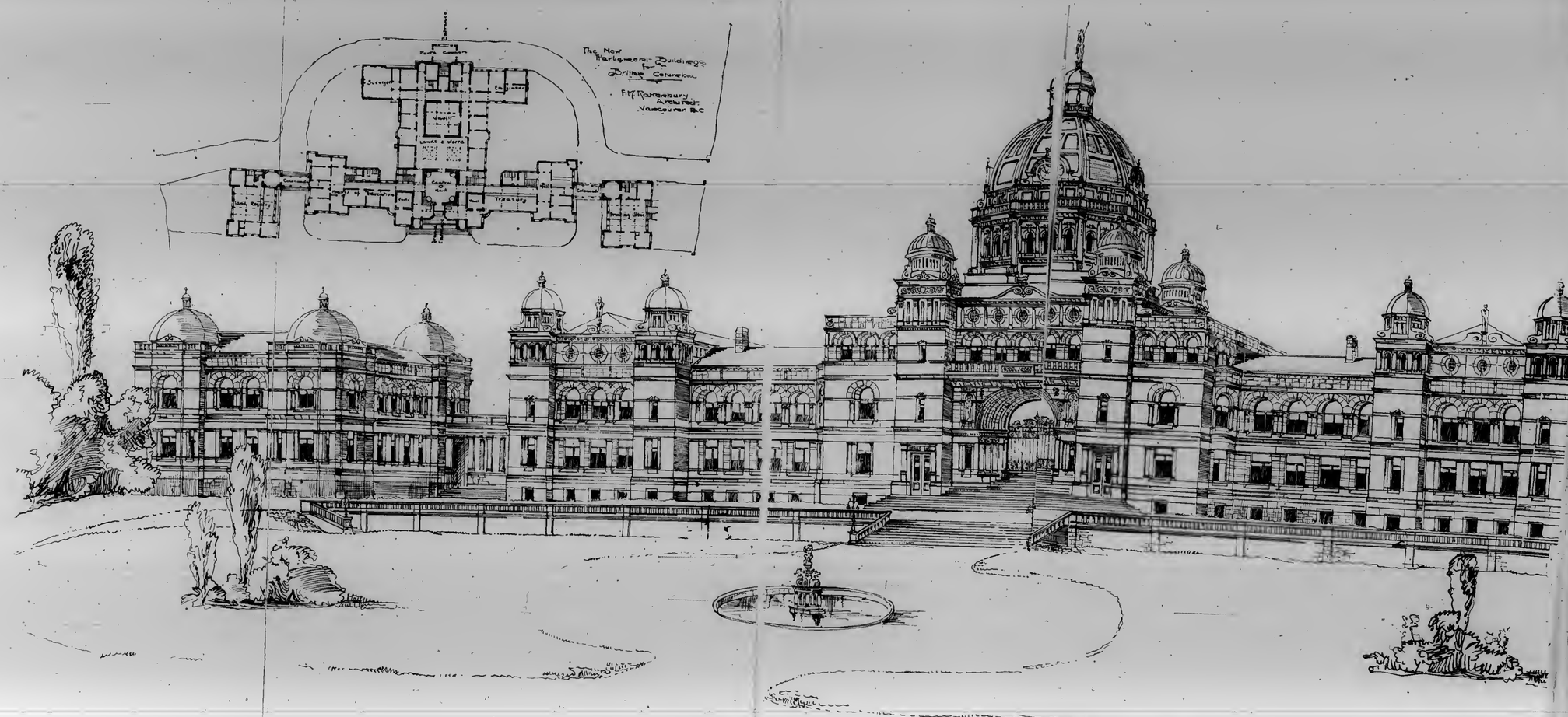
BANK, OFFICE AND VAULT
.. FITTINGS AND FURNISHINGS ..
Mantels, Grates and Tiles, also Show-Cases - - - - -
- - - - Architectural Iron Work, I Beams, Columns, etc.
Church, Sunday-School, Hall, Lodge and Opera House Seating and other Furnishings.
GEO. F. BOSTWICK,
24 West Front Street,
. . . . TORONTO
ESTIMATES FURNISHED ON APPLICATION. . . . . WRITE FOR CATALOGUES.

The Canadian Architect and Builder. [No. 5.
VOL. VI.]

SHAVINGS.

The Toronto Roofing company has assigned

Hayes' Patent Steel Lath

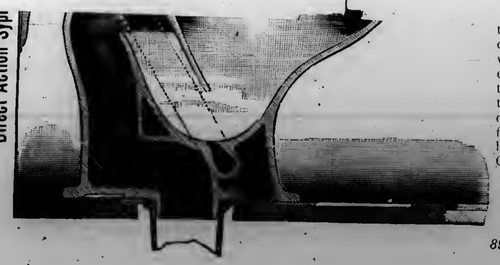


View of Parliament Buildings at Victoria British Columbia

ACCEPTED COMPETITIVE DESIGN FOR PROPOSED NEW GOVERNMENT BUILDINGS AT VICTORIA, B.C.

F. M. RATTENBURY, ARCHITECT, VANCOUVER, B.C.

THE "P.R."
Direct Action Syphon Jet Closet



that a limited quantity of water is required for each operation. We make it in white and ivory ware, plain or embossed, and decorated in colors, if desired. We make these Closets entirely in one piece and in one mould, so that there are no seams, as by the ordinary method of manufacture, thus preventing any risk of flaws or leaks from imperfect joints. The very best imported materials are used, and the Closets will not craze or discolor.

BRANCH HOUSE:

W. B. MALCOLM

89 and 91 Church St., - TORONTO. ONT.

SHAVINGS.

The Toronto Roofing company has assigned to Mr. W. A. Campbell, liabilities $1,700, assets $900.

An exhibition composing virtually a history of ecclesiastical art, is to be held in London, England, this year.

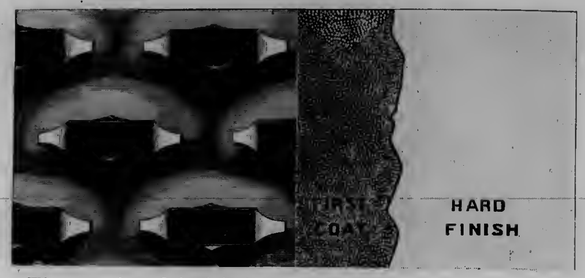
Knox church at Montreal is to be superseded by a new structure. This church was organized 107 years ago, and its first place of worship was erected in 1792 at a cost of $5,250. In 1865 a new edifice was built, and this is now to be pulled down for a new and more imposing structure.

The Master Stonecutters' Section of the Toronto Builders' Exchange have renewed their agreement with the journeymen masons. It is to continue in operation for three years, and the wages to be paid are fixed at 43 cents per hour. Representatives from both parties are to hold a meeting four months before the agreement expires to discuss how the trade stands, and three months notice must be given by either parties before the expiration of the three years if it is their intention not to renew the agreement.

The Confederation Life Association's new building in Toronto was formally opened on the 10th inst. by a luncheon which was attended by many of the prominent business and professional men of the city. The new building, which was the subject of much favorable comment, has cost up to the present about $420,000, and it is estimated that not more than $50,000 additional will be required to be expended for its completion, thus bringing the total cost within half a million dollars. The slow burning principle of construction has been employed.

The Canadian Society of Civil Engineers have appointed the following officers: President, E. P. Hannaford, Montreal; vice presidents, Thomas Munro, Coteau Landing; P. A. Peterson, Montreal; and W. T. Jennings, Toronto; Treasurer, H. Wallis, Montreal; Librarian, William McNab, Montreal. The council also includes H. T. Barrey, St. George Montreal Boswell, Quebec; H. D. Lumsden, Toronto; P. W. St. George, Montreal; J. D. Barnett, Stratford; Alan Macdougall, Toronto; G. C. Cunningham, Montreal; G. A. Mountain, Ottawa; C. K. Donville, Hamilton; C. H. Keefer, Toronto; H. S. Poole, Stellarton; T. Ridout, Ottawa; F. R. F. Brown, Moncton, N. B; E. Mohun, Victoria, B. C.; F. R. Redpath, Montreal.

Hayes' Patent Steel Lath



The tenacity of the bond and other features are unequalled.

Now being used in the "Grand Seminaire," Montreal.

...WE ALSO MANUFACTURE...

Copper, Galvanized Iron and Painted Steel Shingles and Tiles,

Sheet Steel Pressed Brick and other Siding Plates,

Galvanized and Painted Pressed Corrugated Iron.

CORRESPONDENCE SOLICITED.

METALLIC ROOFING CO., LIMITED.

Factories: MONTREAL AND TORONTO.

...ADDRESS...

30 St. Francois-Xavier St., Montreal, or 84 Yonge Street, Toronto.

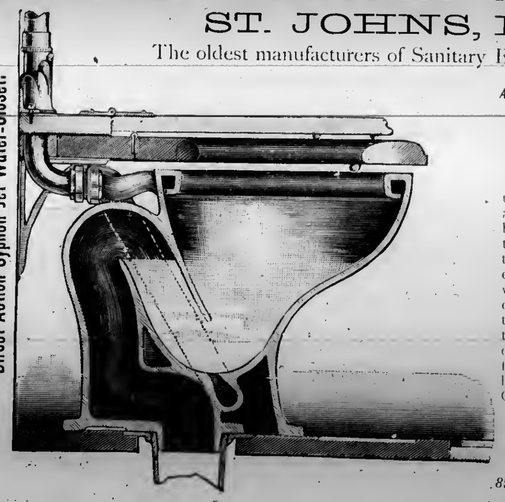
DOMINION SANITARY POTTERY CO.

ST. JOHNS, P. Q

The oldest manufacturers of Sanitary Earthenware in Canada.

THE "PRIMO"

Direct Action Syphon-Jet Water-Closet.



A full line of all the BEST and MOST POPULAR

CLOSETS, BASINS, etc.

WE have selected this pattern as being one of the best of the Syphon Closets now in use. It is simple, quiet and effective in action, and has four to five inches seal of water in the bowl. The jet, besides the Syphon, acts upon the water in the bowl, facilitating the outgo, so that a limited quantity of water is required for each operation. We make it in white and ivory ware, plain or embossed, and decorated in colors, if desired. We make these Closets entirely in one piece and in one mould, so that there are no seams, as by the ordinary method of manufacture, thus preventing any risk of flaws or leaks from imperfect joints. The very best imported materials are used, and the Closets will not craze or discolor.

BRANCH HOUSE:

W. B. MALCOLM

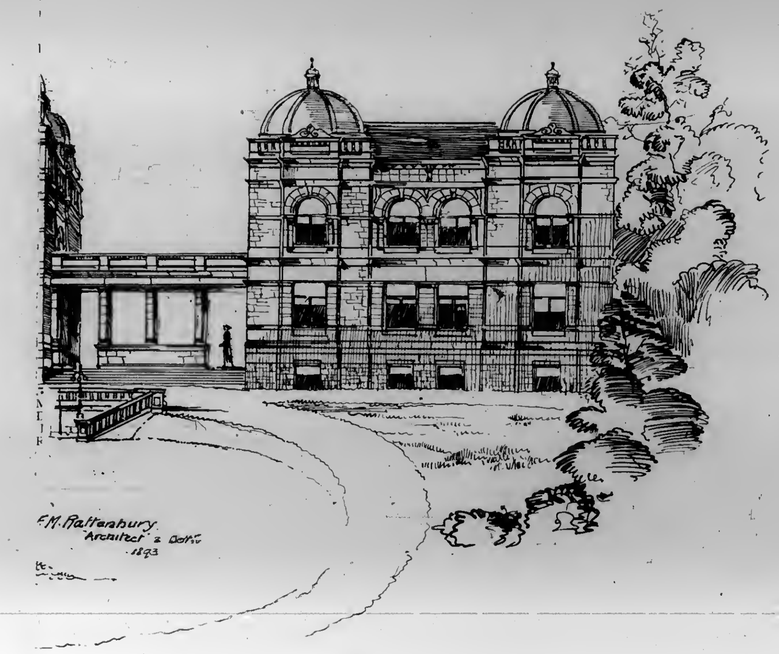
89 and 91 Church St., - TORONTO, ONT.

SHAVINGS.

The Toronto Roofing company has assigned to Mr. W. A. Campbell, liabilities $1,700, assets $900.

An exhibition composing virtually a history of ecclesiastical art, is to be held in London, England, this year.

Hayes' Patent Steel Lath



THE "P-
Direct

there are no seams, as by the ordinary method of manufacture, thus preventing any risk of flaws or leaks from imperfect joints. The very best imported materials are used, and the Closets will not craze or discolor.

BRANCH HOUSE:

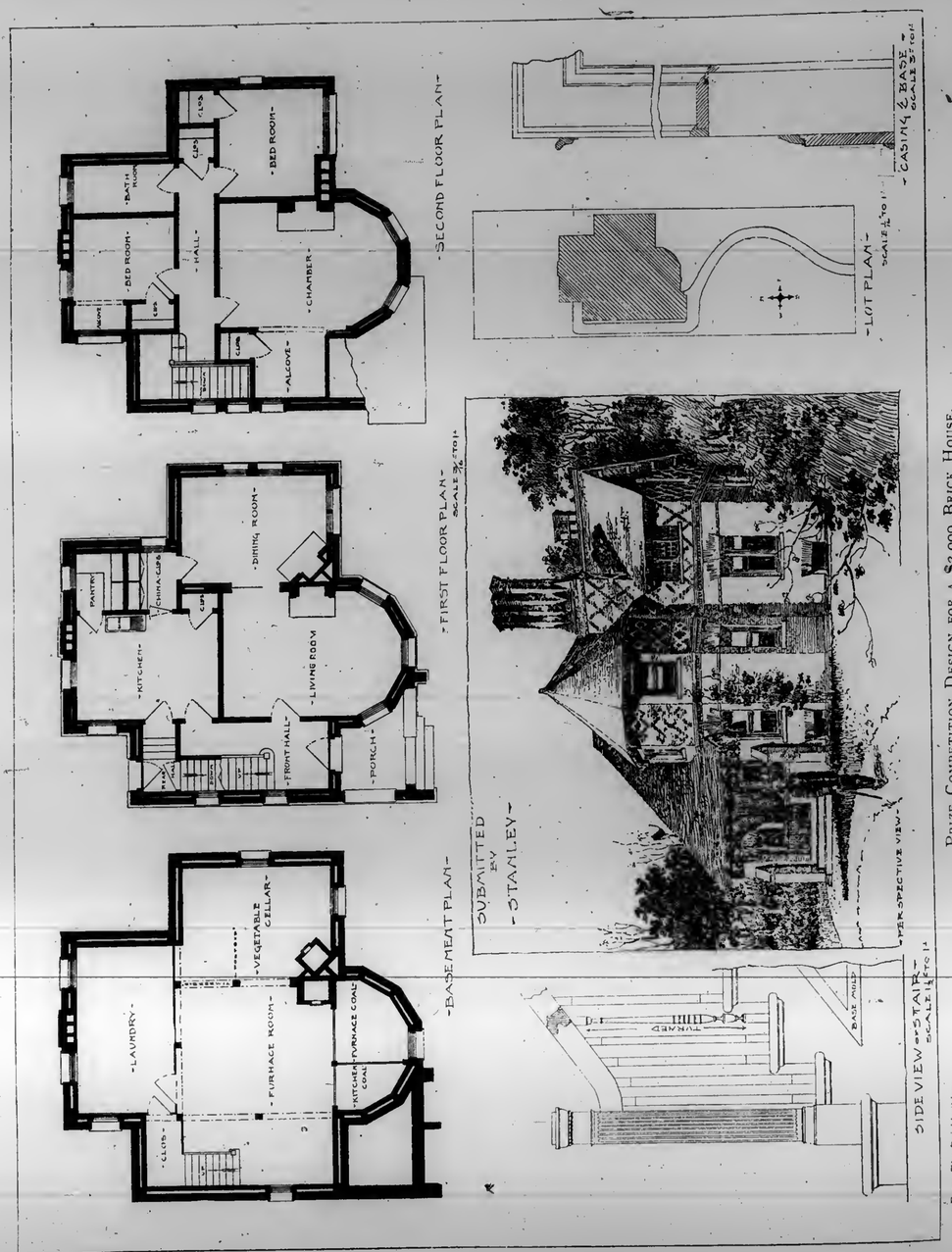
W. B. MALCOLM

89 and 91 Church St., - TORONTO, ONT.

Carved Stone Mantel in the Residence of Mrs. Cameron, Carlton Street, Toronto.

Darling, Sproatt & Pearson, Architects.

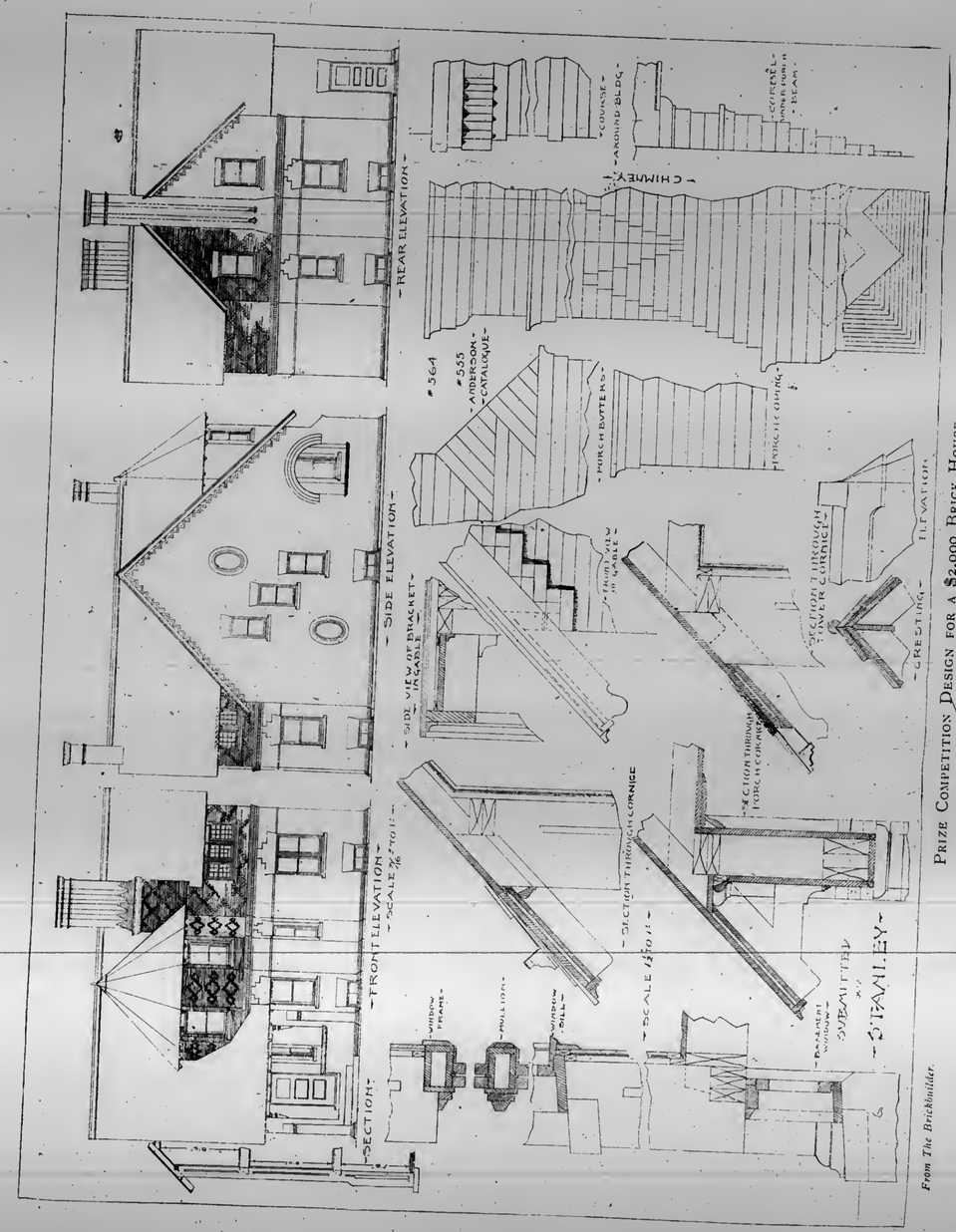
Executed by Holbrook & Mollington.



From The Brickbuilder.

Prize Competition Design for a $2,000 Brick House.

By Stanley F. Kadow, Milwaukee, Wis.



From The Brickbuilder.

Prize Competition Design for a $2,000 Brick House.

By S[illegible] Kadow, Milwaukee, Wis.

CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—No. VI. JUNE, 1893 { PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods,
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
64 TEMPLE BUILDING, - MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	D. B. DICK, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	JOHN E. BELCHER, Peterboro'.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

DAVID EWART	Ottawa.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
FRANK DARLING,	Toronto.
W. A. EDWARDS	Hamilton.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON	Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	V. ROY, Montreal.
1ST VICE-PRESIDENT	J. NELSON, Montreal.
2ND VICE-PRESIDENT	H. STAVELEY, Quebec.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
J. J. BROWNE	Montreal.
J. HAYNES	Montreal.
D. OUELLET	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
GEO. MOIR, 1st Vice-President.
GEO. CAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. J. HILL.
JOHN ALDRIDGE.
JAS. CRANG.
J. LISTER NICHOLLS.
WM. BOOTH.
JAS. ISAAC.
JOHN LOGAN.
WM. PARK.
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

THE twenty-seventh annual convention of the American Institute of Architects will be held at Chicago on July 31st, in conjunction with the World's Congress of Architects, referred to in our issue for May.

THE gentleman who for some years acted as quantity surveyor for many Toronto contractors, having recently removed from the city, there would appear to be at present a good opening for a competent man to set up business in this line.

IT seems to have been finally decided by the architect of the new city and county buildings at Toronto, that the buildings shall be completed by day labor, under the immediate supervision of the architect and his clerk of works. This in the case of such an important work is a new departure, and the outcome of the experiment will be the subject of much interest to architects and contractors as well as to municipal corporations and other public bodies in this and foreign countries.

A NO less personage than the general manager of the New York *Herald*, announces by advertisement that he is prepared to receive proposals for plans of construction with estimated cost of a steel office building of from twelve to twenty stories, and that he will pay the sum of $500 for the plans selected as combining the greatest advantages, and $250 for the second best. This, considering its source, makes easily excusable the like exhibitions of ignorance on the part of persons residing in less highly civilized communities to which we have frequently referred. Surely the height of absurdity with regard to architectural competitions has now been achieved.

THE largest hydraulic testing machine in the world is said to be one designed by Prof. J. B. Johnson, consulting engineer in the Washington University at St. Louis. The purpose for which the machine was designed is for use in the experiments being made by the United States Government to determine the strength of commercial woods grown in the United States. The machine can be made to exert a pressure of 1,000,000 lbs. During some recent experiments at the above named University, a piece of timber capable of sustaining 8,000 persons was crushed like an egg-shell when placed in the machine. Brick piers two feet square, columns of granite a foot square, and sandstone three feet square were ground to powder.

THE volume of building operations for 1893 is less in the city of Toronto, as compared with the first five months of 1892, by half a million dollars. Contractors who have been in business in the city for twenty years state that never within their recollection were the conditions so unsatisfactory as at present. Work is being done cheaper to-day with wages at 36 cents per hour than when years ago the rate required to be paid was but little more than half this figure. Scarcity of contracts has engendered competition to an extent which makes it exceedingly difficult for honest work to be done at a profit. Moreover, the financial stringency is such that builders complain that after having fulfilled their contracts, much effort is often required before payment can be obtained.

THE time set for the reception of designs for the improvement of St. Lawrence Market, Toronto, will expire on July 1st. We are not aware what number of architects will respond to the invitation of the Committee of the Council having this matter in charge, but from the indefiniteness which marked the

advertisements soliciting designs we should not expect to see a satisfactory result attained. The subject of the competition is an interesting one. If the Committee would arrange under proper professional advice a competition under clearly defined and proper conditions, something highly satisfactory to the corporation and creditable to Canadian architecture would perhaps be the outcome. Considering however the strenuous efforts which the aldermen have been putting forth of late for the purpose of reducing sufficiently the estimated expenditure for the current year to bring the rate of taxation down to what will be regarded as a not too extravagant figure, it may be considered extremely doubtful whether the expenditure of any money upon an undertaking of this kind will at the present time be tolerated.

PLUMBERS whether rightly or wrongly have obtained the reputation of charging well for their services. The comic papers are accustomed to tell us that to allow the plumber to gain an entrance to one's house is equivalent to placing a mortgage on the property. In view of the manner in which the plumber's desire for profits has been magnified in the press it is not a matter of wonder that in the eyes of the public he should have come to be regarded as an individual whom it is well to keep clear of. It is the duty of the plumber to seek by every means to prove that he is not the extortionist which he has so often been pictured to be. One method of doing this is to watch closely the workmen, and see that they do not charge for more time than is required to do the work upon which they are engaged. Some workmen will bear watching. On more than one occasion recently the writer has seen journeymen plumbers and apprentices stretched out on benches in the public parks, with their kit of tools for a pillow, idling away hours of precious time, which of course is duly charged up to the customer. Such practices are largely responsible for heavy plumbing bills, and for the complaints of extortion preferred against the plumber. In his own interest as well as that of his client the plumber should first personally inspect the work, see what is required to be done, how much time is required to do it, and then give his workmen to understand what is required of them.

IT was perhaps rather a curious coincidence that at the very time the members of the Ontario Association of Architects were endeavoring to get their Bill amended for the better protection of the public against unqualified practitioners or "jobbers" of the profession, there should have been brought up Bills for the purpose of making close corporations of two or three trades. It certainly was unfortunate, for when the House had listened to the arguments of the undertakers, that on sanitary grounds no one should be allowed to bury but a select few who combined for the purpose of keeping the business in their own hands; and to the suggestions that only qualified milkmen should be allowed to sell milk, it became fearful that every separate trade would be seeking to hedge itself in with special statutes. By the time the Bill of the Ontario Association of Architects was reached, the House was in a regular panic, while misapprehension thickened the air like a fog. Under these circumstances the committee in charge of the Bill saw it would be useless to present it, as members of the House were not in a fit state of mind to weigh it on its merits; they therefore decided at the last moment to withdraw it. The O. A. A. therefore remains in *statu quo*, but the work that is being done by it is of too great value to be stopped; the efficient training of capable students is a matter which should be viewed with great interest by the public, and they should be glad to know that the examinations will still be held annually as heretofore, and none will be admitted to membership unless duly qualified.

THE opening of the tenders for certain street paving contracts in Toronto has lately been a subject for a great deal of talk and not a little "flying into print," while the irregularity of the proceedings has opened the door for a great deal of grumbling on the part of "home" tenderers, not upon the merits of the case only, but upon, so to speak, a side issue, namely, the admission of a tender from an "outsider." The tenders were publicly advertised for and ordered to be sent by registered letter through the post. That being the case, to admit a tender in any other way was utterly indefensible and unfair. As is well known, a tend was submitted —"handed in"— after the appointed time, and it was this one that secured the contract. When it was found that such had been the case, the only fair way of dealing would have been to advertise again, that all might have had an equal chance. It is a very great mistake to say that it is for the good of the city that outside tenders should not be admitted. Nothing could be worse than to exclude them; they have many advantages. Tendering is likely to be more honest if not confined to a few. Combines are by this means prevented. Though we should like to see local men doing the work, yet if their prices are so high that a firm from a distance can give us work as good for a lower figure, our "home" tenderers will learn that it is necessary for them to improve their plant and otherwise to put themselves in a position to give the best work for a more reasonable price. But, while favoring the admission of outside contractors on an equal footing with resident contractors, we emphatically protest against any advantage being according to them.

DEPUTATIONS representing twenty town and city municipalities waited upon the Ontario Government a month ago to ask for legislation which would enable them to grant exclusive telephone privileges for a period of five years in return for a percentage of profits of companies to whom privileges might be given. This step was taken in view of the judicial decision recently given affirming the illegality of such action on the part of municipalities. The petition of the deputation was opposed by the legal representative of an automatic telephone company, which was not a matter of wonder. It was altogether surprising and amusing, however, to see a delegation from the Toronto Trades and Labor Council present in opposition to the granting of the required legislation. The telephone has been properly termed a natural monopoly. One efficient telephone company in a town or city is more satisfactory to the public than two or more companies would be. The existence of more than one company makes necessary the renting by every telephone user of as many instruments as there are companies in order that he may be in a position to communicate with every other telephone user. This means additional expense and trouble. It means, so-far as the companies are concerned, that they will be unable to make a fair profit, and consequently will not be in a position to pay any tribute to the municipality. Thus it is that with exclusive privileges granted to one company, telephone users get a better and more efficient service, the telephone company is able to make a fair profit, and the municipality is enabled to exact in return for the exclusive privilege, a considerable percentage of the net earnings of the company with which to lighten the rate of municipal taxation. Strangely enough, there are found people like the Trades and Labor Council, who, while always complaining of their condition, will refuse to allow anybody to assist them in paying their taxes. The legislature, like a wise parent, saw where these short sighted people's interest lay, and granted the municipalities the power they sought for.

A WALK through the older business portions of Montreal convinces one that there is need of very decided improvement in the business blocks there, to say nothing of the narrowness of the streets which, if it is possible, certainly should be attended to. as to the buildings themselves, we may expect to see in the course of a decade considerable changes. Many of the warehouses and wholesale houses are very old and quite unfitted for the business of the day, and consequently the rentals they bring in are very low, and though the majority present very solid stone fronts the interior upon inspection proves to be very much decayed. The handsome blocks of the Grey Nuns warehouses off St. Sulspice street throw the buildings of St. Paul street into the shade. Unless owners bestir themselves and modernize their buildings it is not at all unlikely that the principal business firms will move west. There is indeed a slow and general movement in this direction, and it would be a good thing for the city if, for instance, a few good streets, wide and roomy, were cut through Griffentown, displacing some of the hundreds of poor dwellings that swarm here and are somewhat deleterious to the city's health. The westerly movement is only a continuation of that which has been in progress for the greater part of the century. The quaint buildings to be seen in Hochelaga were vacated in favor of the newer St. Paul street and its surroundings, and these will probably be left for still further west blocks. A feature among the residential streets has been the "tenement houses," which are now rather losing favor. A few years ago it was difficult to get anything else in a decent locality within a mile or a mile and a half from the centre of the city, a "self contained" house being a rarity. These "tenements" were in many ways most objectionable; two families under one roof, the one occupying the basement and ground floor, and the other, with its distinct entrance and staircase, occupying the upper two floors. In this manner a large population could be accommodated in a limited area, but since this was the only means of housing oneself it had to be put up with. So accustomed do people get to circumstances that owners experienced no difficulty in obtaining high rents for "half houses," while many of the best people were willing to occupy them. Now, however, it is hardly likely more of these will be built.

AN article appeared in *The Week* lately on the subject of "class legislation," which is considered by the writer even in the cases of legal and medical societies to be so absolutely unnecessary that any such thing is equivalent to placing the public in the position of "children and imbeciles." It is stated that "ordinarily it will be sufficient that the individuals practising any profession be held strictly responsible for the results of their own incompetency or malpractice"—or in other words it is sufficient to shut the stable door after the horse has escaped. Such is not the spirit of the age, however. We go now on the principle that "prevention is better than cure," and it is surely rather late in the day to argue it is unnecessary for the law to protect the public against imposture because it *ought* to be able to take care of itself. The article in question was prompted by the withdrawal of the Bill of the Ontario Association of Architects for the amendment of their Bill passed two years ago, but the writer betrays his political bias and sneers at reform because it is fostered by those who hold different views to his own. Most of the newspapers have shewn in this connection that this so-called "class legislation" is an absolute necessity, and in the interest of the public should be extended to architects. It is not a case of closing up the profession for the benefit of a few practising architects, but it is for the purpose of enforcing those who will have the lives of individuals in their hands, to prepare themselves by careful study and prove themselves capable by rigid examination to carry out buildings in a manner that shall conduce to the safety of the occupiers. "Official inspection" and "governmental licensing" has and constantly does show itself to be insufficient, insomuch as we continually hear of the collapsing of buildings, and know to our cost of the awful effects of of unsanitary houses and factories. There is a wide distinction between trade unionism and "class legislation," of which however, the writer of the article in question is wilfully ignorant. We notice the article only because of the mischief such thoughtless words may do among those who are easily led by what they see in print, and as we have done so we would suggest to those who may have been influenced by it to use their own common sense and ask themselves how they would feel if through the incompetency of a so-called "architect" they became injured in limb or ruined in constitution for the rest of their lives—whether they would not prefer to have that guarantee that the building they intend to occupy is well built which "class legislation" in connection with the architectural profession would give.

THE estimated expenditure of the City of Toronto for the year 1892 was $1,200,000; this year it is $1,700,000, an increase of half a million dollars. The Toronto Street Railway Company are taking advantage of this circumstance and of the demand of the citizens for a reduction of expenditure to endeavor to secure a change in their agreement with the city. They offer to put down and keep in repair the pavements on the track allowances on condition that they shall be relieved of the payment of the yearly rental of $800 per mile of track as provided for by the agreement. The citizens and their representatives in Council should have no difficulty in discerning in this proposal an attempt to repeat the act of the cunning Jacob towards his brother Esau, and should promptly refuse to give up great and permanent privileges in return for a temporary financial accommodation. The city has already completed more than two-thirds of the permanent pavements, at a cost of a little more than $400,000. It can surely finance and finish the balance of the undertaking and maintain its control of the streets. A comparatively small yearly amount in addition to the rental of $65,000 or $70,000 received from the Street Railway Company would be sufficient to pay the interest on the cost of the pavements, provide a sinking fund for the redemption of the debentures and defray the cost of repairs. So far as the latter item is concerned, it is not likely to prove a very large one. The contractors who construct the pavements will be required under a guarantee to keep them in repair for five years. A concrete foundation may be taken to last fully thirty years, which is the lifetime of the street railway agreement. In some of the busiest streets of London the surface of asphalt roadways last for fourteen or fifteen years. As there would be little traffic upon the track allowances, the surface would not require renewal for even a longer period than that mentioned; therefore, as we have said, the expenditure under the head of repairs is likely to be light. There are other than financial considerations involved, however. For years the city experienced difficulty and expense consequent upon almost constant litigation in the effort to compel the former lesees of the street railway to perform their share of the work of maintaining the streets. Under the new agreement the city has absolute control of the streets, and under no consideration should this control be surrendered.

THE NEW LEGISLATIVE BUILDINGS FOR BRITISH COLUMBIA.

THE Government of British Columbia are losing no time in proceeding with the erection of the new Provincial Legislative Buildings at Victoria. Advices from British Columbia state that the contract for the foundation has already been let at the price of $56,000. The prompt action of the government in this matter will nullify the efforts of the residents of the mainland to prevent the work from going forward and to secure the removal of the seat of legislation from Victoria. The present Government may be turned out of office by the dissatisfied electors at the approaching election, but it will then in all probability be too late to stop the erection of the new buildings.

ILLUSTRATIONS.

SECOND PREMIATED DESIGN FOR NEW LEGISLATIVE BUILDINGS AT VICTORIA, B. C.—T. C. SORBY, ARCHITECT, VICTORIA.

DESIGN FOR A BARONIAL MANSION.—ERIC MANN, ARCHITECT, MONTREAL.

DESIGN FOR A VILLAGE CHURCH.—GREGG & GREGG, ARCHITECTS, TORONTO.

DETAILS FOR A SMALL HOUSE.

ONTARIO ASSOCIATION OF ARCHITECTS.

A MEETING of the Council was held on June 1st. The report of the committee appointed to obtain legislation amending the Act of Incorporation was received, and the Council approved of the action of the committee in withdrawing the bill of amendment. A circular letter has been issued by the President to the members of the Association stating the circumstances which made necessary the withdrawal of the bill.

* * *

Application to members for the annual fee was postponed until the success or failure of the attempt to procure amendment of the bill had been settled. The Council has decided to keep the fee as low as possible for the next year or two. A schedule has been sent to all members and the Registrar hopes that as the fee is now so small there will be a prompt response that will offset the delay in making the application and that he may be able to return all fees to the Treasurer on July 1st.

* * *

The curriculum for the examinations of 1894 was approved by the Council and has been issued to all students.

* * *

As many students have changed their addresses without notifying him of the change, the Registrar would be glad to receive from every student a post card stating the student's correct address. If by this means it is discovered that any copies of the curriculum have been misdirected second copies will be sent correctly addressed.

* * *

The Registrar begs to remind members of the Association that he has copies of the form of indenture approved by the convention of 1892 and will issue them to all members who require them.

CORRESPONDENCE.

[Letters are invited for this department on subjects related to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

Editor CANADIAN ARCHITECT AND BUILDER.

In a recent issue of your weekly edition, the CANADIAN CONTRACT RECORD, "Data for Steam Fitters," 1st item is not correct. A gallon of water contains 276.48, and the weight to lbs. The gallon given in the paper is the old wine gallon and used in the States only. You had an item copied from some other paper last year in reference to the sun taking the temper out of steel tools exposed in shop windows, and I submitted it to a well known firm, makers of fine steels, and they confirmed my own opinion that it was perfect nonsense.

Yours truly,
JOHN H. BIRKETT,
Kingston, Ont.

BRICK EFFLORESCENCE.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—We have read with much interest the article in your April issue on the above subject, which is one of considerable importance to brick manufacturers, architects, builders, and every person in any way interested in building.

We must agree with you that the effect produced by the appearance of this efflorescence on the walls of fine buildings, is very displeasing, and it is most desirable that every means should be tried for its prevention.

A variety of opinions seem to exist as to the cause of the efflorescence. So far as our knowledge goes there is no process at present in use which will entirely prevent it. Under certain circumstances it is said that a certain chemical preparation if mixed with the clay will serve to prevent its appearance, but we question if it will do all that is claimed for it.

After having been engaged for twenty-three years in the manufacture of different kinds of bricks, we find that some of the buildings erected with our material will never show efflorescence, while in the case of others, the opposite is true.

There are no bricks made in America to-day which will not effloresce under certain conditions of the atmosphere (except virtified brick) but while we cannot altogether prevent it we should make use of such means as we have of checking it.

We would be glad to hear more on this important suject from some of your readers.

Yours truly,
THE BEAMSVILLE PRESSED BRICK CO.

PERSONAL.

M. Alfred Wood, until recently a designer for Mr. David Roberts, architect, Toronto, is reported to have fallen heir to a very large estate in England.

Mr. B. O'Bryne, late inspector of works on the new legislative buildings at Toronto, is superintending the erection of the asylum for the insane at Brockville, Ont.

Mr. Milton Cathro, a prominent contractor of Toronto, was married on the 7th inst. to Miss Caroline Oswald. Mr. Cathro and his bride left shortly after the wedding ceremony for an extended visit to Chicago and the Northwest. We extend to them our congratulations and best wishes for a happy future.

A severe calamity has fallen upon Mr. Edward Burke, architect, Toronto, whose only son met with an accident which resulted in his death on the 6th inst. The lad, who was about twelve years of age, while riding a bicycle on one of the principal thoroughfares, came in contact with some material which projected from a waggon, and was thrown to the pavement with such violence as to cause a fracture of the skull, resulting in his death a day or two later. The deepest sympathy of many friends is being extended to Mr. Burke and his family in view of the unexpected and severe loss which they have sustained.

AN interesting experiment with shingles was tried a short time ago, says a writer in an English journal. A green 6-inch shingle, fresh from the saw was measured and weighed, care being taken to get both exact. It was found that it weighed 7 ounces. It was then dried and again weighed and measured. It had shrunk nearly ½ inch, while the weight had decreased from 7 ounces to 3. It was then submerged in water 24 hours, and the size had not changed a particle, while the weight had increased about one ounce, demonstrating the superiority of cedar shingles over others, as when once dry they will neither shrink with excessive heat nor pry one another off the roof in wet weather.

QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require on lines consistent with the objects of the paper. Every effort will be made to furnish satisfactory answers to all such inquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

W. A. F., Hamilton, writes:

Do you know of any acid or wash that will clean Ohio stone that has been built up for nearly 40 years and is very much discolored?

ANS.—We have no knowledge of any acid or wash which might be effectually used for this purpose, and enquiries made amongst quarry men and stone dealers of large experience met with the reply that the only satisfactory method of cleaning the discolored surface of stone is by re-dressing.

DESIGN IN METAL-WORK.

UNDER the auspices of the Technical Institution Committee, Mr. W. A. S. Benson recently gave an address on "Design in Metal-work" in the Mayor's parlor, at the Manchester Town Hall. Mr. Benson said the two primary conditions that the designer had to acquaint himself with were that metals were fusible, and that they were malleable. It was the combination of these two qualities that distinguished them from other materials so far as structural considerations went. The designer must not forget the nature of metal. As to its strength and tenacity, which enabled thinner sections to be used, that was a mechanical consideration. Then its lustre, so different from any glaze or resinous polish, altered the effect produced by the actual form, so that very different mouldings were required from such as looked well on terra-cotta or oak timber. The brilliant reflective power of polished metal gathered up the lights into points and rings and lines, so that nothing but habitual observation and experience enabled one to forecast the effect of any given form. Nor should it ever be forgotten that when the nature of the work was such that a polished surface could be maintained in high perfection, no beauty or profusion of ornament could compensate for the loss of the mirrorlike beauty of the material itself. The beautiful art of embossing deserved more than mere mention, and that none the less because the very perfection of our technique has gone far to destroy its artistic value. There was perhaps no decorative process which so directly responded to the taste of the craftsmen, which demanded so accurate a feeling for line, for surface and for relief, soft and flowing and yet precise. It was lamentable to see how a piece of genuine Queen Anne or early Georgian silver stood out from the productions of the modern smith, though they in turn were surpassed by many older works. There was no good reason why we should not produce such work again. It only wanted brains and goodwill in the purchaser and the producer. Of course there were some arts which had had their day. We no longer required Damascened sword-blades or etched-steel cuirasses, but we actually did produce, and some paid for, embossed wares by the hundredweight, and it seemed a pity it should not be good. Three elements went to design. First, the physical properties of the material; secondly, there was the tradition or history of man's mastery of it, and thirdly, the need which the product had to serve. The good designer got these three things thoroughly engrained in his mind, and the result was that his work looked as if it had grown. The road to artistic wisdom lay in external nature rather than in authority and tradition. The endless variety of beautiful lines, colors and contours to be found in the growth of vegetation, in animal forms and in the sweep of sea and land and heaven above and around us must ever remain the standards of beauty for man, and in the loving observation of these would be found the ultimate education for that seeing eye which was the final court of appeal in matters of taste.

A GOOD RED DIP.—One of the best red dips known consists of the following:—6 lbs. of red oxide of iron, 3 lbs of Cornwall stone, ¼ lbs. of borax, ½ lb. of barytes. Lynn sand can be used in the place of barytes, and scarlet red in the place of oxide of iron. In preparing the above, mix them well together, then calcine them in a pot or saggar. They can then be ground together into a slip. Take one quart of stain to ten of the clay slip, varying it according to the strength of the clay, to bring up the bright red. For large articles, paint the stain on with a brush when they are black hard.

ARCHITECTURAL DISGUISES.

Concealment of structural materials and forms is one of the characteristics of our modern architecture, says the *Building News*. We have passed from an age of imitation to one of disguises. Formerly it was the fashion to make stucco marble, and graining the natural figure of real wood. Even the groined stone vaults of the churches were represented by the plaster imitations, as in that of St. Luke's, Chelsea. Art apostacy could not have been carried further, for these imitations lost sight of the constructive in all the materials that were so represented or misrepresented. The jointing of stone work and vaulted masonry depended upon the whim of the stuccoist; there was a want of reality apparent which quite demoralized the art of masonry. To a like extent carpentry, and especially joinery, suffered from the enstoms of painting and graining everything, for good jointing and clean finish were impossible when woodwork was painted a stone color, or grained to imitate oak or mahogany.

But this era of misrepresenting constructive materials has passed away—let us hope for ever, and honesty of construction has taken its place.—For a brief period the reaction from imitation led to excesses, for we remember the time when naked brick and stone walls, and unpainted woodwork were looked upon as virtues, and when everything in the shape of casing was pronounced an abomination. Church roofs and wooden benches of the 13th century simplicity and skeleton organs divested of all casings were the order of the day. We have now recovered from these bursts of enthusiasm, and are settling down to rational doctrines in architecture, as we are in church and house building. We have begun to see the difference between mere imitation and clothing; that a covering is not necessarily bad architecture. Still, there are modes and rules to be observed. The increase of new materials and appliances has brought with it a new danger which the architect has to guard against, and to which we may briefly draw our readers' attention.

First, there is the inducement to cover a plain, inexpensive material with one of greater value in the same manner as common metals are electro-plated with silver and gold. Even the ancient Romans resorted to the practice of veneering their buildings with slabs of marble. Secondly, the desire to economise has encouraged the manufacture of materials for the purpose of encasing construction. The first motive, if it does not go so far as to deceive the eye, is reasonable. Take, for example, a wall-lining: if it represents by joints and masonry a stone wall, it is certainly dishonest; but if it is merely fixed to the surface in slab-like pieces, and does not pretend to be anything more than a surface incasement, we cannot find fault with such a mode of wall enrichment. A number of projecting piers or pilasters covered by a marble veneer would be misleading and wrong in design, but a flat, superficial mode of panelling would be quite legitimate. A plaster ceiling "jointed" to represent solid voussoirs and ribs is obviously wrong in principle, and plaster in such a position should be treated as plaster panels by painted or fresco decorations, and in no case show masonry jointing. A more legitimate motive to cover a structural material is to give it a more presentable or comfortable surface, as that of encasing a brick wall with plaster or an iron column with wood, and this motive power opens a very wide field for the use of all kinds of non-conducting and artistic surfaces. But in this application there is decidedly need for caution. There is the danger of sacrificing the real structure or material, as, for instance, in making the design for an iron column suitable for a wooden or a marble one; in short, of thinking of the encasing material rather than of the actual support. In this way the sin of imitation or misrepresentation is likely to be revived if architects are not on the alert. Let us take a few examples. Iron columns and stanchions are frequently used to support the upper walls of large banking premises. These are generally incased either in plaster or wood, and we have seen these casings made to agree with the wall or dado work by covering the iron column with panelled work, making them square or octagonal, instead of honestly treating the column as a support and arranging the casing independently of adjoining woodwork. We often see walls lined by materials which are designed or manufactured to ignore the idea of a wall lining. The panels, instead of being large and square, are in a profusion of small sizes, irregular in shape, set diamond wise, intended to display the joiner's art, or the fabric itself, whatever it may be. All this is contrary to art. Marble veneers, wood parquetry, glass, keramic decoration are all open to this objection. We found fault with stucco or plaster walls painted and jointed to represent marble: an almost similar objection would apply to a casing which ignored the walls and its piers.

Ceiling decoration, including in this description skylights, the incasing of girders, and other structural things, is a disguise which is often carried to an excess. The whole construction of the floor, or roof—whatever it may be—is so far disguised by plaster or papier-mâché decorations, that the design of the roof is lost sight of. The whole structure is changed. Is this architecture? Certainly not, if we accept the definitions. Is it architectural to introduce hugh plaster coves to flat roofs carried by beams or girders, so as to give the ceiling a semi-domical shape? Imagine a large room with a flat over it made to represent inside a vault of plaster. Yet this kind of construction is often met with. We see an ugly external skylight, so covered and shaped internally by decorative adjuncts as to totally alter its constructive form; or an iron girder transformed into a flat arch or incased in plaster several feet deep to give it the appearance of an entablature supported on end columns which carry nothing. These are every-day instances of how we disguise our large buildings, town halls, city banks, and residential blocks. We do not say these sorts of materials are inadmissible when they are made to incase timber or iron, so as to present an internal covering: but let it be done honestly, without going out of the way to falsify the invisible means of construction. We can understand, for example, the incasement of an iron column or a plate-iron girder by materials which present more suitable surfaces internally, such as plaster or papier mâché, or wood and keramic decoration; but there is a right and a wrong way of doing it, both in the application and mode of decoration.

The fashion of disguising structural features, and especially iron, is developing in several ways. Some time ago iron was boldly used in columns, roofs, and other structures, and the material was left untouched. Several applications of iron are to be met with. We have, for example, lately seen an iron staircase in which the strength and rigidity of wrought iron has been given in shape of strings and risers, which are covered with wood. The iron plate string shaped to the curve of stairs is sandwiched between wood strings, the outer one of mahogany, and the risers of iron riveted to the string have teak on the outside. The St. Pancras Iron Company have, we understand, carried out several of these staircases, one of which we described last week. There is no reason, artistic or otherwise, why strength and rigidity should not be given to these and like structures by the use of iron as a skeleton frame work. An iron frame economises space, and where curves are required, as in a wreathed staircase or in theatre-gallery construction, the value of iron is undoubted, and many of our threatres, such as the Alhambra and the Empire, have their galleries and dress circles constructed of iron imbeded in concrete. Disguises of this kind are legitimate and harmless enough if they do not assume too much, such as imitating stone or marble.

The consideration of economy in the employment of materials that take up little room and cost less than making a structure solid is sound as a principle, if only builders and architects knew what real economy was. They have often, however, confounded cheapness with it, and have encouraged the use of materials which are anything but economical in the long run, or have done what is quite as reprehensible—reduced the working strength of their iron girders and columns, and have made up their apparent size by using cheap substitutes as a covering.

All kinds of patented compositions have been introduced as concealments of structure of recent years. Wood has been manufactured into a variety of ways for wall and other linings; all manner of plastic materials have been used for similar purposes, even leather and paper and wood-fibre have been pressed and embossed into a variety of forms; Anaglypta, leather papers, and other like materials, have come largely into use in decorations, and we have substitutes for cement, stone, and marble—all of them excellent in their way—intended to cover, protect, or decorate our buildings. But, in the multitude of these inventions and appliances, there is a danger of disregarding solid, honest construction, and in sacrificing good design to superficiality, and artistic ornament to spurious and unmeaning repetition.

ELECTRIC KALSOMINING MACHINE.

ONE of the queerest applications of electricity at the World's Fair, says the *Western Electrician*, is the attachment of a motor to a machine that is doing a large share of the painting—or kalsomining, to be strictly correct—on the interiors of the great buildings. It was discovered some months ago that it would be very difficult, even with a small army of men, to do all the necessary painting by hand, and so C. Y. Turner, who is interested in the painting contract, devised an apparatus which, with the assistance of two men can apply as much kalsomine in a day as forty men with brushes. The painting machine consists essentially of an electric motor, a rotary pump, a barrel of kalsomine, a line of hose and a flat nozzel. The nozzel consists of a gas pipe about a foot long, pounded flat at one end so as to leave an opening about an inch across and wide enough to insert a sheet of card board. The pipe is attached to a long piece of rubber hose, the other end of which is dipped into a barrel of paint. A rotary pump run from a countershaft operated by an electric motor forces a current of air and particles of paint through the hose. The force of the air scatters the paint in a fine spray as it comes from the gas pipe. A painter simply seizes the gas pipe, holds it about eighteen inches from the surface he is decorating, the electric motor is turned on and the work is done. Mounting two men with this device upon a movable platform scaffolding, the work of a gang of men for a fortnight can be accomplished in one day. The motor used is of the Edison type, of five horse power capacity. The arrangement has been in successful operation for some time. The color used for the interior of the electricity building is a very delicate blue, and it is evolved out of several component parts. A deep Prussian blue is the pronounced color taken as the basis. Dutch pink, which is not pink at all, but rather a reddish yellow, is another component, and these two are tempered with white in the proportion of 360 pounds of whiting, four and one-half gallons of Prussian blue. All the great iron arches in the roof have been painted by brushes. Half a dozen men are still plying brushes above the galleries, but in other proportions of the building hose lines are playing on the woodwork. The effect of the things is very pleasing, and the work is now nearly completed.

SOME NOTES ON PEN DRAWING.

IN this age of the perfection of pictorial reproduction and of the multiplication of illustrated magazines, it is not surprising, writes Albert P. Willis in the *Architectural Era*, that architects along with other classes should endeavor to use these means of placing their work before the public. Looked at merely from a business point of view it introduces them, for better or worse, to a wider circle of critics than would ever see their products in stone or brick. This is perfectly legitimate and were the work well done nothing more need be said ; but some of it is as poor in execution as anything ever honored by the name of illustration. If architecture is a fine art, as every day we are coming more and more to believe it to be, its practitioners must be seen by other lights than through an atmosphere of plans, estimates and contracts. Their works must appeal to us as things of beauty, and their illustration in the press must be artistically presented as our knowledge and experience will permit. If architects deem it necessary or tempting to illustrate at all, surely such illustration should not do injustice to the building itself.

It is admitted that the purpose of a drawing should govern its production ; now as the purpose of a pen or wash drawing cannot be purely descriptive, plans and elevations could fill that office better. It must be pictorial ; it must endeavor to present a building in an attractive manner ; to give us a composition with the building as the central and striking feature.

DESIGN FOR A VILLAGE CHURCH.—GREGG & GREGG, ARCHITECTS, TORONTO.

Some architects, I fear, find themselves unable to do this, and perhaps, hand the work over to one of the 'T-square' trained office men, as incapable as themselves. Let us rejoice, however, that our best firms, in such a predicament, employ an artist or illustrator and with most exceellent results, as Blum's drawing of the Alcazar at St. Augustine, for instance, will prove.

If the architects want to do the work themselves they at least should become acquainted with the methods of well known illustrators. There is a score of artists in this country who in the last few years have had occasion to illustrate architecture, and while they know nothing about its technical features their numerous drawings in *Harper's*, *Scribner's* and *Century* bear testimony to the excellent work done. The means employed have been various, but none I think have given better results than pen and ink. For clean, sharp, crisp drawing and for the expression of detail it cannot be surpassed.

In looking over a list of pen draughtsmen whose works are worthy the study of the architectural student, the difficulty lies in selecting the few representative ones ; Pennell, Brennan, Blum, Cox, Gregg, Meeker, Fenn and some others claim recognition. They are all able men who well know the limitations of their art. Some of them are close students and large borrowers of the methods of the great Spaniards, Fortuny, Rico and Vierge, but that should not detract from their prestige.

Pennell's illustrations of the English cathedrals, which appeared in the *Century* in 1888-89, give him the first claim for consideration. The beauty of his drawings lies in the grace and economy of line, the exquisite expression of atmosphere, the large use of whites, the sparing and concentrated use of blacks Between his and Rico's work there is a striking similarity, making allowance of course for the difference produced by the brilliant sunlight of Spain and the cooler lights of England and America. He works mostly on Whatman's hot pressed or some paper with a slight grain. This, in the reproduction, gives a slightly broken line, very good for soft effects. Ordinarily he uses a Gillot's "Crow Quill," 659, which he claims is almost a living thing, so responsible is it, to the touch and so wide in its field. Occasionally, however, we find him using other and heavier pens, to suit the occasion. His lines are broad and open with little cross hatching. The forms are defined either by outline without shade or shade without outline ; only occasionally combining the two. The very scarcity of his blacks makes their occurrence extremely telling. Texture and local color are almost eliminated, and the general effect seems to be gotten by the juxtaposition of a great variety of grays. When he has occasion to use single outlines he is careful to break them frequently.

These, as nearly as can be formulated are Pennell's methods. At times he forsakes them to try new things ; occasionally we find him using lithographer's crayon to scumble in his shadows at other times he combines the pencil with the pen. But whatever the experiment, whatever the work, we will see the same masterly knowledge of drawing and chiaroscuro, the same patient toil over detail which yet does not obtrude itself. It may be interesting to know that Pennell seldom uses the camera, sketching directly from the building. Though we have been unable to print any of Pennell's works, through the kindness of the *American Architect* and the *Engineering Record* we are enabled to show drawings by two men, Gregg and Meeker, whose methods differ so radically from each other and from Pennell's as to be extremely interesting and instructive. The former is a jurist, if such a term may be applied to the art. He discards local color and texture, and seldom uses the outline without breaking it into dots, and never cross lines. The shade lines which are apt to be slightly wavy, by their direction give no clue to the inclination of the surface. Gregg has certain well defined effects in view, which he attains in the most direct manner at the expense of all else. His work is open and devoid of tricks, his results are soft and clear.

The second artist, Meeker, while working with more feeling for artistic effect, yet has not that singleness of purpose which characterizes Gregg in his work. The latter discards everything but mass and shadow, the former pays little attention to cast shadow, but devotes himself to the material of his walls, the stone jointing, etc. His darks are used rather to show windows, emphasize the carving and to indicate difference in color than to give the larger elements of the building their proper relief. The different materials used also make considerable difference in the result. Gregg uses an Esterbrook or Gillott pen, making a medium line, whose direction is studied. Meeker seems to use a "Crow Quill" on a perfectly smooth paper, which allows the pen to wander over it with perfect freedom. With him the

direction is of no consequence. Both men confine themselves more to one kind of pen than Pennell does. Meeker's work in the ensemble, though lacking the modelling of Gregg's, still has more snap and life, especially his grass and trees. The conflict of aims in his drawings is the result, I think, of the too frequent use of the photograph. There are other treatments with the pen, such as are used by Wilson Eyre or Kirby, but the work of the latter appeals to me more as outline drawing, as architectural suggestions or memoranda, than as finished drawings.

There is one Englishman, Herbert Railton, whose work may be studied with profit. His style is peculiar to himself. There is a sparkle about it which in the single drawing is charming, but, alas, when seen in the aggregate this very excess of glitter becomes monotonous. His frequent and unsystematic use of blacks, which he evidently put in with a toothpick or brush, and his spotty and broken lights, are in the mass unpleasing. The rapidity with which he works gives a peculiar hooked radiating character to his lines, and this stroke does yeoman service for walls old or new, surfaces smooth or rough, grass or trees. If the effect is not dark enough he does not hesitate to crossline, being careful to subordinate the second series of lines to the first, thus keeping a predominating tendency to the lines. In this I think he has the advantage over Pennell.

In these few remarks I have made no effort to go deeply into the subject of pen illustration. This has been so ably done by Pennell in his book on pen draughtsmen that it seems superfluous to attempt to do more.

WHAT IS A CONTRACT ?

A contract, says *Metal*, is a deliberate engagement between competent parties, upon a legal consideration, to do, or not to do, some act. In its widest sense it includes records and specialties, but the term is usually employed to designate only simple or parol contracts. By parol contracts it is to be understood, not only verbal and unwritten contracts, but all contracts not of record nor under seal. This is strictly the legal signification of the term contract, inasmuch as that reciprocity of consideration, and mutuality of agreement, which are necessary to constitute a parol agreement, are not requisite in obligations of record and in specialties.

Contracts are divided into three classes : first, contracts of record, such as judgments, recognizances and statutes staple ; second, specialties, which are contracts under seal, such as deeds and bonds ; third, simple contracts, or contracts by parol.

A parol contract, then, is any contract not of record, nor under seal, whether it be written or verbal. Certainly the facility of proof are all the advantages gained by reducing such an agreement to writing ; the liabilities of the respective parties are not changed. Every contract is founded upon the mutual agreement of the parties, and that agreement may be formally stated in words, or committed to writing, or it may be a legal inference, drawn from the circumstances of the case, in order to explain the situation, conduct and relations of the parties. When the agreement is formal, and stated either verbally or in writing, it is usually called an express contract. When the agreement is matter of inference and deduction, it is called an implied contract. Both species of contracts are, however, founded upon the actual agreement of the parties, and the only distinction between them is in regard to the mode of proof, and belongs to the law of evidence. In an implied contract, the law only supplies that which, although not stated, must be presumed to have been the agreement intended by the parties. The law always presumes such agreements to have been made, as justice and reason would dictate, and assists the parties to any transaction to an honest explanation of it. But a promise will not be implied, contravening the express declarations to the party charged, made at the time of the supposed agreement, unless such declarations be at variance with some legal duty, and then the law will imply a promise to perform that duty.

Wherever a party avails himself of the benefits of services done for him, although without his positive authority or request, the law supplies the formal words of contract and presumes him to have promised an adequate compensation. So also where a person engages to do any work or perform any service, he is understood to engage that he has sufficient skill and ability to fufil his contract, and also that he will use all the means necessary to accomplish it. So, also, if a man having a title to certain property silently permits another to deal with that property as his own, in all transactions between such person and others, acting in the confidence that the property belonged to him, the true owner would be bound.

Thus, if a man stand by and knowingly sees his own property sold and either encourages the sale or does not forbid it, the law implies a contract between him and the vendee, and accredits the actual seller as his agent ; and this rule obtains on the clear ground that if one of two innocent persons must suffer a loss, where one had misled the other, he who has been the cause of the loss ought to bear it. But in all cases, the circumstances must be such as to unequivocally imply a contract between the parties, and evidence may be given to rebut such a presumption. Nor is this rule restricted to cases where the true owner of property knowingly permits another to make sale of it, without interference or objection, but it extends also to cases where a party, being ignorant that he has any title, does or says anything in the premises which actually misleads the purchaser to his injury ; for however innocent he may be of a fraudulent intent, he ought to suffer the consequences of his own act, whatever loss or injury must accrue to one or the other party. Yet, if his mistake would not occasion absolute injury, or did not operate to deceive, he will not be bound thereby. So whenever there is a uniform usage in a particular trade the parties are presumed to have contracted in reference to such usage, unless it be expressly excluded by them, or unless it be inconsistent with the actual terms of their agreement. It must, however, be a general usage, or a universal custom which is brought home to the knowledge of the party, or it must be the special course or habit of dealing of one of the parties, recognized and assented to by the other, or no such presumption will arise. In such cases, the usage is understood to form a portion of the contract, and to exclude a rule of law inconsistent with it.

If, in a written contract, the words of recital or reference manifest a clear intention that the parties shall do certain acts not expressly stipulated, the courts have therefrom inferred a covenant to do such acts and have sustained actions of covenant for their non-performance, in like manner as if the instrument had contained express covenants to perform them.

HOUSE MOVING.

THE *Scientific American* says :—The ferry-house located at the Brooklan terminus of the thirty-ninth street ferry, between the Battery in New York and South Brooklyn, is a brick structure 52 by 110 feet. This building was located at the foot of Thirty-ninth street. The Brooklyn City Railroad Company required increased facilities in that part of the city, and in consequence of this the ferry-house was removed from its original site 150 feet westward and 25 feet northward, and when the job is completed the building will stand 17 inches lower than it stood on the old site. This work was done in about one month, without injury to the walls, and at much less expense than would have been involved in tearing down and rebuilding.

The building was placed on a rigid framework and its walls were shored and braced by tie rods and cross timbers, and it was moved on ways consisting of a framework of heavy timbers provided with diagonal guides which caused the building to move sidewise as well as endwise, the frame upon which the building rested being provided with shoes sliding diagonal guides. The abutments against which the moving screws rested were heavy timbers secured to the ways by means of chains. After the screws which abut upon the timbers had been run out their full length, they were returned to their original positions and the timbers moved forward and again made fast, when the operation was repeated.

This job was done by B. C. Miller & Sons, of Brooklyn, N. Y., who moved the Brighton Beach Hotel bodily in 1889, after the damaging encroachment of the sea on the beach. The building was 465 feet long and 150 feet deep, three storeys high and weighed 5,000 tons. It was moved 239 feet back of its original position upon 112 platform cars by means of six locomotives.

The appointment of a building inspector is being advocated by one of the Kingston aldermen, who states that at present buildings are sometimes erected of fragile material and weak construction.

STRENGTH OF CONCRETE.

A PAPER recently read before the Society of Architects, London, by Mr. H. W. Chubb referred to the use of concrete as a material in building fireproof structures. The specimens of concrete which Mr. Chubb mentioned as having been tested by Mr. J. J. Webster, M. I. C. E., had been specially prepared. The following table shows their composition, together with the results which were obtained:

Nature and Proportions of Materials in Concrete Briquettes.	Average weight per cubic foot.	Breaking weight per square inch at 60 deg. Fair.	Breaking weight per-square inch after being heated and quenched.	Average loss per cent. of original strength after heating and quenching
	lbs.	lbs.	lbs.	per cent.
Neat Portland cement	124.6	554.6	117.2	66.8
1 part cement, 1 part sand	126.9	448.0	93.0	80.0
1 part cement, 3 parts sand	111.2	100.8	18.7	81.4
1 part cement, 5 parts sand	109.7	74.6	15.0	79.8
1 part cement, 4 parts iron furnace slag	163.08	108.1	23.06	69.3
1 part cement, 1 part pumice stone	64.8	94.58	38.3	59.5
1 part cement, 4 parts broken fire-brick	95.04	84.4	30.5	50.9
1 part cement, 4 parts coke breeze	71.65	69.9	39.06	57.1
1 part plaster of Paris, 4 parts broken fire-brick	89.6	66.8	10.3	75.6
1 part plaster of Paris, 4 parts pumice stone	55.6	57.4	3.4	94.7
1 part plaster of Paris, 2 parts furnace slag	148.0	223.3	6.9	96.8
1 part plaster of Paris, 2 parts broken fire-brick	106.9	165.5	15.7	90.0

DOORWAYS.

A VERY important feature of the house in more than one respect is the doorway. It is in fact a most prominent part of the structure, says *Trefoil*, and only too many are the possibilities between making it a work of art like the masterpieces of Ghiberti on the Baptistery in Florence, or leaving it a mere aperture in a monotonous expanse of wall, which reminds us forcibly of the hole in the fence or the crude entrance of a tent, from which the door doubtless took its origin.

In many instances the entire effect of an otherwise pleasing structure is hopelessly marred by the treatment accorded the doorway, and more than one facade is reduced to the commonplace by the utter neglect or the architectural decoration to which the door, if any part of the building, is most legitimately entitled. To the eye, the doorway and the roof line are the critical points in a building, and the good treatment of either will do much toward remedying the defects of a poor design.

It will hardly do, however, to blame the architects for the stagnation of public taste for half a century in regard to architecturally meritorious doorways. In this country, particularly among a class of owners that, above all others, might have done so much to bring about the much needed revolution of an architectural sense, art has been subjected to rules and restrictions that might aptly apply to card etiquette, but the effect of which upon architecture can only be deplored. When a doorway essentially ugly has come to be considered the only proper thing by a vast number of people in the community, the era of the studied commonplace can be said to have reached the climax.

This was pre-eminently the case some twenty years ago. Our revolutionary forefathers in this respect had better taste; they followed the classical ideals they had with a zeal that gave us, if not a new style, at least a strong impulse toward something good. The decadence was, however, rapid. In 1850 doorways were mere holes in the wall, and thereafter followed a period of barren ugliness and dull respectability, an era of unredeemed bad taste, from which the newer departures in architecture, and its more general appreciation, are beginning to save us.

DECORATIONS AND FURNITURE

FLOWER DECORATION.

DECORATION by means of natural flowers has from time immemorial been recognized as the most beautiful and effective method it is possible to conceive, the one and only disadvantage it possesses being its necessarily temporary character. It is this feeling that lead to the introduction of floral design cut in solid materials, of which we have such exquisite examples in the architecture of the thirteenth century. But all attempts at live flower decoration heretofore carried out appears to be eclipsed and thrown into the shade by the display in the Assembly Hall of the World's Fair upon the occasion of its formal opening by the President of the United States. A model of the Washington capitol made of *white flowers* was the central feature, the grounds in which the building stands being represented by real plants in miniature. The stage of the hall was banked up with palms and cut flowers while the head stairway was covered with a drapery of white and gold, festooned with smilax and tiny lamps. Pillars were traceried with smilax and flowers, while overhead canopies of white and gold hung with flags completed the gorgeous and tasteful scene. It is said that $10,000 was expended in this decoration of an hour.

Says "Goth" in the *Building News*: An art-critic complains of our modern stained glass. Greatly as we have progressed, there is yet a vast gulf between the effect of some old glass and that produced to-day. It may be that, like wine, stained glass improves with age: on many tints there can be no doubt that time has a mellowing effect. The quality that always seems to me to be wanting nowadays is the sparkle and scintillation of old glass such as we find in some of the Continental cathedrals. I suppose that the real secret of the matter is that we cannot get away from the idea that a stained-glass window is, and should be, a picture; whereas, considered as a decorative feature, it should be subordinate to the architecture and contribute to the general effect. Then there are two schools—on the one hand the advocates for dark effects and heavy coloring in broad masses, and on the other the more delicate style in which light and light tints play an important part, and the color is concentrated into little points with jewel-like effect. Considering the technical difficulties of the art, there is no need to despair, for, relatively, it has advanced as much as other handicrafts.

USEFUL HINTS.

A correspondent of the London *Ironmonger* furnishes a recipe which is easily tried and probably efficacious. He writes as follows: People often want to know how the steaming of windows can be obviated. I am told it is done in these parts with a solution of glycerine. Fifty-five grammes (about 2 oz.) of glycerine dissolved in one litre of diluted alcohol (about two-thirds alcohol and one-third water). After this solution has become quite clear moisten linen or leather with it and rub the window on the inside. It keeps the glass clear from freezing and steaming.

RESISTANCE OF MASONRY ARCHES.—The Austrian Society of Engineers and Architects is now engaged in a series of very important experiments on the resistance of masonry arches. Sufficient is now known of the strength and elasticity of stone and cements, says *Engineering*, London, to render the theory of the elastic arch applicable to masonry arches which have been and still are designed purely by empiricism, so that in many cases very little is known as to the actual stresses carried by the structures, and there is no doubt that the factor of safety is in many cases excessive. The experiments to be carried out will afford data as to the permissible working stresses, and the design and arches will therefore be simplified. One group of experiments will be devoted to researches of the elastic and resistant properties of the materials to be used in constructing the arches to be experimented on

DURABILITY OF TERRA COTTA.—During the discussion following the reading of certain papers on terra cotta before the Royal Institute of British Architects Sir Henry Doulton said: "As to its durability, I may perhaps mention two examples which occur to me as within my own observation. The figure of Britannia on the top of the Exchange at Liverpool was made a hundred years ago at Lambeth, and also the figure of St. John Crosby, which was made, when I was a little boy, at Lambeth. These, especially the figure of Brittania, though exposed to adverse influences, are as perfect to-day as on that of their erection. There happened to be two large statues on the triangular piece of ground opposite St. Thomas Hospital, brought here recently, also made at Lambeth, which are ninety-six years old, and which have been quite untouched by time. There is, of course, terra cotta and terra cotta; but there is no reason why terra cotta should not be absolutely imperishable.

MANUFACTURES AND MATERIALS

QUALITY OF ROOFING SLATES.

THE following are the general conclusions reached as the result of a series of tests of roofing slates, as given by Mr. Mansfield Merriam at the September, 1892, meeting of the American Society of Civil Engineers:

1. Slates containing soft ribbons are, by common consent, of an inferior quality, and should not be used in good work.
2. The soft roofing slates weigh about 173 pounds per cubic foot, and the best qualities have a modulus of rupture of from 7,000 to 10,000 pounds per square inch.
3. The stronger the slate, the greater is its toughness and softness, and the less is its porosity and corrodibility.
4. Softness, or liability to abrasion, does not indicate inferior roofing slate, but on the contrary it is an indication of strength and good weathering qualities.
5. The strongest slate stands highest in weathering qualities, so that a flexural test affords an excellent index of all its properties, particularly if the ultimate deflection and the manner of rupture be noted.
6. The strongest and best slate has the highest percentage of silicates of iron and aluminum, but is not necessarily the lowest in carbonates of lime and magnesia.
7. Chemical anaylses give only imperfect conclusions regarding the weathering qualities of slate, and they do not satisfactorily explain the physical properties.
8. Architects and engineers who write specifications for roofing slate will probably obtain a more satisfactory quality if they insert requirements for a flexural test to be made on several specimens picked at random out of each lot.
9. Although the field of this investigation is probably not sufficiently extended to fully warrant the recommendation, it is suggested that such specifications should require roofing slates to have a modulus of rupture, as determined by the flexural test, greater than 7,000 pounds per square inch.

THE KENT FREESTONE QUARRY.

The Moncton, N. B., *Times* states that the formation of a joint stock company is in contemplation to develop the Kent freestone quarry situated on the Moncton and Buctouche railroad. This quarry, opened a few years ago, consists of 30 acres, on the bank of the Coeagne river. The depth of stone to the level of water in the river where the quarry is now being worked is 60 feet, and further up the stream the quarry shows a solid body of stone 125 feet deep. Lack of capital has up to the present hindered the proper development of this quarry, as well as some others in the same province.

The capital stock of the Gurney Foundry Co., Toronto, has been increased from $40,000 to $350,000.

The business of the Toronto Furance Co. will in future be carried on by the Toronto Furnace and Cremating Co., which has lately been incorporated with a capital stock of $40,000.

The Steel Clad Bath and Metal Co., of Toronto, who a year or so ago established a factory for the manufacture of the specialties at Detroit, Mich., have lately shipped to England the necessary plant for a factory which it has been decided to establish there. This is certainly an evidence of commendable enterprise.

CREDIT VALLEY BROWN STONE
From Carroll & Vick's No. 6 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure	Height.	Crushing Load.	Crushing Stress per sq. in.	Average Crushing Stress per Square Inch
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	2 7/8 × 3	2 7/8	131,000	15,188	
C	2 1/16 × 3	2 7/8	130,000	14,751	
D	3 × 3	2 7/8	133,000	14,777	14,905

14,905 pounds is the average crushing strength per square inch of our Credit Valley Brown Stone.
The highest standard of test attained by any pure Sandstone in America.

IN confirmation of the facts above stated, we have pleasure in directing your attention to the accompanying table, showing the result of the test of our stone, in connection with the series of tests of building stones conducted in 1892 at the School of Practical Science, Toronto, under the direction of a committee of the Ontario Association of Architects.

By referring to the results of the tests above mentioned, it will be seen that the average crushing stress of the majority of Canadian and American sandstones is far below that of ours, the difference in our favor ranging from 75 to 50 per cent.

The Credit Valley Brown Stone, owing to its modest tone, harmonizes beautifully with red or cream colored brick.

It has been reported that there is difficulty in obtaining Credit Valley Brown Stone. To correct this mistaken notion, we wish to state to architects and the public that we have 40,000 cubic feet of stone ready to ship on the shortest notice, which can be followed up with an unlimited supply. Last year we made extensive additions to our plant and opened up new quarries and mines, and will supply promptly all orders given to us or our agents.

CARROLL, VICK & CO.
Quarries: Credit Forks, Ont. Office: 84 Adelaide St. West, TORONTO.
Montreal Agents: T. A. MORRISON & CO., 118 St. Peter Street.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The SEMI-ANNUAL EXAMINATION for admission to study and for registration will be held in the rooms of the Association, No. 186 St. James Street, on

TUESDAY AND WEDNESDAY,

the twenty-seventh and twenty-eighth days of July, at 10 a.m. each day.

Intending candidates are required to give one month's notice to the undersigned. The fees are:
For admission to study..... $10.00
For registration..... 25.00

ALEX. C. HUTCHISON,
Sec. P. Q. A. A.

HEATING . . .
AND
VENTILATION

The **FULLER & WARREN SYSTEM** of Warming, Ventilating and Sanitary Construction for Schools and Public Buildings is the best and most economical in use.

Robb Engineering Co.
(LIMITED)
AMHERST, - NOVA SCOTIA,
Agents for Canada.

ARTISTIC · WALL · HANGINGS

Sole Wholesale Agents in CANADA for
Lincrusta Walton

Over **75** Stock Patterns
in this the best of **Relief Decorations**, comprising **Dadoes, Hangings, Friezes, Ceilings, Mouldings and Art Panels.**
. . . CATALOGUE AND PRICE LIST ON APPLICATION . . .

Wall Papers, Room Mouldings and Window Shades

M. Staunton & Co.
. . . TORONTO . . .

USEFUL HINTS.

BOARD MEASUREMENTS.—Boards are sold by superficial measurement, at so much per foot of an inch or less in thickness; adding one-fourth to the price for each quarter of an inch thickness over an inch. It sometimes happens that a board is tapering, being wider at one end than the other. When this is the case (if it be a true taper), add the width of both ends together, and half their sum will express the average width of the board. Again, if the board does not taper regularly, take the following course to find its area:

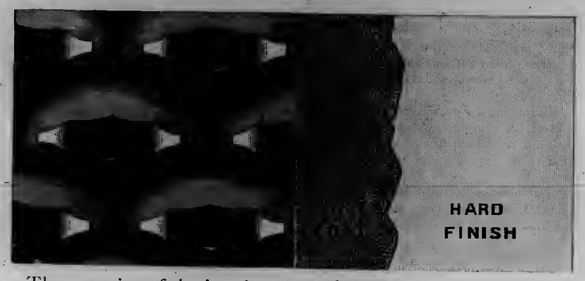
1. Measure the widths at several places equidistant.

2. Add together the different breadths, and half the two extremes.

3. Multiply this sum by the straight side of the board and divide the product by the number of parts into which the board was divided. It is usual in measuring rough lumber, to pay no attention to fractions of an inch in the width of the stuff. If the fraction is more than half an inch it is counted as an inch; if less than half an inch it is not counted. Thus, a board 10⅝ inches wide would be measured as 11 inches wide; if only 10⅜ inches wide the board will pass only as 10 inches.—*National Builder.*

PAINTS AND SHINGLES.—The *Timberman* very wisely remarks that it has always seemed singular that in the use of paint to preserve wood exposed to the weather, the fact that a shingle roof was omitted from the catalogue was invariably the rule. This idea of oversight was one of the things in which custom becomes habit, and because every one else did so, all the rest followed suit. It is safe to presume that the custom of leaving the shingle roof unpainted originated in its angular form being less exposed to the after effects of rain and snow. A little thought will show the folly of such a conclusion when remembering the frail nature of a shingle and the slight fastening it has. If paint would be useful to any weather exposed surface it would certainly be so on the roof. The fact goes without telling, and in the present style of suburban residences, the roof receives its share of paint along with the rest of the building, thus at once combining the useful with the beautiful. It is certainly singular that painting of roofs has not always prevailed, and it adds much to the finish and character of the building to see the roof painted. When the thin, slender nature of the shingle is taken into consideration, it will be plain to every one that sun cracks will easily go through the shingle, and to that extent render it worthless. The only way to overcome this is to paint and always keep the shingles painted.

Hayes' Patent Steel Lath



The tenacity of the bond and other features are unequalled.

Now being used in the "Grand Seminaire," Montreal.

... WE ALSO MANUFACTURE ...

Copper, Galvanized Iron and Painted Steel Shingles and Tiles,

Sheet Steel Pressed Brick and other Siding Plates,

Galvanized and Painted Pressed Corrugated Iron.

CORRESPONDENCE SOLICITED.

METALLIC ROOFING CO., LIMITED.

Factories: MONTREAL AND TORONTO.

... ADDRESS ...

30 St. Francois-Xavier St., Montreal, *or* 84 Yonge Street, Toronto.

DON VALLEY PRESSED BRICKS

STILL LEAD THE MARKET.

Aggregate sales for 1892 nearly as large as the combined output of all other .... Canadian manufacturers. ....

SPECIALTIES FOR 1893:

STANDARD RED AND BUFFS, and many new colors, including BROWNS, MOTTLES, GREYS, etc., etc.

The elegant finish on our goods adapts them for inside decorations and mantels.

Terra Cotta and Enamelled Bricks
IN ALL SHADES.

TAYLOR BROTHERS, -

Office and Show-rooms:
60 Adelaide Street East, TORONTO.

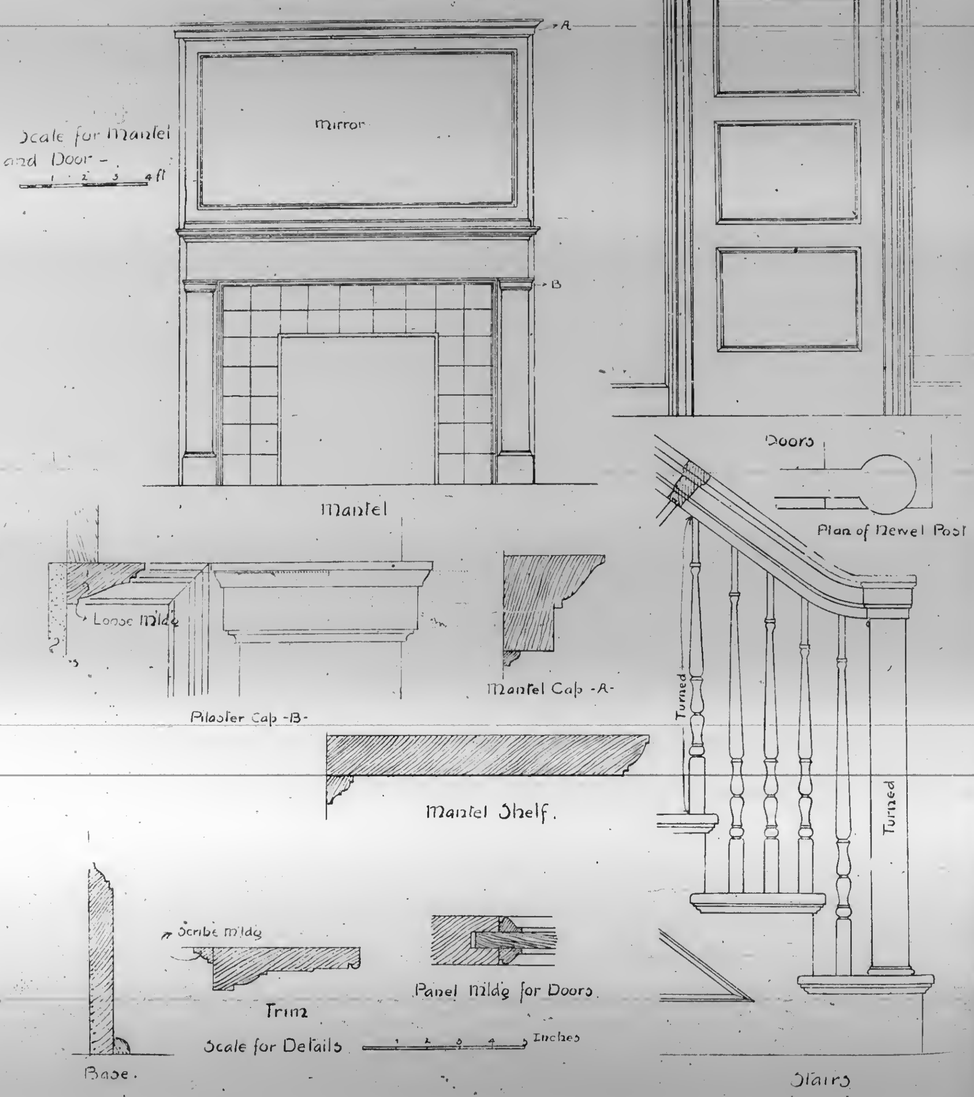
A GREAT LOSS!

IF you have any pipes or boilers uncovered, you are losing on same at the rate of 80 cents every year on each square foot of surface exposed. By having them covered with our ***Mineral Wool Sectional Covering*** you will save 85% of this loss. The saving thus effected in fuel will in one year more than pay the cost of covering, which we guarantee to last as long as the pipes. Our covering is the best fuel saver on the market.

MONTREAL AGENT:
GEO. A. COWAN,
Room 23, 204 St. James Street.

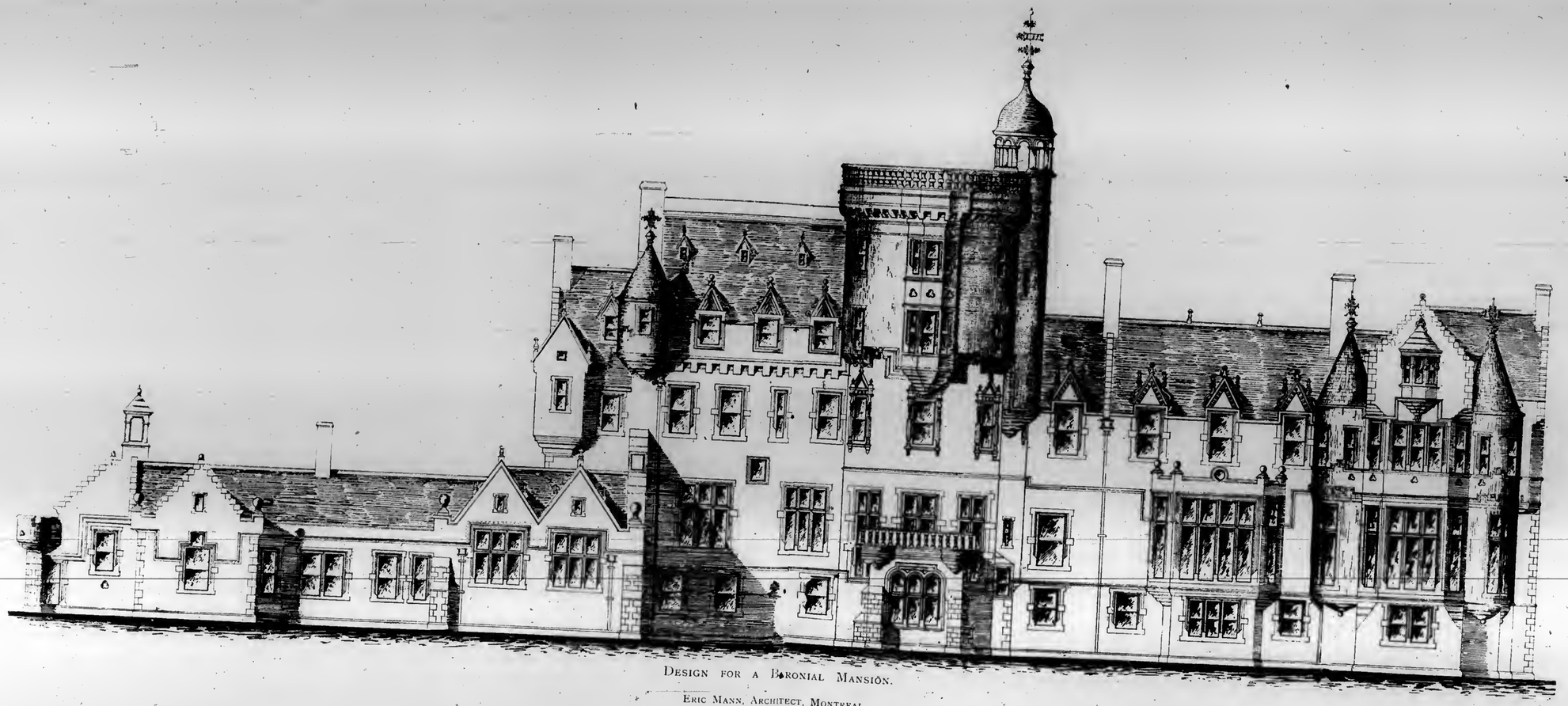
CANADIAN MINERAL WOOL CO., Ltd.,
122 Bay Street, TORONTO.

DETAILS FOR A SMALL HOUSE.



Second Premiated Design for New Legislative Buildings at Victoria, B. C.

T. C. Sorby, Architect, Victoria.



Design for a Baronial Mansion.

Eric Mann, Architect, Montreal.

CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—No. VII. JULY, 1893 PRICE 20 CENTS $2.00 PER YEAR.

THE
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods,
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
64 TEMPLE BUILDING, - MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	D. B. DICK, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	JOHN E. BELCHER, Peterboro'.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

DAVID EWART	Ottawa.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
FRANK DARLING,	Toronto.
W. A. EDWARDS	Hamilton.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	V. ROY, Montreal.
1ST VICE-PRESIDENT	J. NELSON, Montreal.
2ND VICE-PRESIDENT	H. STAVELEY, Quebec.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
J. J. BROWNE	Montreal.
J. HAYNES	Montreal.
D. OUELLET	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
GEO. MOIR, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. J. HILL.
JOHN ALDRIDGE.
JAS. CRANG.
J. LISTER NICHOLLS.
WM. BOOTH.
JAS. ISAAC.
JOHN LOGAN.
WM. PARK.
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

THERE has just been published by the direction of the General Assembly of the Presbyterian Church in Canada, a pamphlet of nearly forty pages containing illustrations accompanied by brief descriptions of designs suitable for country, village and town churches. Most of the designs are reproductions of drawings submitted in the recent Presbyterian church competition. Although they cannot all be declared to be satisfactory examples of church design, the excellence of some is such as to encourage the hope that they will in a measure serve the object the church had in view in their publication, viz., improvement in the design of rural churches. The authorities of the Presbyterian church deserve commendation for the attempt they have made to improve our church architecture. It is to be hoped the result of their first modest effort will prove so satisfactory that at some future time they will feel encouraged to carry their purpose a step farther.

THE ingenuity of the impecunious and dishonest contractor is truly wonderful, and when aided by that of an unscrupulous lawyer, is well nigh certain to succeed in defrauding persons unaccustomed to doing business in other than a straightforward manner. A contractor and lawyer of this description have been practising of late in Toronto, and have succeeded in defrauding a number of supply firms and sub-contractors. The lawyer writes a letter stating that the contractor is about to secure through him a loan, and that he will control its distribution. The impression is conveyed that the lawyer will assume responsibility for the payment out of the loan of claims for material and labor required by the contractor in the carrying out of his contract. The letter is, however, so skilfully worded that while it has in several instances obtained for the contractor the material and help he required, the supply firms and sub-contractors who subsequently brought suit against the lawyer were unable to recover their claims. It is hoped that this *expose* may assist in putting a check on such crooked practices.

THE difficulty of securing the title to the land required for the proposed union railroad depot at Toronto, which has been the means of delaying for nearly a year construction on the building, at last appears to have been overcome, and the work is to be proceeded with at once. In the present inactive condition of building enterprise it is satisfactory to learn that this important undertaking, which will absorb both labor and material to a considerable extent, is to go forward during the present season. In this connection we must express our regret that apparently no advantage is to be taken of the favorable circumstances at present existing for permanently improving the appearance of the water front. The shabby old wooden structures which occupied a portion of the site required for the new depot, instead of being torn down and forever banished from sight, have been permitted to be removed out to the line of the new street which it is proposed to construct as a promenade at the water side. The city authorities should determine to get rid of these and as many as possible of the other old buildings which for years have disfigured the city front and falsely impressed strangers visiting it for the first time by boat or train. Has the idea of a small park on the water front been abandoned? We trust not. The opportunity now exists for establishing such a park or garden, which would do much to make the city front attractive and afford a pleasant resting place for persons having to wait for boats or trains, as well as those who would wish occasionally to enjoy a half hour beside the water without being obliged to spend effort, time and money to go across to island park.

WITH many others we indulged the hope that the disgraceful revelations brought to light a couple of years ago of bribery and fraud on the part of government officials and contractors for public works, would suffice to purify the methods of these classes of persons in the future. Unfortunately in this hope we have been disappointed by the evidence which has lately been given before the Commission appointed by the Government to investigate the expenditures and circumstances connected with the erection of the new railway bridge across the Lachine canal at Montreal. The investigation was ordered when the fact became known that the estimated cost of the work,

which was $250,000, had been exceeded by $200,000. The investigation has shown that the work was not let by contract, but was done by day labor under the supervision of government officials. It would be instructive to learn why the usual custom of letting such work by contract was departed from in this instance, and under whose authority the departure was made. It is also pertinent to enquire why, having decided to do the work by day labor, the government superintendent did not hire direct the mechanics, laborers and teams required, instead of making a contract with a third party to supply them at prices which enabled him to pocket a substantial commission on the transaction. The thing has the appearance of having been worked in this way for the deliberate purpose of enriching certain individuals at the expense of the government and the country. The evidence given before the investigating Commission strongly supports this view. The testimony is that double the number of men, horses, and in some cases material, were provided and paid for than were required, that the prices paid for both work and material were largely in excess of the market value, and that material was paid for by the government which was diverted to the use of private individuals connected with the work. In short, as we have said, there appears to have been an organized and successful effort on the part of everybody to rob the government, as was illustrated by the remark of a laborer who, when some one suggested that less men were required to do the work, replied "Mind your own business—we're working for the government." It is to be hoped that a severe example will be made of persons who may be proved guilty of having conspired to squander the public funds for their own benefit and that of their friends. The boodling propensity which seems to have obtained such deep root must, if possible, be stamped out.

LEAD water pipes that are used on streets occupied by electric railways who use the rail for a ground and return, are found in various places to be seriously affected by the eating away of the outside of the pipe by electrolytic action. In the city of Hamilton the water department have been compelled to renew the service pipes in quite a few places, the worst affected seeming to be in close proximity to the power house. It would perhaps be quite a difficult matter to advance a proper theory for this result. It is perhaps caused by the pipe being laid in a particularly dry sandy soil, and by the return current in its effort to reach a good ground finding such ground by way of these lead pipes to the water mains in preference to forcing its way to a wet spot in the ground through dry sand or perhaps rock. That it should occur in the immediate vicinity of the power house is more difficult to account for, unless it be that the rail connections on the ground plate at that end offer a greater resistance to the passing of the current than does the intervening earth between the rails and these numerous water service pipes. In the case of Hamilton the water mains are several feet higher than the level of the bay and the streets all dip at a great angle to the bay, forming thereby a water shed that must result in a somewhat dry sub-soil. That the pipes are eaten away as the result of the current going to ground through them there can be no doubt, and that this action is purely an oxidization of the metal through the electrolytic action is reasonably certain. To remedy the trouble we think will be quite a difficult matter, but as experiments in that direction will no doubt be the order of the day, we would suggest the following as worthy of consideration and trial: Wrap the pipe with a covering of tarred (pine tar) hemp about half an inch thick before burying it; give the outside of the pipe a thick coat (or two or three coats) of a good, hard, but elastic japan, which has been well dried in an oven; let the outside of the pipe be enamelled with an elastic enamel the same as is now being used on the inside of some lead water pipes; surround the pipe by a square box some three or four inches in internal diameter, thereby allowing an air space as an insulator; last but not least, see that the rails are well grounded, bearing in mind the fact that a hole dug some six or seven feet in the ground and a large piece of an oil boiler stuck in with a number 4 galvanized iron connection to the rail is simply no ground at all in a sandy soil, and would not be much better in a pool of water. For the carrying of heavy currents such as are used in street railway work, a good ground should consist of at least 100 square feet of exposed metallic surface, preferably copper, covered on its two sides with at least one foot in thickness of fine gas coke and buried in decidedly moist earth, and connected to each rail by a No. 0000 copper wire well rivetted and sweated on. With such a ground every quarter of a mile, and good and sufficient bonds between the rails we predict that the eating away of lead water pipes would soon be a thing of the past.

CANADIAN PRESSED BRICK IN THE UNITED STATES.

A CANADIAN manufacturer of pressed brick informs us that he has an order from Boffalo for 200,000 bricks, and that other Canadian firms in the same line are shipping quite extensively to eastern American cities. When asked what gives rise to the preference for Canadian brick, he replied that it is mainly their superiority and uniformity of color. "We are able," he said, "to manufacture two hundred thousand bricks in which exactly the same shade of color will be maintained. The American manufacturers, owing I presume to the nature of the material at their disposal, do not appear to be able to succeed thus in securing uniformity of tone. Hence we find Americans who, in order to secure superior results, are willing to pay the duty on Canadian bricks."

ILLUSTRATIONS.

COMPETITIVE DESIGN FOR PROPOSED NEW GOVERNMENT BUILDINGS AT VICTORIA, B. C.—MESSRS. DICK & WICKSON, ARCHITECTS, TORONTO.

BANK OF HAMILTON, WINGHAM, ONT.—MR. D. B. DICK, ARCHITECT, TORONTO.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Sir William Dawson, who for nearly forty years has discharged with distinguished ability the duties of President of McGill University, has retired. The weight of advancing years demanded that he should lay down the activities associated with the position. Sir William Dawson has commanded world-wide recognition as a scientist and educator, and has had conferred upon him many marks of distinction by learned societies, including the presidency of both the British and American Associations for the Advancement of Science. His successor to the Presidency of McGill has not yet been chosen.

There is a desire expressed by some of the aldermen that the city should discard the contract system and carry out municipal works by day labor under the supervision of the city surveyor and his assistants. By this means they hope to save the contractor's profits. In theory the thing seems easy of accomplishment, but it has worked out differently in practice in more than one city where it has been tried. It opens the door to jobbery, and for some reason or other the work costs more than when done by contract. Workmen in the employ of the city apparently do not feel called upon to put forth their best efforts.

It is reported that a large hotel is to be erected at the corner of Peel and St. Catherine streets, on the site of Erskine church, and that Mr. Townsend, architect, of New York, has been employed to prepare the plans. Dr. Dugald Graham's name is mentioned as being one of the leading projectors of the enterprise.

The formal opening of the new Board of Trade building has been postponed until September. The occasion promises to be one of much interest.

The Dominion Bridge Company has re-elected the following officers: Mr. James Ross, president; Mr. James P. Dawes, vice-president; Messrs. R. B. Angus, Duncan McIntyre, T. G. Holt, James Cooper and P. Donaldson, directors.

On the 13th of June there was sold at the Fraser Hall, a most interesting and valuable collection of antiquities and objects of art, the property of Mr. E. Collonna, architect, of this city.

About twenty-five models have been submitted in the competition for a memorial statue to the late Sir John A. Macdonald. These models have been open to inspection by the subscribers to the fund, prior to a choice being made by the Committee.

Owing to delay in completing the new additions, the formal opening of the art gallery will not take place until the autumn.

WINNIPEG.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Mr. Geo. Browne, architect, of this city, has designed a new building to be erected for the congregation of Westminster church at the corner of Notre Dame and Charlotte streets. The structure will cost about $25,000, and will be constructed of white brick with Selkirk stone trimmings. The seating capacity will be upwards of 900. The auditorium is 65 feet square, with inclined floor and seats arranged in semi-circular form. There will be towers at three corners of the building and an octagonal bay on Notre Dame street.

Tenders have been invited for the erection of a new church for the congregation of St. Paul's, at Regina, to cost $20,000.

Mr. Hugh McGowan, architect, this city, has designed and commenced the erection of a new school building at Gretna, Man.

The corner stone of a new Methodist church at Boissevain, was laid with appropriate ceremony June 19th.

Tenders have been received by the Minister of Public Works for the heating of the new Court House building.

The Salvation Army is preparing to erect a building to serve as headquarters in this city.

A large number of small residences, ranging in cost from $500 to $2,000 are being erected here this season.

The Mason Contractors' Association and the Carpenters and Builders' Association, of this city, have recently amalgamated under the name of the Builders' Association of the city of Winnipeg. The move is without doubt a good one.

It is estimated that the total expenditure on buildings in this city during the present year will exceed that of 1892 by three quarters of a million dollars.

LONDON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

In London this season there is an immense amount of building to be done, but so few good builders that they are busily employed, and tenders for new work are fully 30 per cent. higher than ordinarily. The result is already apparent, there are numerous prospective new residences which have already been dropped on account of the great cost, and others are sure to follow, especially if the fact of the change becomes generally known. I think it advisable to make these facts known in the hope that possibly some good brickworkers and carpenters in Toronto may be encouraged to figure on work here. If, as I am given to understand, building is not brisk in Toronto, there must be many contractors to whom the information would be beneficial. If building continues to be abandoned here for the reasons given above, contractors here will lose, and can afford to welcome outsiders. Recently two or three prominent firms here have given up business, so that there seems to be an unusually good opening for some one competent to manage a builder's business. The cause of giving up was death in both cases.

THE LATE JOHN. A. WILLS.

IT becomes our painful duty to chronicle the unexpected death on the 16th of June, of Mr. John A. Wills, Chief Engineer at the Toronto Custom House, and Chairman of the Board of Management of the Toronto Technical School. Mr. Wills, who was in his 48th year, was possessed of a naturally strong physical organization, and until the last two years enjoyed the best of health. Of late he was a sufferer from Bright's disease, and early last spring passed through a severe illness which several times threatened to have a fatal ending. Greatly to the comfort of his family and many friends, what seemed to be a marked improvement in his condition manifested itself a few weeks ago; he gained strength rapidly and was able to go down town. But a few hours previous to his death he drove around town with a friend who was on a visit to Toronto. After returning from the drive he lay down to sleep—which proved to be the sleep of death—for he passed quietly away a few hours later without having regained consciousness.

The deceased was a native of Ottawa, in which locality his parents were among the first settlers. After graduating from college, he entered as an apprentice the machine shops of Messrs. E. & C. E. Gilbert, at Montreal, who at that time were the principal manufacturers in Canada of marine engines. On completing his apprenticeship he went to the New England States, where he spent several years.

On his return to Canada he received the appointment of Chief Engineer of the Dominion Parliament Buildings, which position he held for three or four years, when at his own request he was transferred to Toronto and assumed the duties of the position which he occupied at the time of his death and for seventeen years previously. He took an active interest in the subject of technical education, and upon the organization of the Toronto Technical School was elected to the Board of Management and at the commencement of the present year was called to preside.

His cheerful, sympathetic disposition made for him a multitude of friends, to whom his sudden death is the subject of profound regret.

THE LATE JOHN A. WILLS,
Chairman of the Toronto Technical School Board.

TORONTO BUILDERS' EXCHANGE.

THE second annual excursion and pic-nic under the auspices of the Exchange, took place at Wilson Park, N. Y., on Wednesday, the 28th of June. The new and comfortable steamer, "Garden City," carried the pleasure seekers across the lake in less than three hours, and the water being smooth the time spent on the water was greatly enjoyed by all.

About two hundred members and friends of the Exchange participated in the outing. Business engagements prevented the attendance of some, while the threatening aspect of the weather in the early part of the day and the nearness of Dominion Day militated against a larger attendance. On the whole, however, the Exchange are to be congratulated on the success and enjoyment which marked the occasion, and which it is hoped will encourage them to maintain the annual excursion and pic-nic during many future years.

The steamer made two trips, leaving Toronto at 8 a.m. and 2 p.m. Fortunately the sky which in the morning was overcast with heavy clounds, gradually cleared as the sun's bright rays forced their way through and smiled graciously down upon the pleasure-seekers.

The voyage was much shortened and its enjoyment enhanced by the humorous character impersonations of Prof. Stuart and the charming music discoursed by Burton's orchestra. These also entertained the company in the pavilion after the arrival at the park, as well as on the return trip.

One of the principal events of the day was the baseball match, the rival teams representing respectively the builders and supply men. The builders' nine, which was captained by Mr. T. Cannon, was composed as follows: Messrs. T. Cannon, Benjamin Brick, Harry Martin, John Hanrahan, Eli Wickett, Jas. Crang, jr., E. B. Aaeworthy, Jethro Crang, Wm. Rowe.

The supply men were captained by Mr. John Maloney, their nine being composed of Messrs. Maloney, W. Whillans, B. McKenny, R. Elliot, W. Dickey, B. Anderson, L. Robertson, —. Mowat, W. Hollyman.

It was agreed that the playing should last for two hours. At the end of that period the supply men had scored 24 runs, while the builders had gained but 12. The game was a most interesting one and the playing on both sides very creditable, notwithstanding that the score from a professional standpoint might be regarded as a trifle large.

An interesting program of sports was also provided for the children, with suitable prizes for the winners. These special features and the excellent boating facilities served to pleasantly pass the time at the company's disposal. The only regret which we heard expressed was that, in view of the fishing possibilities, Mr. David Williams should have neglected to take with him a hook and line. It was a case of "what things one sees when he hasn't a gun."

The thanks of all who participated in this pleasant outing are due to the following gentlemen who composed the Committee of Management: Messrs. Thos. Cannon, chairman; David Williams, treasurer; John Phillips, secretary; John Maloney, Benjamin Brick, Harry Martin, M. Murphy, W. Williams, Joseph Brown, John Barnard and John Aldridge.

CANADIAN ASSOCIATION OF BUILDERS.

At a recent meeting of the Exchange, the subject of endeavoring to bring about the organization of a provincial or Dominion Association of Master Builders was discussed. While it was felt that the present, perhaps, owing to the prevailing depression, might not be the most favorable time to attempt the organization of such an Association, yet it was thought that the idea might to some extent be worked up. The Secretary was accordingly instructed to communicate with the Secretaries of the Builders' Exchanges in Hamilton, London, St. Thomas and Ottawa for the purpose of getting an expression of opinion on the subject. The advantages of such an organization have more than once been referred to in these columns, and we hope in the near future to see the proposal assume tangible form.

LEGAL DECISIONS.

AN ARCHITECT AND DEFECTIVE DRAINS.—We learn from the *British Architect* that in the Queen's Bench Division the other day, before Justices Mathew and Wright, the case of Levenberg *v.* Wykes came on for hearing. It was an appeal by the defendant, an architect, from the judgment of the County Court Judge at Birmingham after the finding of a jury. The defendant was architect of some houses built in Portland Road, Edgbaston, in 1878, and plaintiff's case was in that year, when there was a nuisance on the premises and the drains were opened, it was found that they had not been constructed in accordance with the plans deposited with the local authority. An action was therefore brought against the defendant for fraudulently representing that they had been so constructed, and the jury found a verdict for the plaintiff. Mr. Hugo Young, for defendant, now contended that there was no evidence on which the jury could so find, that defendant had no representation as to the drains, and that he had altered them in the exercise of his discretion under the contract. Mr. Turrell, for the respondent, urged that the verdict of the jury must stand, as there was ample evidence on which they could find as they had done. Mr. Justice Mathew, in giving judgment, said the sole question for the Court was whether there was evidence in the case on which the jury could reasonably find as they had done. He was satisfied that there was that evidence, and he was also satisfied that the learned judge, in his summing up, told the jury the law with great clearness. In fact, he represented the case in such a way that the jury, if they were disposed to take a favourable view of the defendant's conduct, had an opportunity of doing so, but they considered that the plaintiff had made out his case, and so found. The appeal would be dismissed with costs. Mr. Justice Wright concurred.

QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require on lines consistent with the objects of the paper. Every effort will be made to furnish satisfactory answers to all such inquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

C. H. W., Peterboro', writes: Can you inform me where I may obtain the best slate for blackboards? I have tested several kinds of composition offered as a substitute for slate for this purpose, but they are to my mind not satisfactory. I have examined the advertisement pages of the CANADIAN ARCHITECT AND BUILDER, without finding the name of any dealer in slate for this purpose.

ANS.—We understand that at Rockland, Que., slate is to be found which is well adapted for blackboards, and that a new company has recently purchased and undertaken to develop these quarries.

Charles E. Thibault and Joseph Perrault, have been registered to carry on business in Montreal as plumbers under the firm name of Thibault & Perrault.

FUNCTIONS OF THE BUILDER.*

THERE are apparently changes impending which may modify, if they do not transform, the office of the builder. On all sides we find people who are eager to introduce new arrangements. The system by which Great Britain is covered with buildings that are sound, commodious, and economical is, in the opinion of amateurs, out of joint, and wants mending. Hence it is we find good-natured people are eager to benefit the world by substituting for our experience the undisciplined boldness of outsiders.

This spirit reveals itself not only in the dreams of imaginative gentlemen who would desire to see the architect leading a body of craftsmen, while in some way he shares in their toil. It is seen, too, in the desire to have architects whose diplomas are evidence that they have mastered all the mysteries of construction, and are able to take our places. It inspires also the proposals of public bodies to dispense with builders. It gives point to the articles which the journals print whenever an accident occurs. The support which is given to strikes depends on the belief that we are in some way in the wrong. It is a curious fact, as exemplifying this tendency of the present that the member who was charged with the introduction of the last Registration Bill in Parliament imagined it was intended to apply to builders as well as to architects.

It is not in England alone that there is a wish to disturb arrangements which exist, because they are found to be in correspondence with the needs of the public. I have been told that a few weeks ago in Paris the Chief Administrator of the Department of Public Works declared in public that it was wrong to have a division between architects, engineers, contractors, and workmen, and that all their duties could well be fulfilled by one individual. In England we often hear similar propositions about rolling four single gentlemen into one, but in France the State out of the taxes creates both architects and engineers. Such amalgamation as was suggested on that occasion is equivalent to saying that the Government have been acting wrongly, and that public funds are misapplied. Yet such is the courage of the advocates of change, they will incur any sort of risk if it helps to advance their hobby.

I am not concerned with a defence of the French system of executing works. But I would ask, what evidence is there that English builders are not performing their work most satisfactorily? In spite of the extraordinary variations of our climate, how many buildings are cast down? Even among the defects of jerry-building want of stability is not included. Indeed, some artists lament the enduring powers of that class of structure. I am not disposed to maintain that builders are not fallible like the rest of humanity, but I do say that there is no business in the country which, taken as a whole, is conducted more honestly than our own. Nor should it be forgot en that in many cases the temptations to the contrary are very strong.

The proposals to erect dwellings and buildings in London by the County Council without the intervention of a contractor may be taken as an illustration of the lengths to which reformers or rather theorists are prepared to go. In an experiment of that kind everything works smoothly, for there is no risk. The defects in foundations or other natural obstacles need excite no alarm, for the cost of dealing with them is provided for. It will not be necessary to be alarmed about extra works or grieve over the deduction of items which were expected to be profitable. There is no anxiety about the chance of loss or any other contingency of the kind. The men employed will always be in good humour, and those who supply materials will always be in the most accommodating mood. Building in fairyland could hardly be more of a pastime than it will be under the County Council in London. But can you imagine, gentlemen, that so happy-go-lucky a method can be economical? We who have to suffer mental distress every day on account of the responsibility which we have assumed and who occasionally have to bring all our courage to bear in order to face our risks, know two well what the consequence will be. No doubt a very pleasant sight will be afforded when we find all who co-operate in a building working harmoniously together, but like all spectacles which are novel it will be found that money must be liberally expended on the arrangements. It will be said by the advocates of similar schemes that on private works in many places the builder has been already superseded. Drapers, co-operate stores, and providers of miscellaneous things are credited with having carried out important works very successfully at a fraction of the legtiimate charges. All those cases have never been properly scrutinized. If, for example, a co-operative store is able to furnish gasfittings at one-fifth the price which experts had estimated, is it not plain that the profit and loss account of the gaslighting department of the store was never properly made out? In all such cases a great number of departments have to be taken together and the loss in one of them is compensated by the gain in another. Then, again, when we hear that a draper has offered to do certain work in stone or iron far below cost price, we may always expect to find that he is to be allowed to supply goods that are within his province. For what he loses in construction he is able to refund himself by what he gains in furnishing. It would be easy to explain many other inconsisteneies, but I need not waste your time about them. The public may rest assured that in building works, no matter what agency they may employ, they will not gain more than if they had trusted themselves to a respectable and established builder.

We have no opportunities of performing such tricks of legerdemain. If by an oversight we under estimate the cost of work we have to bear the penalty. We have no means of finding compensation. We have no prospect of receiving payment for work which was not executed. In fact, I consider that if the advocates of revolutionary changes were aware of the liabilities of builders to incur loss, they would be somewhat less bold in bringing forward their schemes.

They are to be excused, however, for workmen who sometimes have been closely connected with us for many years appear to have a notion that all contracts are profitable. In no other way can I explain the tendency to strikes which has prevailed of late. Any cause seems to be sufficient to stop works. I will give the English workman the credit of being very honest. If he had not assured himself that there was more than sufficient profit in every case to meet his demand, he would hesitate before he created so much confusion. Of late years his demands have taken two forms—an increase of wages and a reduction of working. To discuss on what principles wages should be determined would take me too far on the present occasion. It is a vast subject, and one which has many sides. But I think I may say that the workmen of any district (Cardiff among others) would find in our association as reasonable advisers in their difficulties as they could select. The Council of the Association are bound to take a road view of the organization of which workmen form an important part, and they are not likely to under-value anything which would cause business to be stopped for a day if in an honorable way they could devise a remedy. I am sure that I am only expressing your minds when I say we have the fullest sympathy with our workmen. This is seen by the endeavours which are made to keep them with us. We are all proud of having workmen who have continued with us since their apprenticeship, and I have no hesitation in saying, incredulous as it may appear to skeptics, that one of the causes which lead so many of us into unprofitable contracts is the desire to retain an unbroken staff around us.

As regards working hours the question must be judged from another point of view. No doubt, gentlemen, your experience has been the same as my own, which is that in no department of life, outside the Government service, a man has not been able to advance himself who has been satisfied with working eight hours a day. All professional men must undergo greater toil unless they wish to remain at a low level. I am afraid our own business would hardly be profitable any day if we were satisfied with giving only eight hours attention to it. I see no reason, in spite of all my regard for the working classes, why they should have a much easier life than our own. As a rule, they have not only to work fewer hours, but they are free from responsibilities and other harassing sorts of wear and tear, which we must endure.

Some of you remember in your youth to have seen statements or tables which were prepared by Peter Nicholson, who once upon a time was accepted as an authority. He called them "Constants of Labour," and they were intended to show how much time was to be occupied with the most insignificant details of builders' work. I have never used Nicholson's "Constants," nor met a builder who employed them in preparing a tender. But I have no hesitation in saying that the time he assumed as a basis for his calculations would not correspond with what is now required. For all kinds of handwork more hours are indispensable than formerly. If the "Constants" were now in use they would have to be altered every year.

Now, this is a subject which does not concern us alone. The builder is in reality no more than an agent for the public, and whatever affects him must operate also on those who employ him. Strange to say, this undoubted fact is not realized. The public would seem to be indifferent when there are contests between workmen and builders. They appear to consider that the disagreeable affair is entirely circumscribed to the parties who encounter one another. For instance, is there a member among all those I have the privilege of addressing who can recall one case where he was told that he might proceed with deliberation in the erection of a building? The rule, as we all know, is to insist on the utmost expedition. We are bound under penalties not to go beyond a determined day.

Now, if buildings have to be erected as hitherto—i. e., without loss of time—is it not plain that with shorter hours and a diminution of the quantity of work produced in each of those hours, it will be necessary to employ far more hands, for which building owners will have to pay? By all means let the public become philanthropists. We are quite willing to keep works open for only a few hours every day, and to employ such a number of men that labour will need no exertion. But in that case they must not grumble at the amount of our tenders, nor go about bewailing the degeneration of builders.

There are, perhaps, very few of the public who are not more or less responsible for the condition of affairs which is supposed to make a reform of the building trade a necessity. They may not argue like the French official, the representative of the Minister of Public Works, to whom I referred at the beginning. He would lead the public to imag ne that it is possible for a workman, under a proper system of administration, to change places with an architect, engineer, or contractor. But by tolerating experiments like those of the London County Council, by encouraging dealers in cotton and soft goods, pins and needles, to go in for masonry, ironwork and sanitation, and by their unconcern during strikes and trade disputes they are helping to make workmen discontented. For my part, I believe that the worst sort of grievances to endure are those which are vague, and I am sure building workmen at the present time would suffer less if they defined what they want, and endeavored to discover how it could be realized.

As regards our trade, I suppose there never was a time when there were better facilities and more competence for executing work than there are at present. I am an advocate of the promotion of technical education, but I must say that I still believe the best school for young builders is to be found in builders' workshops. No branch among all the industries of England has been put to severer tests than ours. Styles of architecture change, and whatever is in fashion we are able to realize it with all the spirit of our predecessors. Greek, Gothic, Roman or Dutch buildings are alike to us. New requirements demand novel arrangements of construction, which are carried out as if they were an every day affair with us. In that way the history of any great building works become a sort of key to the industrialism as well as the taste of the age.

The public may not be able to appreciate all that we do at a right value. They cannot tell how much it costs to organize a system which will answer promptly and accurately every sort of demand that can be made upon it. But it is evident that at least one school of architects is able to realize how an ordinary builders' workshop can become an auxiliary to the architects office or the school of art. Some of you, gentlemen, may have seen the remarkable collection of essays entitled "Architecture: A Profession or an Art?" In the pages we find many things which reveal an altered recognition of the builder's importance. Thus it is stated "The contractor, the purveyor of labour, is not so far removed from actual building work as we architects, for he has, at all events, to know the nature and quality of materials, and he has generally passed through the workshop and learnt one or more trades, and made himself a handicraftsman. It would be an excellent thing if everyone who aspired to be an architect did the same, and learnt to do work with his hands as well as with his head." The example of the late Sir Gilbert Scott (a name that can never be mentioned by a builder, and especially myself, without reverence) might be cited as suggesting the value of some experience in a builder's workshop. When he had completed his articles in a London architect's office, he went direct to the offices of Messrs. Peto & Grisswell, to whom he gave his services in return for having the run of their workshop and their London works. There he acquired that knowledge which was of such advantage to him during a career which was marked by masterpieces.

* From the inaugural address at the meeting of the National Association of Master Builders of Great Britain, by Mr. Robert Dennett, President.

Dredging under ice with a steam shovel was a contractor's trick in excavating for some stone piers at Winnipeg, Man. The Red river at this point is 468 feet wide. The work was begun in February, according to the *Railway Age*, the shovel used being a very powerful machine manufactured by the Vulcan Iron Works Company, of Toledo, O. The work was done by W. G. Reid, a Montreal contractor of large experience in bridge work. An ordinary track was first laid to within about 30 feet of a hole (22 x 60 feet) cut in the ice, which was about 2½ feet thick, over the proposed location of the first pier, from which point heavier ties, 8"x8"x10', laid 2 feet apart, were used. At the immediate edge of the hole were placed three long ties 10 inches in diameter and 50 feet long, and over this track the shovel was worked to within 6 inches of the edge of the hole, where it was securely anchored with blocks and chains. After a distance of about 10 feet in length along the full width of the hole had been excavated, a bent 888 feet and 13 feet 6 inches in height made of 10-inch timbers was sunk to the level of the ice, and cross-timbers 50 feet in length laid down, thus distributing the weight equally upon the ice and the bent. This method was continued until the whole excavation necessary for each pier was completed. The material excavated was discharged from the bucket upon sleds and hauled away.

CORRESPONDENCE.

[Letters are invited for this department on subjects related to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

THE PLUMBER'S PROFITS.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—While coinciding with the remarks appearing in your June issue anent the necessity of the plumber satisfying himself that his client is not made to pay for time which has been loitered away by journeymen and apprentices, I wish to call attention to the fact that the plumber's profits are by no means what they are frequently pictured to be. Competition is not less keen in the plumbing business than in other branches of the building trades, nor have the effects of this competition been less in the direction of reducing profits. There is this difference, however, as compared with some of the other trades, that plumbing material is of a very expensive character, and the plumbing work is expensive in consequence. A glance over the list of plumbers in Toronto to-day fails to show more than one or two who have succeeded in accumulating even a competency out of the profits of their business. This fact should in itself suffice to refute the charge that the plumber asks or receives exorbitant prices for his work. I hesitate not to say that there is probably no class of business men in the community who get smaller returns from their business than do the plumbers.

Yours truly,

JUSTICE.

ONTARIO ASSOCIATION OF ARCHITECTS.

THE supplemental examinations for 1893 will be held on September 27th and 28th.

* * *

The Association library has received from the Architectural Club a gift of Lübkes History of Art. The Architectural Club, in winding up its affairs, found a surplus on hand, which it expended in this way.

DECORATION AND FURNITURE

A CRITICISM.

THE *British Architect* prints the following criticism of the illustration of a carved stone mantel which appeared in a recent number of this journal: In the CANADIAN ARCHITECT for May there appears an illustration of a carved stone mantel for a private residence in Toronto, which shows a grotesque face looking out from the centre of a mass of foliage ornament. The face, which has strongly marked features, is on the broad grin, of that type associated with the goblins of the nightmares of one's childhood. The head is covered with a flowing mass of rough tangled locks, and round the neck is a sort of collar, from each side of which stretch out the goblin's wings. We cannot say we appreciate this kind of thing inside the home, though it may be all very well in gurgoyles outside the building. As it is shown in this mantelpiece it is, however, decidedly out of place as an ornamental feature, and we can well imagine the time when to a sensitive child such an apparition would call up all sorts of horrible imaginings. But perhaps the lady for whom it has been executed, married though she be, has no children, or, if she has, expects them to be quite as strong-minded as herself in respect to grinning grotesques and hobgoblins.

CONTRAST OF COLORS IN NATURE.

NATURE is very sparing of showy contrasts of warm and cold colours, says Mr. W. Barnes in a recent issue of the *Architect*. Red and blue are very rare, and of yellow and blue the cases are but few, and black and blue are found in lepidoptera more often than white and blue are seen in our flora or fauna. It is not uncommon for one of two strong colors to be overcast with a tinge of its fellow, or for both of them to be reconciled by a common touch of black or of some third colour, or for one of them to be lightened by a dash of white, while the other is lowered by as much black; and so red off-hued with black—russet and green upbrightened with white—often meet in the autumn in dead and dying patches of fading leaves. It may be shown, I believe, by the refractions of light in crystallised gypsum that brown is the complementary colour to lavender-grey; and how true to herself is Nature, we may go forth and see in the fall of the year; in the dead and curled leaves of the mugwort, or meadow sweet; which are beautiful even in their death, with one side brown and the other the brown-matching grey; and if brambles be cut in the leaf-greeny season, their two surfaces soon wither into the harmony of grey and brown. And what use are we to make of these hues of nature? They are warrants for a grey mantle under locks of brown hair, or a brown bonnet or trimmings, or a grey room wall with brown furniture; and if on a hot summer's day, I see the dark leaf shades playing on the grey bark of a young beech, I can boldly lay darkish leaf shades on a wall of the beech bark's hue; or if, after the winter rains, I find a barkless pole in railings, tinted with the palest blue-grey, and on breaking off a splinter of it I find its inner wood of its true colour of pale brown yellow, why should I not take the inner tint for my wall and the outer one for the skirting? Or, if I pick up a piece of lichen of dull green on one side and dull grey on the other, why should I not bind my book in one colour and lay on it a lettering piece of the other? Nature is the best school of art, and of schools of art among men, those are the best that are Nature's best interpreters.

THE CANADIAN CONTRACTOR'S HAND-BOOK.

THE second edition of this book which has recently left the press, has already had quite an extensive sale. We append a few opinions of the book as expressed by some of the leading papers:—

The *Monetary Times*: This is a compendium of useful information for persons engaged in works of construction, containing upwards of 150 pages. That it has been found of service is proved by the fact that the present is the second edition. First, and appropriately, appears the text of the Mechanics' Lien Act of 1877, and that of 1890 for simplifying procedure; also the consolidated Act respecting workmen's compensation, and Toronto and Montreal building by-laws. Next a glossary of terms used in building, notes on estimating—which seem to us very practical and valuable—and various tables having relation to the strength of materials and the weight of substances. A feature which to employers is worth the whole price of the book is the table giving the amount of a workman's wages for any number of hours, from 2 to 120, at rates per hour ranging from 15 cents to 45 cents. Then there are "Hints" for painters and paperhangers, "Points" for plumbers, &c., &c. Send to Charles H. Mortimer, publisher, Confederation Life Building, Toronto, for a copy, price $1.50; to subscribers of the CANADIAN ARCHITECT AND BUILDER, $1.

The Toronto *Mail*: "The Canadian Contractor's Hand-Book," by Chas. H. Mortimer (Toronto: Canadian Architect and Builder Press). This little book, which is a compendium of useful information for persons engaged on works of construction, is not to be estimated by its size, its value being greater than the number of cubic inches it occupies. In the pocket of the builder, the bricksetter, the stonemason, the joiner, and many other persons it will be found frequently useful. Besides a copy of the Mechanics' Lien Act, the Compensation to Workmen Act, and various by-laws relating to the building trade, it contains numerous useful tables and receipes, all of which have been carefully selected, and are applicable to daily use.

PUBLICATIONS.

We have been favored by the secretary with a copy of the calendar of the Architectural Association, of London. It comprises 200 pages of useful data relating to the Association, including the constitution and by-laws, form of application for membership, syllabus of meetings, curriculum, reports, list of members, etc.

We extend our congratulations to our esteemed Antipodean contemporary, the *Australasian Builder and Contractors' News*, which has lately celebrated its sixth anniversary. It is one of the most interesting of the many architectural journals which come regularly to our table, and is deserving of the largest measure of encouragement and support from those in behalf of whose interests it speaks.

We are informed that the Toronto Radiator Mfg. Co. have now in the printer's hands a catalogue which gives promise of being the most elaborate and expensive production in this line that has been executed in Toronto for a number of years. The volume is to contain some 200 steel plate views of Canada's best buildings, in addition to the usual illustrations of the Safford patent radiators and a carefully prepared treatise on Hot Water and Steam Heating.

The July *Cosmopolitan* will mark the most radical step ever taken in periodical literature. With that issue the magazine, unchanged in form, in fact, one of the best numbers of the *Cosmopolitan* ever issued, will be put on sale at *twelve and one-half cents per copy—$1.50 a year*. The cutting in half of a price already deemed low for an illustrated magazine is the result of an intention long since formed, to give to the public an illustrated monthly of the very highest class at such a price as must bring it within the reach of all persons of intellectual tastes, however limited their income.

PERSONAL.

Peter Belanger, contractor, Ottawa, is dead.

B. Mooney & Sons, builders, St. John, N. B., have dissolved.

The death is announced of Mr. Edward McCoskrie, architect, Victoria, B. C.

Mr. W. H. Carrick, manager of the Gurney Foundry Co., Toronto, is visiting the World's Fair.

We regret to learn of the accidental death of Mr. N. D. McDonald, a well known plumber of Winnipeg. While getting off an electric street car he was struck by a passing bicycle, receiving injuries which shortly after caused his death. Among some of the important contracts carried out by Mr. McDonald was the plumbing in the Hotel Leland, the Manitoba College, the Grain Exchange and the Barracks.

RUSKIN ON BRICKMAKING.

OUR fields of good clay were never given to us to be made into oblong morsels of one size. They were given us that we might play with them, that men who could not handle a chisel might knead out some expression of human thought. In the architecture of the clay districts of Italy, every possible adaptation of the material is found exemplified, from the coarsest and most brittle brick used in the mass of structure, to brick for arches and plinths cast in the most perfect curves, and of almost every size, strength, and hardness; and moulded brick wrought into flower work, and tracery as fine as raised patterns upon china. And just as many of the finest works of the Italian sculptors were executed in porcelain, many of the best thoughts of their architects were expressed in brick, or in the softer material of terra cotta; and if this were so in Italy, where there is not one city from whose towers we may not descry the blue outlines of the Alps or Appenines, everlasting quarries of granite and marble, how much more ought it to be so among the fields of England?

Jean Marie and Louis T. Aubin have been registered partners to carry on business as builders at Montreal under the style of Aubin & Frere.

SANITATION AND HEATING

ASSOCIATION OF EXECUTIVE HEALTH OFFICERS.

THE eighth annual meeting of the above Association was held at the city of Guelph, Ont., on the 27th and 28th of June. The proceedings were presided over by the President, Mr. Willis Chipman, C. E.

An address of welcome was presented by the mayor, and by the Local Board of Health.

Four sessions were held, one of which took the form of a public meeting, to which the citizens were invited.

Among the papers presented and discussed were the following :—"Diphtheria Epidemics and how Principally Propagated," by C. A. Hodgetts, M. D., Toronto ; "Notes on the Prevention of Disease," by A. Groves, M. D., Fergus ; "Toronto Water Supply," by J. J. Cassidy, M. D., Chairman Provincial Board of Health, Toronto ; "Defences of the Province against Cholera," by J. Coventry, M. D., Medical Health Officer, Windsor ; "Our Schools in Relation to Health," by Prof. J. Mills, M. A., President Agricultural College, Guelph ; "The Danger of a Smallpox Epidemic," by P. H. Bryce, M. A., M. D., Secretary Provincial Board of Health, Toronto ; "Systems of Sewerage available for Ontario Towns and Villages," by Alan Macdougall, C. E., Toronto ; "Public Abattoirs, their Necessity and Benefits," by J. Wallace, M. D., Alma.

The following are the officers elect for the ensuing year :—President, Dr. Cameron, Owen Sound ; First Vice-president, Alan Macdougall, C. E., Toronto ; Second Vice-president, Dr. Howitt, Guelph ; Secretary-treasurer, Dr. P. H. Bryce, Toronto ; Executive Committee, Dr. Hall, Chatham ; Dr. Coventry, Windsor ; Dr. Sheard, Toronto ; Dr. Griffin, Brantford ; Dr. McCrimmon, Palermo.

NEW PLUMBING BY-LAW OF THE CITY OF MONTREAL.

FOLLOWING is the text of an ordinance which is about to be adopted in the city of Montreal for the regulation of plumbing. This ordinance has been revised by and received the approval of the Montreal Sanitary Association. We are assured that the ordinance will probably pass the Council without material amendment :

Sec. 1. All plumbing and house drainage in the city shall be made and constructed in accordance with the following rules, which shall be binding on all parties concerned :

(1)—No drain or plumbing work shall hereafter be made unless plans, drawings and a description of the same shall have been previously deposited by the proprietor, or his representative, in the health office, at least eight days before the commencement of the work, and unless such plans and drawings shall have been approved of by the authorized officer ; and in case of repairs or alterations affected by sanitary regulations, notice shall be given to the health department within 24 hours ;

(2)—No part of the work shall be covered or concealed in any way until after it has been examined and approved of by the inspector ; and notice shall be given to the health department when the work is sufficiently advanced for such inspection ;

(3)—The water department shall refuse to turn on the water unless the demand for the same is accompanied by a certificate of the inspector, to the effect that the work has been inspected, and found to be in accordance with said rules ;

(4)—The material used shall be of good quality and free from defects, and the work shall be executed in a thorough and workmanlike manner ;

(5)—The arrangement of the soil, waste and ventilation pipes shall be as direct as possible ;

(6)—The soil, drain, waste and ventilation pipes shall, if practicable, be at all times exposed to view ready for inspection and for convenience in repairing ;

(7)—When necessarily placed within partitions or recesses of walls, soil, drain, waste or ventilation pipes shall be covered with woodwork so fastened with hinges, or round headed screws, as to be readily uncovered ;

(8)—Every house or building shall be separately and independently connected with the street sewer, in front of such house or building, or with such other sewer as shall be designated by the board of health ;

(9)—Every house drain shall be of iron, with a fall of at least ¼ inch to the foot, and no joint shall be made directly under the wall of the house ; moreover, where water-closets discharge into it, it shall be at least 4 and not more than 6 inches in diameter, and be laid in a straight line if possible. All changes in direction shall be laid with curved pipes and all connections with Y branch pipes and curved bends ;

(10)—Every such drain put in and covered without due notice to the health department shall be uncovered for inspection within 24 hours, if required by the inspector ;

(11)—No brick, sheet metal, earthenware or chimney flue shall be used as a sewer ventilator, or to ventilate any trap, drain, soil or waste pipe ;

(12)—Soil pipes shall be of cast iron of the weight specified in subsection 20, and shall extend at least two feet above the highest part of the roof or coping, light, shaft louvres, window or other opening ; they shall be of the same size throughout, and in no case shall they be less than four inches in diameter ; no cap or cowl shall be affixed to the same ;

(13)—Soil, waste and vent pipes in an extension, shall be carried above the roof of the main building when they are closer than twenty feet to the windows of the main building or adjoining houses ;

(14)—The vent-pipe from the horn of a water-closet shall be required only when the closet is at a distance of fifteen feet from the main ventilation pipe of the drain ;

(15)—Rain-water leaders shall not be connected with sewers unless by special permission of the board of health ;

(16)—Joints of sewers and soil pipes shall be gas and water tight ;

(17)—When no water-closet exists, ventilated in accordance with the rules aforesaid, the main waste pipes shall be of lead or iron of the weight specified in subsection 20, and shall be not less than 2 inches in diameter unless there are more than four sinks, in which case the size shall be 3 inches in diameter ; and every such pipe shall be continued full size through the roof in the manner prescribed for soil pipes ;

(18)—When lead pipes are used to connect fixtures with vertical soil or waste pipes, or to connect traps with vertical vent pipes, they shall not be lighter than six lbs. sheet lead to the foot ;

(19)—There shall be no traps in connection with vertical soil or waste pipes, unless by special permission of the board of health ;

(20)—All pipes shall be sound and free from holes or cracks ;

(21)—The following weight per lineal foot shall be accepted as standard :

IRON PIPES.

For plumbing work.

2 inch 4 pounds per lineal foot.
3 " 5 " " " "
4 " 9 " " " "
5 " 12 " " " "
9 " 15 " " " "

For drain work.

4 inch 12½ pounds per lineal foot.
5 " 16 " " " "
6 " 20 " " " "

LEAD PIPES.

For waste sink pipes.

2 inch 10 pounds per lineal yard.
4 " 15 " " " "

Lead waste pipes, bends or cesspools shall be equal to not less than 6 lbs. per square foot of sheet lead ;

(22)—The fittings used in connection with such pipes shall correspond with them in weight and quality ;

(23)—No tar-coated cast iron pipes shall be used ;

(24)—The plumbing work shall be tested by the Inspector in the presence of the plumber, (when the latter is required to be present) with the peppermint, smoke, water or any other test approved by the board of health ;

(25)—When defective pipes are discovered, they shall be removed and replaced by sound pipes ; defective joints shall be made tight and every part of the work in which defects are found shall be made to conform to the present rules ;

(26)—Joints in iron drain, soil and waste pipes, shall be so filled with oakum and lead and hand caulked so as to make them gas tight, and they shall not be painted, varnished, tarred or puttied over until after inspection, unless the inspector does not signify his approval or disapproval of the work within 36 hours after the health department shall have been notified that the work is ready for inspection ; the said joints may also be screwed joints ; should the work prove to be satisfactorily executed in the judgment of the inspector, he shall grant a certificate to that effect to the person concerned ;

(27)—All connections of lead with iron pipes shall be made with a brass or copper sleeve or ferrule of the same size as lead pipe, put in the hub of the branch of the iron pipe and caulked with lead ; and the lead pipe shall be attached to the ferrule by a wiped or overcast joint ;

(28)—All connections of lead pipes, shall, where practicable, be by wiped joints ;

(29)—No tile pipe shall be connected with the soil or waste pipe unless the same be provided with a flange to admit of a proper connection being made ;

(30)—Every water-closet, urinal, sink, basin, wash tray, bath, and every tub shall be separately and effectively trapped. This rule shall apply to a set of tubs, but only one trap shall be required for the set ;

(31)—The connections between iron and tile pipes shall be made with the best Portland or Roman cement, or by such other mode as may be approved of by the board ;

(32)—Traps shall be placed as near the fixtures as practicable, and in no case shall they be distant more than two feet from the fixtures ;

(33)—There shall be only one trap under the water-closet and that immediately beneath the same ;

(34)—All waste pipe fixtures other than water-closets, shall be provided at the inlet of such fixtures with strong metallic strainers to exclude from such waste pipes all substances likely to obstruct them ;

(35)—In no case shall the waste pipe from a bath, tub or other fixture be connected with a water-closet trap ;

(36)—Overflow pipes from fixtures shall in every case be connected within the inlet side of the trap, and above the water ;

(37)—Drip or overflow pipes from the safety pan under water-closets and other fixtures, or from tanks other than those of water-closets or refrigerators, shall be made to run into some place in open sight ; and in no case shall any pipe be connected directly with the drain, waste or soil pipe ;

(38)—Water-closets apartments shall open to the outer air, or be ventilated by means of a window, shaft or air duct, or by a vent shaft to the chimney ;

(39)—Interior water-closets shall in no case be supplied directly from the city reservoir supply pipes ;

(40)—In tenement houses containing more than one family, there shall be one water-closet for each family and a separate cistern for each closet ; in other houses, however, a group of closets may be supplied from one tank ; but not water-closets on different floors ;

(41)—The overflow pipes from water-closet cisterns shall discharge into an open sink, or the basin of the water-closet, or where its discharge will attract attention and indicate whether waste of water is occurring into the soil or waste pipe or into the drain ;

(42)—Valves must be so fitted and adjusted as to prevent wasting of water ;

(43)—No privy vault or cesspool for sewerage shall be permitted in any part of the city where water closets can be connected with a public sewer in the street ; when no sewer exists in the street a permit for a temporary privy may be granted by the board of health ; and in such case it shall be water tight, of a capacity of 45 cubic feet ; the sides and bottom shall be constructed of cemented brick twelve inches in thickness and well cemented inside ; such vault may be constructed of cast iron, the shape or form of which shall be either circular or oblong without angles, and with a concave bottom ; it shall be provided with a ventilation pipe at least 4 inches in diameter, extending from the pit through the roof, sufficiently high as to prevent inconvenience to occupants of neighboring houses ; the seats shall have a tight fitting cover ; it shall have an aperture opening exteriorly to allow of cleaning by pneumatic process, such aperture to be 2 feet by 1½ feet in size ; or else the flooring shall be air tight and shall have a tightly fitting trap door communicating with the pit ; the top of the vault shall be one foot above the level of the ground ; nothing shall be put into such pit, excepting human excreta ; privies shall be located at a distance of 20 feet (or more according as the board of health may deem necessary) from any house or street ; they shall be emptied when the contents reach to within eighteen inches of the top of the vault, or when judged necessary by the board of health, by persons appointed by the board ; no offensive smell or gases shall be allowed to escape therefrom. But, in no case shall a privy be allowed within the walls of a dwelling house ;

(44)—No steam exhaust, blow off pipe shall connect with a sewer or any house drain, soil pipe or waste pipe ; such pipe must discharge into a tank or condenser ;

(45)—Cellars shall not be connected with the house drain unless necessary, and by special permission of the board of health, and according to plans approved of by the board ;

(46)—A sub soil drain shall be provided when necessary, and shall be constructed and trapped to the satisfaction of the board of health ;

(47)—No trap shall be permitted between the house drain and the public sewer, unless by permission of the board of health ; conditionally however that such trap shall have a handle-hole for cleaning purposes and a fresh-air inlet pipe the whole as may be decided upon by the board of health ;

(48)—Drains in yards shall, in all cases, be trapped below frost, that is to say : four feet at least under ground ;

(49)—In the case of privy vaults now drained into a common sewer, they shall be isolated by means of suitable traps placed below frost and according to instructions from the board of health ;

(50)—In the case of a new house being built or one already existing being prepared, wherever there is a public sewer in the street, a water-closet shall be put in, to the exclusion of privy pits ;

(51)—The inspection of drains as well as the inspector of drains shall be under the exclusive control of the board of health ;

Sec. 2. The word "board," wherever it occurs in this by-law means the board of health of the city of Montreal ; and the word "inspector" means the inspector appointed by the said board to carry out the provisions of this by-law ;

Sec. 3. Any person contravening any of the provisions of the present by-law shall be liable to a fine, and in default of immediate payment of the said fine, and costs, to an imprisonment, the amount of said fine and the term of said imprisonment to be determined by the Recorder's Court, at its discretion ; but the said fine shall not exceed forty dollars, and the term of imprisonment shall not exceed two calender months ; the said imprisonment however to cease at any time before the expiration of the period fixed upon by the Recorder's Court, on payment of said fine and costs and where the infraction is continuous, such infraction during each day, shall constitute a saperate offence.

COMBINATION HEATING.*

THE word "combination" may be defined as the result of combining or joining together two or more different elements or systems into one harmonious whole. There are several distinct and different systems of heating, and the combining of any two of these systems into one would naturally result in a combination system. The specific form of combination heating which I wish to treat of is obtained by a combination of steam or hot water and air, or, as it is commonly called, furnace heat. The advantage of the combination system in buildings suitable to its use are manifold, but in order that these advantages may be made apparent, it may be necessary to diverge a little. Heat is supposed by many to be an actual and discernible substance, and until within a very few years even the more advanced students of natural physics were of the same opinion. Later investigation has shown that heat is nothing more or less than molecular motion, consisting in case of air of nearly uniform rectilinear motions, with sudden changes in direction and velocity when the molecules come too near one another ; in case of a liquid of irregular wandering of its molecules, and in case of a solid or orbital or oscillatory motions. By the foregoing definitions it will be readily seen that air will absorb heat much more rapidly than either liquids or solids, and as in combination heating we are depending for fully fifty per cent. of our heat on air heat, the natural conclusion is that a combination heater will give results in the rooms to be heated much quicker than either straight steam or straight hot water.

Heat is communicated from one body to another in three ways, viz. : Radiation, convection and conduction. Radiant heat passes from one body to another at a distance through the air in straight lines and with great velocity, but it does not, to any appreciable extent, warm the air through which it passes. Conducted heat passes from one particle of matter to another at insensible distances, as an iron bar with one end in the fire becomes gradually heated at the other end. Convected heat is the movement of the heated body itself from one point to another, as the circulation of hot air or hot water. In combination heating we again have an advantage over straight steam or hot water, as we utilize in the rooms to be heated two or three processes of heat distribution—*i. e.*, radiant and convected heat—while in steam or hot water only the radiant heat is utilized.

One of the most important features of combination heating is the fact that where the air supply is taken from the outside, as it always should be, it ensures a perfect ventilation throughout the building, as well as heat. The necessity for ventilation is very little appreciated by the general public, but as heating and ventilation have always seemed to me to be inseparable, and as the people naturally turn to our profession for their knowledge of these matters, it might be well for me to ask, What is ventilation, and why is it necessary? Ventilation is the act of replacing foul, impure air, in a confined space, with pure air. Please note that word "replacing." Times without number have I had people assure me that they had looked out for the ventilation of their house, as they had fireplaces in all the principal rooms. When asked if they did not know that "Nature abhorred a vacuum," and that their fireplaces would not exhaust unless there was some means provided for replacing the air thus removed, would reply, "They had not thought about that, but guessed there would be enough leaks in the doors and windows anyway." I could cite any number of leading authorities and read whole chapters showing the necessities of ventilation and the vast consequences of the result of continued breathing of impure air, but a mere statement of the component elements of air will suffice for this article. If we divide air into 10,000 parts, its composition would be as follows : Oxygen 2,096, nitrogen 7,900 and carbonic acid 4 parts. When the proportion of carbonic acid in a room is increased from the normal amount of 4 parts in 10,000 to between 5 and 7 in 10,000, a faint, unpleasant odor is usually perceptible to one entering from the fresh air ; if the proportion reaches 8 per cent the room is said to be close. According to some authorities, a full-grown man at rest will exhale through the pores of the skin and from his lungs nearly ¾ cubic foot of carbonic acid per hour. Taking a room containing 2,500 cubic feet of air in its normal condition, we find that the air contains 1 cubic foot of carbonic acid. Now, let us suppose this room to be a sleeping room, not ventilated, occupied by two persons eight hours each night. If the windows and doors of the room were closed during the eight hours, the natural portion of carbonic acid would be increased to about 13 cubic feet (or 1 part to 200), and the occupants would arise in the morning with depressing headache. A person coming into the room from the outside would declare the air to be "foul," and a man does not need to be a crank on ventilation to reach the conclusion that such a situation would be anything but healthful. This condition could be obviated, to a certain extent, by raising the windows, but that practice is dangerous in results, is a prolific source of colds and sickness, and as a means of ventilation totally unreliable, not to mention the morning's discomfort of arising in a cold room. Accurate ventilation will replace the air in a given room every 20 or 30 minutes without draft.

I wish to call attention here to the reason why the combination heater will from natural causes give more perfect and greater results in ventilation than it is possible to obtain from indirect

* Abstract of paper read by Mr. Geo. Hoffman before the National Association of Steam and Hot Water Fitters.

steam or hot water, more particularly hot water. The force which we use to crowd the fresh air into the room and drive the foul air out is due to the expansion of the fresh air by heat. Air expands one-four-hundred-and-ninety-first of its bulk for every degree it is heated above 32° F.

Thus it will be seen if we heat the air 55° warmer than the surrounding air we have increased its bulk very nearly one-tenth. The greater the difference in temperature the greater the expansion, and, as a natural consequence, the more rapid the movement of the warmer air. On a moderate winter day the indirect radiator in a hot water job is rarely heated over 130° to 140° F., and as it is not possible for the air in passing through the stack to absorb more than from one-half to two-thirds of the heat, the temperature of the air flowing into the room under such conditions will rarely exceed 75° to 80° F. As the force with which the air comes into the room depends upon the difference in temperature of the air in the stack and the air in the room, it will be readily seen that the movement must be very sluggish. With the combination heater, the air coming in contact with the fire and smoke surfaces only, the temperature is raised much higher, with the result of a rapid flow of a large volume of air into the room in question.

Now, one more point, then I am through. In installing a combination job great care should be taken to place the heater as near the centre of the work as possible, locating all air registers as near the heater as practicable, so as to insure short connecting pipes in the basement. Always locate registers away from windows or cold walls, selecting, if possible, the warmest side of the room. Cold and warm air are always antagonistic, and you should give the warm air all the advantage possible if you wish for the best results.

Lastly, the combination system of air and water heating particularly is in the market to stay, and to you who are interested in residence or school heating the subject is worthy of your most careful consideration.

USEFUL HINTS.

Fine bolted whiting is a good thing to add to graining color for oak when it is desired to thicken it without changing the shade. Melted beeswax, or soap dissolved in hot water, and added to the color while warm, may also be used.

According to a contemporary, sheet brass may be cut chemically with success by the following method: Make a strong solution of bichloride of mercury in alcohol; draw a line across the brass with a quill pen, where it is to be cut. Let it dry on, and with the same pen draw over this line with nitric acid. The brass can then be broken like glass cut with a diamond.

The art of producing mosaics is, according to an American contemporary, being extended to leather, the pieces being variously colored, some having metallic hues, others with a transparent glaze over another color. They are attached by glue to a hardwood ground, framed the depth of the pieces, which are shaped as required.

The formation of efflorescence takes place in the following manner: Bricks made from clay, having a high percentage of the sulphates of magnesia, soda or potash in their composition, and not sufficiently fired to fuse or amalgamate them with the silicates and oxides of iron, will readily dissolve the alkalis on becoming wet, and with the evaporation of the moisture a large quantity is carried to the surface and deposited in crystalline form.

FIREPROOF MORTAR.—Mortar for resisting the action of fire, and proper to be employed in building slight brick piers as substitutes for, or instead of employing, iron columns, may be made of pozzolano mixed with fresh-ground lime of chalk from the lower beds; and as real pozzolano is an imported substance and likely to be expensive, its place may be very well supplied by an artificial substance of similar character, produced by burning any marly clay that is fit for brickmaking to a gray clinker, and reducing such clinker to a grain of the size of gray sand. Three-fourths of this substance to one-fourth of fresh-ground lime, mixed dry in the first instance, and, when so mixed, rendered plastic by the addition of soft water, will yield a mortar capable of resisting fire for a long time, and water, if need be, as long as any bricks that can be set in it.

A plastered ceiling that is very loose and almost about to fall, may sometimes be saved by the following method: Form of two or three pieces of scantling, and ordinary laths, a frame long enough to cover the defective part. Hold this against the ceiling by means of two uprights and gently press back the loose plaster against the underside of the joists, supporting the lower portions of the uprights by means of wedges. Now take some ordinary wrought nails, and file slots into their heads so that they may be driven home by means of a screwdriver. Use a sharp screwdriver and press each nail gently through the plaster into the joist, giving each a twist when it has entered the wood. If this is done carefully, the plaster will not be disturbed, but will be held perfectly when the framework is taken away. A little plaster of Paris, for filling up the holes will give a very good job. For safety the ceiling is best papered before being whitened.

COAL-TAR FOR WATERPROOFING.—The use of coal-tar for waterproofing masonry is recommended by a French technical journal. For surfaces exposed to the air it is advised to apply from one to three coats boiling hot. Its durability is increased by adding a small proportion of India-rubber dissolved in benzine. If the color of the coating is objectionable, it may be dusted with plaster-of-Paris before drying. Where surfaces are to be covered with earth a single coating of tar made thick by blazing is preferable. A small quantity, two or three gallons, is brought to a boiling temperature and lit at the surface. It is allowed to blaze and kept constantly stirred at the same time until the volume is considerably reduced and it becomes pasty on cooling. The product is spread as rapidly as possible with a large flat brush, which is dipped often to prevent cooling. A single coat applied in this manner adheres firmly to even the smoothest surface.—*Invention.*

A recent invention, says the American *Upholsterer* intended to supersede the heavier wood ceilings, is a light and handsome wood veneer. This consists of a thin layer of natural wood on a background of paper, which is placed upon the ceiling in about the same way that ordinary wall-is laid—only to attain perfect results it is first necessary to coat the surface to be employed with a thin layer of muslin. This ceiling when completed is, if anything, more artistic in appearance than those of heavy inlaid wood. The cost of treating a ceiling in this way is much less, and the great variety of woods and their easy attachment seems to give a wider latitude for beautiful effects. There is hardly any combination of color that cannot be formed out of the natural wood. The white bird's-eye maple, curly maple, white holly and pink bird's-eye maple form a combination that is beautiful in its light and chaste effect. The union of the laurel burl, figured walnut and amaranth is most taking in appearance. The dark, rich colours of these woods blend into perfect harmony.

MANUFACTURES AND MATERIALS

Quite a demand for Canadian lumber is reported from St. Johns, Nfld., where large building operations are in progress.

The Consolidated Plate Glass Company of Canada, Limited, has been incorporated, with a capital stock of $250,000.

Mr. E. B. Jarvis, architect, Toronto, has invented and patented a system of heating and ventilating. The Toronto Radiator Mfg. Co. will manufacture the apparatus.

The Paterson Manufacturing Company, with chief place of business at Toronto, is being incorporated with a capital stock of $50,000, to manufacture building paper, roofing material, etc.

At one of St. George granite quarries the other day, says the *Sun*, a block was taken out 32 feet long, 18 feet wide and 15 feet thick. It is computed that this block of stone when loaded on a car will be worth $5,000. It contains about 250 tons of stone.

The Company which is being organized in Victoria, B. C., to manufacture Portland cement expect to find a profitable market in China and Japan. The cement manufactured in those countries will not it is said stand for any length of time under water, and half a million dollars worth of English cement is imported annually.

We understand that the Toronto Radiator Mfg. Co. are preparing a very large shipment for Tientsin, North China, and that they export very largely to Great Britain, France and Germany. They also ship to the United States. In certain parts their goods are preferred to those manufactured there, and the consumers are satisfied to pay the additional 45% duty and use the goods manufactured in Canada, which speaks well for Canadian industry.

Messrs. W. R. Melville, E. P. Brammer, W. H. Robertson and S. E. Manuel are the owners of 200 acres of land on Cortes and Rugged Islands, about 90 miles from Vancouver, B. C., which has been found to contain an unlimited supply of red granite of excellent quality. The quarry is situated on a good harbor, the depth of water making it possible for vessels of any tonnage to approach close to shore. The stone will shortly be placed on the market.

At a meeting of the Consolidated Plate Glass Co., of Canada, Limited, held at Toronto on the 4th inst., the following gentlemen were elected directors: Frank J. Phillips, William Ferguson, Edwin Hill, William G. Phillips and Joseph McCausland, of Toronto; William R. Hobbs and Thomas S. Hobbs, of London, Ont.; Alex. Ramsay and L. I. Boivin, of Montreal, and George Howe, of Ottawa. At a subsequent meeting of directors, Frank J. Phillips was elected president and William R. Hobbs and Alex. Ramsay, vice-presidents.

CREDIT VALLEY BROWN STONE

From Carroll & Vick's No. 6 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure	Height.	Crushing Load.	Crushing Stress per sq. in.	Average Crushing Stress per Square Inch
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	2 3/8 × 3	2 7/8	131,000	15,188	
C	2 11/16 × 3	2 7/8	130,000	14,751	
D	3 × 3	2 7/8	133,000	14,777	14,905

14,905 pounds is the average crushing strength per square inch of our Credit Valley Brown Stone.

The highest standard of test attained by any pure Sandstone in America.

IN confirmation of the facts above stated, we have pleasure in directing your attention to the accompanying table, showing the result of the test of our stone, in connection with the series of tests of building stones conducted in 1892 at the School of Practical Science, Toronto, under the direction of a committee of the Ontario Association of Architects.

By referring to the results of the tests above mentioned, it will be seen that the average crushing stress of the majority of Canadian and American sandstones is far below that of ours, the difference in our favor ranging from 75 to 50 per cent.

The Credit Valley Brown Stone, owing to its modest tone, harmonizes beautifully with red or cream colored brick.

It has been reported that there is difficulty in obtaining Credit Valley Brown Stone. To correct this mistaken notion, we wish to state to architects and the public that we have 40,000 cubic feet of stone ready to ship on the shortest notice, which can be followed up with an unlimited supply. Last year we made extensive additions to our plant and opened up new quarries and mines, and will supply promptly all orders given to us or our agents.

CARROLL, VICK & CO.

Quarries: Credit Forks, Ont. Office: 84 Adelaide St. West, TORONTO.

Montreal Agents: T. A. MORRISON & CO., 118 St. Peter Street.

PERMANENT PASTE FOR PAPER HANGERS.—Dissolve one ounce of alum in one quart of warm soft water. When cold add flour to make it about consistency of cream, then add half a thimble of resin and half ounce of sugar of lead. The above is the preparation for a bucket of paste.

WE HAVE THEM

In every color and in every style of design, for every room in any house, whether a mansion or a cottage, and in every grade and price. We allude to

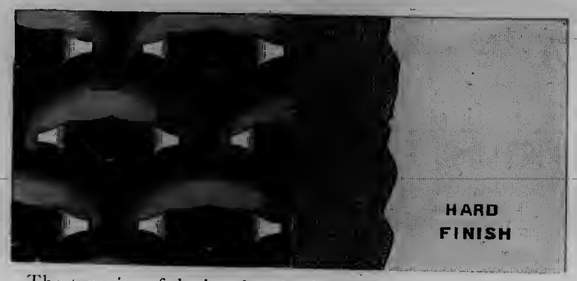
WALL PAPERS
ROOM MOULDINGS
WINDOW SHADES

M. STAUNTON & CO.

6 KING STREET WEST.

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with advertisers.

Hayes' Patent Steel Lath



The tenacity of the bond and other features are unequalled.

Now being used in the "Grand Seminaire," Montreal.

...WE ALSO MANUFACTURE...

Copper, Galvanized Iron and Painted Steel Shingles and Tiles,
Sheet Steel Pressed Brick and other Siding Plates,
Galvanized and Painted Pressed Corrugated Iron.

CORRESPONDENCE SOLICITED.

METALLIC ROOFING CO., LIMITED.

Factories: MONTREAL AND TORONTO.

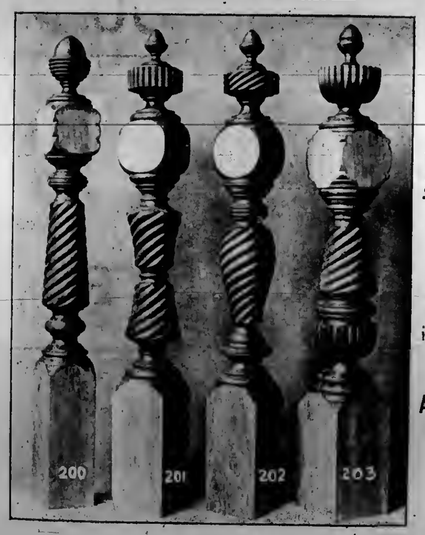
...ADDRESS...

30 St. Francois-Xavier St., Montreal, *or* 84 Yonge Street, Toronto.

S. KNECHTEL MANUFACTURER OF MOORISH FRET WORK

ROPE AND SPIRAL MOULDINGS

and all kinds of Spiral Turnings



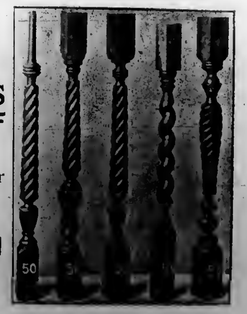
Newels

...AND...

Balusters

Table Legs, etc., etc.

in straight, tapering or irregular forms.



ALL WORK EXECUTED FROM ARCHITECTS' DETAILS.

SEND FOR PRICES.

MAPLE HILL - ONTARIO

STONE UNDER THE MICROSCOPE.

It is often held that the best method of determining the probable durability of a building stone is to study its surface, or thin transparent slices, under a microscope. This method of study in recent years has been most fruitful in developing interesting and valuable knowledge of a scientific and truly practical character. An examination of a section by means of the microscope will show not merely the various substances which compose it, but also the method according to which they are arranged, and by which they are attached to one another. For example, pyrites is considered to be the enemy of the quarryman and constructor, since it decomposes with ease and stains and discolours the rock. Pyrites in sharp, well-defined crystals sometimes decomposes with great difficulty. If a crystal or grain of pyrites is embedded in soft, porous, light coloured sandstones, its presence will certainly soon demonstrate itself by the black spot which will form about it in the porous stone, and will permanently disfigure and mar its beauty. If the same grain of pyrites is situated in or near very hard, compact, non-absorbent stone, the constituent minerals of which are not rifted or cracked, this pyrites may decompose and the products be washed away, leaving the stone untarnished.

PORTLAND CEMENTS

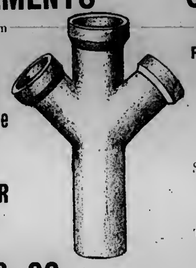
All the best known brands at from $1.80 per cask.

ROMAN CEMENT

KEENE'S Coarse, Superfine and Parian CEMENT.

CALCINED PLASTER

We are Agents for the best Nova Scotia makers.



SEWER PIPES

Standard and Scotch,

FIRE BRICKS

FIRE CLAY

FLUE COVERS

CHIMNEY LININGS AND TOPS

Scotch Derricks, Building Sandstones, and all kinds of Builders' and Contractors' Supplies.

The largest stock in Canada of these Goods, and at bottom prices.

W. McNALLY & CO. - MONTREAL.

W. J. Burroughes & Co.

. . . CONTRACTORS . . .

FOR

Steam and Hot Water

Heating and Plumbing

. . . AGENTS FOR THE . . .

FLORIDA STEAM AND HOT WATER BOILERS

353 Queen Street West, Toronto.

WE

know many people who think it wise to buy an article because it is cheap. That is poor policy. We

SELL

the highest grade of mortar known in the trade, and anyone who has used Adamant will back up this statement. Use Adamant and get full value for your

MONEY.

ADAMANT MFG. CO. OF AMERICA,

100 ESPLANADE EAST,

Telephone 2180. - TORONTO.

Works: ST. HELENS, ENGLAND.

PILKINGTON BROTHERS

MANUFACTURERS OF

POLISHED PLATE

Rolled and Rough Cast Plate,

BRITISH SHEET GLASS P.B.

FANCY CATHEDRAL

ENAMELLED, GROUND

and all kinds of ornamental

WINDOW GLASS

Depot: BUSBY STREET, MONTREAL.

R. McDougall & Co.

MANUFACTURERS OF

"PLAXTON"

HOT · WATER · BOILERS

GALT, ONT.

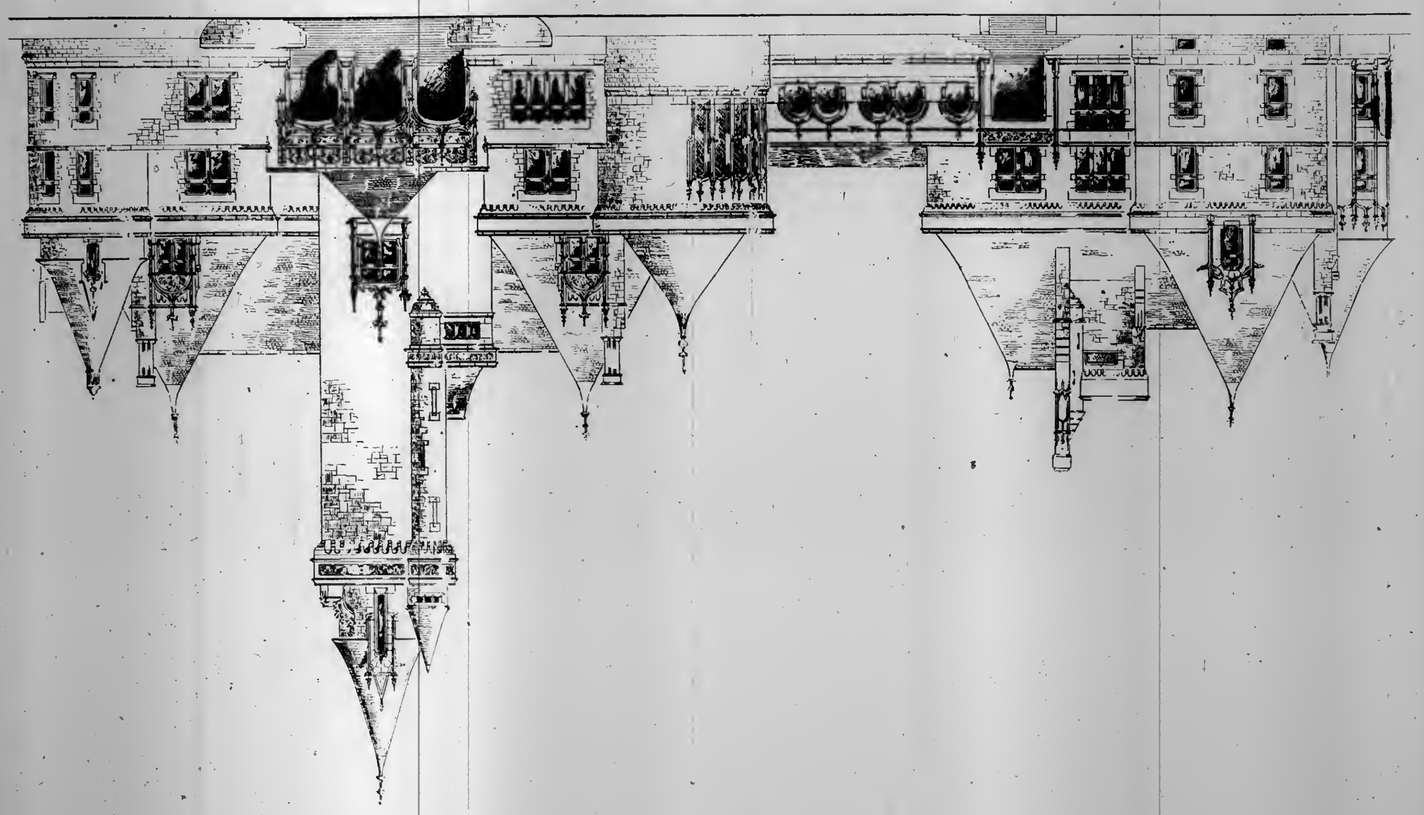
SEND FOR PRICE LISTS AND TESTIMONIALS.

Bank of Hamilton, Wingham, Ont.

D. B. Dick, Architect, Toronto.

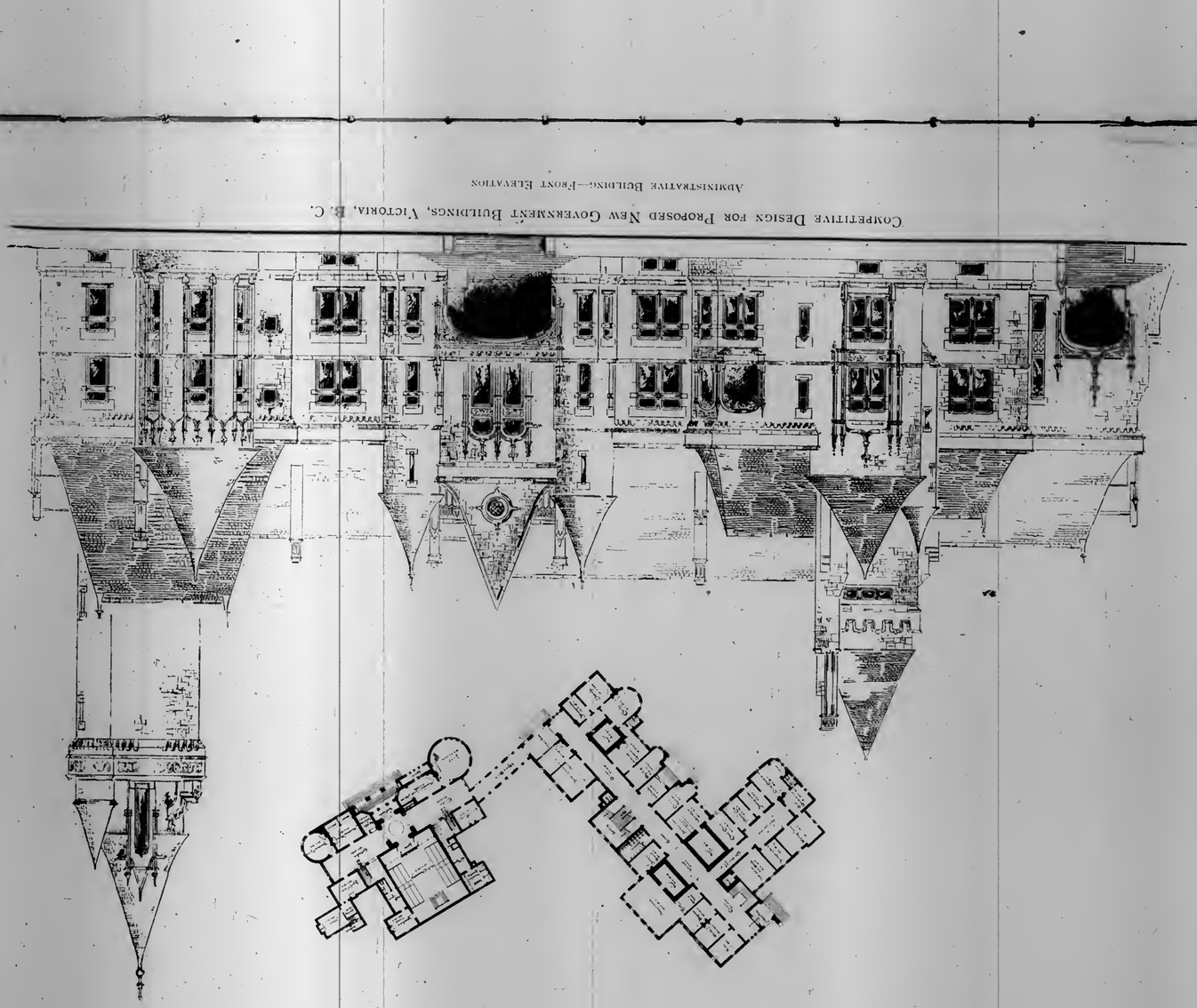
COMPETITIVE DESIGN FOR PROPOSED NEW GOVERNMENT BUILDINGS, VICTORIA, B. C.

LEGISLATIVE ASSEMBLY BUILDING. FRONT ELEVATION.



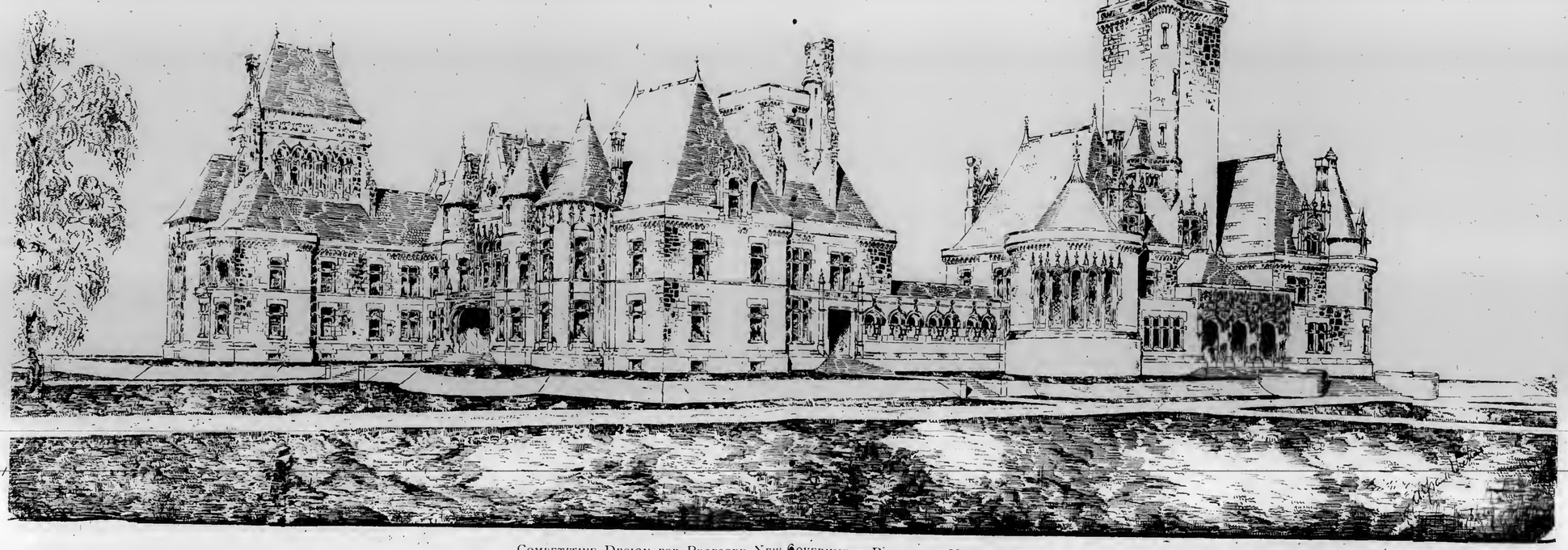
COMPETITIVE DESIGN FOR PROPOSED NEW GOVERNMENT BUILDINGS, VICTORIA, B. C.

ADMINISTRATIVE BUILDING.—FRONT ELEVATION



Proposed Parliament Buildings
British Columbia.

Sept. 1893



Competitive Design for Proposed New Government Buildings, Victoria, B. C.

Messrs. Dick & Wickson, Architects, Toronto.

CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—NO. VIII. AUGUST, 1893 { PRICE 20 CENTS $2.00 PER YEAR.

THE
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
64 TEMPLE BUILDING, - MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	D. R. DICK, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	JOHN E. BELCHER, Peterboro'.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

DAVID EWART	Ottawa.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
FRANK DARLING,	Toronto.
W. A. EDWARDS	Hamilton.

REGISTRAR AND LIBRARIAN:
W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	V. ROY, Montreal.
1ST VICE-PRESIDENT	J. NELSON, Montreal.
2ND VICE-PRESIDENT	H. STAVELEY, Quebec.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
J. J. BROWNE	Montreal.
J. HAYNES	Montreal.
D. OUELLET	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
GEO. MOIR, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. J. HILL.
JOHN ALDRIDGE.
JAS. CRANG.
J. LISTER NICHOLLS.
WM. BOOTH.
JAS. ISAAC.
JOHN LOGAN.
WM. PARK.
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

AMONG the other changes of climate incident to Canada which have taken place within recent years, is the growing frequency of wind storms, the severity of which in some instances should perhaps entitle them to be called cyclones. The wind force exerted on some occasions has been sufficient to carry away church spires, and overturn buildings which were not firmly anchored to their foundations. These cyclonic storms should form a factor in architects' calculations in the future, otherwise we may expect to see the projections on many buildings, if not the buildings themselves disappear.

WE believe it would be the means of largely increasing the interest of the members in the Toronto Builders' Exchange if at stated intervals, especially throughout the winter, meetings of a social character were held. An interesting and instructive feature of the program at such meetings would be the reading of papers by members on various subjects connected with the building business, to be followed by discussion. There is without doubt the necessary talent available for this purpose, as well as to provide entertainment of other kinds. A never ending succession of business meetings is apt to become irksome unless relieved in some way by social gatherings such as we have suggested. We therefore hope to see action taken by the officers of the Exchange in the direction which has been indicated.

THE Electric Wiremens' Union and the Bricklayers' Union, of New York, are at present engaged in a dispute as to which class of workmen is entitled to cut the holes in a brick wall required to bring the electric wires into the building. On the Mutual Life Insurance Company's new building the wiremen had been doing this work themselves. The walking delegate of the Bricklayers' Union notified the superintendent that the bricklayers would strike if the work was not given to them. When this came to the ears of the Wiremens' Union, the superintendent was advised that to hand the work over to the bricklayers would mean a strike of the wiremen. As the building was not being erected by contract, the superintendent wisely decided to cease operations and give the two unions the opportunity of fighting the dispute out between themselves. It will be of interest to learn the decision of the matter, and the method by which it was reached.

THE death is announced of Col. Auchmuty, founder of the New York Trade Schools. Col. Auchmuty, who was the possessor of an independent fortune, quitted some years ago the practice of his profession as an architect and set himself to establish an institution which would afford to the youth of America facilities for acquiring a practical knowledge of the various trades. Something was felt to be required to take the place of the apprenticeship system which was fast declining, and under which the trades unions permitted only a very limited number of apprentices to be employed. The trade school which Col. Auchmuty established met the requirements of young men anxious to learn trades, and the attendance rapidly increased until it became necessary to erect more extensive buildings designed to meet the special requirements. These buildings, erected by the students themselves, stand as an object lesson in proof of the thoroughness of the instruction imparted. The schools were from the outset bitterly opposed by the trades unions, but the endowments of $130,000 and half a million dollars given by Col. Auchmuty and Mr. J. Pierpoot Morgan, respectively, have established them on a basis which will insure their future existence and usefulness.

WE lately referred to the fact that an enquiry had been received by the Dominion Government from Jamaica for ready made houses, and pointed out to Canadian builders and manufacturers that a profitable opening for business in this line might be found to exist. We now learn that Messrs. Rhodes, Curry & Co., of Truro, N. S., have embarked in this enterprise, and have recently forwarded their first shipment of houses to Jamaica. These houses require to be proof against dampness and the attacks of insects which in that country honeycomb the softer kinds of wood. To meet this requirement the manufacturers have employed Southern or hard pine. The houses are one storey in height, and in size 27 feet by 20 feet. The roof is covered by a special preparation of felt. The sides are made of panels three feet square, neatly trimmed with suitable moulding, the whole ornamented with gables and a neat cresting on the roof. Everything required in the construction of the houses was cut and fitted to its place and each piece numbered.

ITALIAN labor has of late been largely employed in the construction of railroad and other works in Canada. The Italian laborers have superseded those of other nationalities because their services can be obtained cheaper. There is, however, reason to believe that the saving to the contractor is not so great or so real as at first sight it appears. Experienced contractors assure us that Italians cannot compare with Irishmen as shovelmen. Unlike the latter they are not given to celerity of movement. We have been told of a contractor's foreman whose gang of Irish excavators was supplanted by Italians, and who was much annoyed at the lack of expedition which the latter displayed. Suddenly he bethought him of a method by which to accelerate their movements. A skillful Irish shovelman was quietly told to take his place with shovel and wheelbarrow among the Italians, and "lead them a chase." This, having no love for the Italians, he was eager enough to do. The speed at which the Italians were obliged to work in order to keep pace with the Irishman was such as they had never before experienced, and while it conduced to the contractor's profits did not enhance the friendship of the Italians for the Irishman.

THE municipal fathers of a town in northern Ontario are posing in a somewhat peculiar way as disciples of the evolution theory. It is not the evolution of the species which is engaging their attention, but the evolution of architectural ideas. Having been entrusted with the arrangements for the erection of a new town hall and market building to cost nearly $20,000, their first resolve seems to have been to avoid having anything to do with an architect. Their next step was to call in a local carpenter and ask him to prepare a rough design. Having secured this, they instructed one of the builders in the town to prepare the plans, which, on examination, met the views of some of the members of the Council but were declared by others and by the majority of the citizens to be unsuitable. In order that this important point may be satisfactorily decided, it has now been found necessary to procure the opinion and advice of an architect. It is to be hoped that the evolution theory will now be abandoned in favor of common sense methods, and that in the case of this and other works of like importance, the saving of a few hundred dollars in architects' fees will not be accomplished at the sacrifice of architectural beauty and utility.

COMMERCIAL depression seems to exist at present throughout the world. In Europe business conditions are far from satisfactory. The recent financial crisis in Australia and in the United states at the present time have laid in ruins many business enterprises in these countries, and has given rise to a widespread feeling of alarm. In the city of New York alone at the present time reports from the various trades unions show that, out of a total of 99,950 members, 36,177, or 37 6-10ths per cent, are unemployed, while the total number of unemployed workmen in the city is placed at 100,000. In the case of some trades, as for example that of plumbing, over 50 per cent. of the union workmen are reported to be out of employment. This condition of affairs across the border is likely to be accentuated in the west at least by the closing of the World's Fair a month hence. The Builders' and Contractors' Association of New South Wales decided some time since to reduce the wages of all workmen in the building trades by 10 per cent. For a time a strike of the workmen threatened to be the result, but more common sense counsels prevailed, and the reduction was accepted. Canada, too, has been passing through a time of depression, but owing to her magnificent banking system, her agricultural resources, and the absence to a great extent of the speculative spirit among her people, she has thus far escaped disasters such as have overtaken her neighbors. With the prospect of a harvest of unusual abundance, there is good reason to hope that the situation in Canada will steadily improve.

SOME interesting evidence was lately given by Mr. Stanley G. Bird, a well known master builder of London, before the Royal Commission on Labor. Mr. Bird testified that the cost of labor in the building trades had doubled within the last thirty-five years; that brickwork which then cost 40s. a rod, costs now from 80 to 90s. The surprising part of the testimony was, however, the statement that notwithstanding the great increase which had taken place in the rate of wages, the workman of to-day did not accomplish more than half the amount of work which his predecessor was accustomed to do. The witness stated that where it used to be the custom for a good bricklayer to lay a thousand bricks a day, three or four hundred is about the usual thing now. With regard to joinery the witness said, that although the workmen are given the use of machinery, the labor costs just as much as it did twenty-five years ago, when the men had to cut the stuff out of the deal, strap it up, square it up and work it. In answer to the enquiry of the examiner, Mr. Bird plainly said that the workman of to-day, instead of doing a fair day's work, does as little as he can. These statements were corroborated by a number of other builders present. While they certainly do not apply to all workmen, they are no doubt correct as regards the majority, and the condition of affairs which they reveal is far from being creditable to unionism, to the influence of which the change is chiefly due. In Canada the rate of wages has similarly advanced. As to the return given by the workman of to-day as compared with a former period, we are not in a position to speak with authority. The rise of wages alone, however, has been sufficient to largely increase the cost of building; notwithstanding, contractors are obliged to take work at lower figures than ever before. Instead of the increased cost being a charge upon the owner of the building, as it properly should be, keenness of competition necessitates that it come out of the profits of the contractor, and in many instances it is sufficient to turn profit into loss.

THERE is no more important subject that can engage the attention of the Architectural Associations of Ontario and Quebec than that of the proper education of students. By the liberality of the provincial Government of Ontario, a Department of Architecture has been established in connection with the School of Practical Science at Toronto, and the beneficial influence arising therefrom is already manifest. The Department of Architecture has been warmly endorsed and supported by the Ontario Association of Architects, and will no doubt grow in efficiency and exercise a marked influence upon the architects and architecture of Canada in the future. Unfortunately the architectural students of the Province of Quebec are at present without any means of securing instruction other than that which they may obtain by serving a term in an architect's office. While experience of this kind is most important and necessary, something more is required to equip the architect of the future to practice his profession in a manner that shall bring honor to himself and to the community in which he labors. Commendable attempts have been made to impart instruction to the students in Montreal through the medium of classes and lectures under the direction of leading members of the Province of Quebec Association of Architects, but with indifferent success. Teaching is itself a profession, and very few architects, however large the stock of information which they may have acquired, are possessed of the faculty of successfully imparting their knowledge to others. What is required is a Department of Architecture to be established in connection with McGill University. To this object we hope to see early and determined effort directed by the architects of the Province. All the accommodation which such a Department would require already exists in the splendid Technological School which has recently been erected. It only remains for some wealthy citizen to endow a Chair of Architecture and by so doing take rank among the men whose illustrious gifts have been the means of placing this University in the foremost position which it now occupies amongst the educational institutions of the world. We trust that at the approaching annual convention of the Province of Quebec Association of Architects this subject will receive the earnest attention which its importance demands.

ILLUSTRATIONS.

QUEEN'S HOTEL, MONTREAL.—A. F. DUNLOP, ARCHITECT, MONTREAL.

The building is situated at the corner of St. James and Windsor streets, near the Bonaventure Railroad depot. It is thoroughly fireproof. The walls are lined with terra cotta fireproof material, the floors and roof being constructed with rolled steel beams, filled in with terra cotta arches and strengthened with shell built angle columns. The principal interior walls are constructed of brick, and the whole façade of imported Scotch sandstone.

CHRIST CHURCH CATHEDRAL, OXFORD, OXFORDSHIRE—SKETCH BY MR. E. G. BIRD.

The accompanying sketch is a view looking towards the choir through the Lantern Tower from the North Transept. The

RESIDENCE ON BATHURST STREET, TORONTO, FOR J. R. DUNN.—HENRY SIMPSON, ARCHITECT.

earliest annals of this church date back to Saxon times and connect themselves with the almost legendary history of a renowned priory founded by St. Fredeswide, who died in 740 A. D. The Cathedral as it is to be seen now, was commenced in 1120 A. D., by Prior Guimond, and completed in 1180 A. D., and is a very interesting architectural type of the transition period between the Norman and early English styles. The roof of the choir is the work of Cardinal Wolsley in the beginning of the 16th century, and, except in size, it is one of the best and most remarkable ever executed.

C. A. AND B. COMPETITION FOR A SERVICE-PANTRY—DESIGN BY "SPERO MELIORA" (MR. ERNEST WILBY.)

COMPETITIVE DESIGN FOR ST. JOHN'S EPISCOPAL CHURCH, TORONTO—AWARDED SECOND PRIZE—J. FRANCIS BROWN, ARCHITECT, TORONTO.

COMPETITIONS.

FIVE sets of plans were submitted in the competition for plans for the improvement of St. Lawrence Market, Toronto, for which $1,000 in prizes was offered by the City Council. The judging of the merits of the designs was done by the aldermen. The first prize was awarded to Mr. H. G. Paull, the second to Messrs. Strickland & Symons, and the third to Mr. A. W. Peene, all of Toronto. The cost of carrying out Mr. Paull's design is estimated at $71,000.

LEGAL DECISIONS.

AN action has been tried in the Irish Queen's Bench Division, with the Secretary of State for War as plaintiff, the defendant being Mr. John Good, a builder, the particulars of which we find recorded in the *Builders' Reporter*. The plaintiff claimed 405*l.* damages for alleged breach of contract in regard to the proposed erection of certain buildings at the Curragh Camp Co., Kildare, and in respect of which the defendant was to receive 4,995*l.* The plaintiff alleged that it was a term of the contract that upon the expiration of two weeks from the time of receiving possession of the site the works should be commenced and proceeded with with all due diligence, so that the brickwork should be finished and the buildings roofed and completed within nine months. It was further stipulated that if the defendant failed to commence at the date mentioned and proceed in the manner agreed upon, the plaintiff should be at liberty to make any other contract for the completion of the works upon such terms as to the plaintiff should seem best, and to charge the excess of cost to the defendant. The site was handed over to the defendant in accordance with the contract, but he did not proceed with the works, and the plaintiff, owing to the default of the defendant, was compelled to make a contract with another contractor, and the plaintiff had to pay this other contractor the sum of 5,400*l.* for the works contracted to be built and completed by the defendant, being an excess of cost of 405*l.* over the amount agreed upon by the defendant.

The defence was a denial of the terms of the contract, and that it was a term of the contract that in the event of the combination or strikes of workman or other causes beyond the contractor's control the defendant should be excused and discharged from the performance of the terms of the contract. The defendant stated that he duly commenced and proceeded with the works, but shortly after the commencement a strike for an advance of wages occurred amongst the workmen and labourers employed by the defendant on the works, and by reason of the strike the defendant was prevented from proceeding with and completing the works pursuant to the contract, and under its terms he became discharged from the performance thereof. It was denied that he was guilty of any default in relation to the contract; that it was by reason of any default of his that the plaintiff was compelled to make a contract with another contractor for the building and completion of the works, or that the plaintiff had made another contract, or that he had paid to another contractor the sum of 5,400*l.* in regard to the works.

Mr. Justice Holmes submitted the following questions to the jury:—Whether the works were delayed by reason of the strikes of the workmen, and was satisfactory proof of this given to the Secretary of State for War.

The jury found for the defendant.

Send for a copy of the "Canadian Contractors' Hand-Book" (second edition). Price, $1.50; to subscribers, $1.00.

QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require on lines consistent with the objects of the paper. Every effort will be made to furnish satisfactory answers to all such inquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

Wilson Bros., Collingwood, Ont., ask: What is the correct weight of 1000 feet of inch lumber, maple and pine, dressed and undressed?

ANS.—The weight of undressed inch maple lumber is 4½ lbs. to the foot, and when dressed, 3½ lbs. to the foot.

"Architect," Montreal writes:—In the Province of Quebec, a considerable burden of ice accumulates on the roofs of buildings, and this must be taken into account by the architect in designing roofs. I have not been able to obtain any very definite information as to the weight of ice which would assist me in making my calculations, and would feel obliged if you could enlighten me on the subject.

ANS.—The weight of a cubic foot of ice is about 57 lbs.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE semi-annual examinations for matriculation and registration of the Province of Quebec Association of Architects were held of the 27th and 28th of July. Six candidates presented themselves for examination, of whom the following four were successful: M. Helbronner, P. Sicotte, Frank Peden and J. A. Deschamps. The examiners were Messrs. A. T. Taylor, J. Haynes and A. C. Hutchison, and the examinations comprised arithmetic, mensuration, algebra, geometry and free hand and linear drawing. There were no candidates for the final examination.

The next annual meeting of the Association will be held in the city of Quebec on the 28th of September. Arrangements are not yet completed as to the proceedings, but the secretary is now in communication with the members at Quebec regarding this.

IN FAVOUR OF COMPETITIONS.*

From my point of view, it is a mistake to suppose that the profession can dispense with healthy, stimulating competitions. A man never knows what is really in him until he has measured himself with his fellows in real honest work of this kind. Consider what a large field for effort is presented to our younger men at the outset of their career, when youth, with its enthusiasm and capacity for work is so strong. With many, the commissions which they have in hand fail to fully occupy their time. Does not the opportunity thus afforded, through the medium of competitions, and which I think is confined to our profession, create, if grasped, a lasting habit of steady, continuous application and activity, a prelude to the time when hands and head will be fully occupied on more certain work.

Let me remind you of the endless opportunities which cross our path through the medium of competitive problems, for the study and investigation of the many kinds of architectural structures the architect of to-day is called upon to design. Frequently are we compelled before making a new venture, to seek, and then to thoroughly satiate ourselves with the ideas and treatment we find in the best and most successful work of perusal of illustrations, as well as by a personal inspection of their structures. Can anyone, on reflection, fail to see the helpful and lasting influences that must accrue from such a probation, even if no other advantage be the immediate outcome of the effort? How can we achieve success, if we learn no lesson from our failures? The knowledge and grasp of the requirements of any structure thus acquired, as well as the familiarising of one's self with the mind and method of some eminent specialist, probably the "facile princeps" in the particular class of work attempted undoubtedly will be a clear gain to the earnest competitor, and from my own short experience I can affirm the result will be a joyous one, and will, in the near future, bear succulent fruit. Is not the trend of some of our younger men, who look askance at competitive work, to drift into that self satisfied and crystallised state (so aptly described by Sir Joshua), from which their work ultimately becomes reduced from mere architectural barrenness, to the poorest of all imitations—having to repeat what they have before often repeated.

We may love and reverence the past as archæologists, but, as architects, let us not forget that archæology is the bone of living progressive Architecture, and if our art is ever to evoke popular enthusiasm it must do so by embodying the thoughts, the aspirations, and the genius of the living people for whom we build.

There is one more thought so intimately connected with the whole question, viewed from the professional side, that I think it ought not to be passed over without comment, however brief. It is the deplorable preponderance of misdirected effort competitive work produces. One is confronted in almost every competition with the melancholy sight of many very meritorious architectural productions, possessing picturesqueness of grouping, excellent proportions, combined with artistic and well-designed detail, yet having all chance of their success nullified by the utter unsuitability of the design, and which is frequently mated to an indifferent and ill-considered plan. These artistic and impractible productions are greeted with the admiration both of the profession and the general public, but, alas! command nothing more substantial. Those who allow their prolific pencil to have the upper hand—resulting not infrequently in relegating to quite a secondary consideration the actual needs and inexorable stipulations of "Competitive Instructions" given for their adherence, and who prefer to follow the bent of their own sweet will and pleasure—are only amusing themselves. It is misapplied energy, and any chance of probability there is of their clever but impracticable design being chosen, becomes merely a "vision of their own romance."

With regard to the etiquette aspect of competitions, there is still floating about, even among many practising architects, who on other matters are not without intelligence and discernment, that strange notion that to be engaged on competition work is somehow derogatory from a professional point of view. These men (who ought to know better) carelessly deprecate in very doubtful taste the praiseworthy efforts made by their more enthusiastic and energetic fellows, through this medium presented to them. I feel very confident, indeed, that those who look with lukewarmness, if not with absolute hostility, on the many opportunities thus open for the obscure professional man, probably, as Gray has it, "A youth to fortune and to fame unknown," to further his advancement and to ultimately achieve success, have really never been reasoned into the position and attitude they take.

In the first place, by this method, a strong belief and advocacy in the policy of universal "Free Trade" is shown, the soundness of which, I venture to affirm, no one will be prepared to question, and thus is secured by the market the privilege of purchasing in the open market. Liberty also is afforded for any qualified practitioner to dispose of his wares (*i. e.*, the prodnct of his brains and skill), wherever that kind of merchandise is in requisition, and thus a wide field of additional opportunity and usefulness is opened out to us, and which may largely conduce to the greater prosperity of our profession. Again, the competitive system is largely instrumental in bringing about an entire immunity from those petty jealousies which we all deplore, but which are frequently experienced in many provincial towns, where several practitioners are about equal in status, professionally and socially. If competitions be framed and conducted on strictly equitable lines (which is of paramount importance, and to which I shall shortly refer), then the spirit of emulation being stirred, each competing architect is dependent entirely on the merit of his effort, and not on the number and the influence of his friends; then it follows that the discreditable and unprofessional touting, which is greatly to be deprecated, but which, alas! is only too frequently resorted to, at once ceases, and a more honourable and equitable state of things is adduced.

There is one other advantage I should like to point out that the public obtain through their encouragement and adoption of competitive work. It is the benefit of having any contemplated architectural project attacked by a number of distinct minds, and the results submitted for their inspection and choice. Frequently one's attention is arrested, whilst inspecting competitive designs, by some that exhibit a freshness of conception, an originality, and a boldness that doubtless has been drawn out by their authors zeal to excel, and which, I venture to state, would not be obtained through any other agency. No more being attempted than is done, but a faithful performance of what is undertaken to be performed.

Many of us will recall with pain the heartburning and strong sense of indignation we have been occassionally subjected to by a flagrant deviation from rectitude and fair dealing on the part of the promoters in some competition, into which we have been cajoled to enter the lists. The indifference displayed by such unscrupulous people to the inexhaustible patience, time, and labour that architects have fruitlessly given, is so inconceivably deplorable that it will hardly bear discussion. The question as to how this particular evil is to be remedied forms part of a larger question affecting the whole subject. But are we not all "masters of our fates"? Does not the blame for such a state of things chiefly rest with ourselves, and have we not the remedy mainly in our own hands? It is invariably the case that in these "questionable" competitions, neither are the "instructions, drawn up" on lines suggested by the Institute, or by some practitioner (a man of repute), nor is any mention made in same as to the promoter's intention to call in a professional man to advise them in arriving at a decision. With these very ominous omissions clearly before us, it is our duty to our profession, as well as to ourselves, to leave all projects framed on such doubtful lines severly alone, and I for one shall gladly welcome the day when every practising architect shall consider it his duty as well as his privilege to become a zealous and enthusiastic supporter of the Royal Institute, thus further to strengthen its hands by which alone it can successfully cope with some of the disabilities we still have with us.

* From a Paper read before the Manchester Society of Architects.

An action has been entered by the management of the Dominion Bank with the object of preventing the Baldwin Estate from building upon a light area on the west side of the bank building on King street, Toronto. It is claimed that the lease of the land on which the bank stands covers also the area.

ORNAMENTAL TREATMENT OF IRON.*

IRON has great cause to be dissatisfied with the mode of ornamental treatment it has received. Its special qualities as a building material have conferred such general advantages that it is a matter for regret we do not pay the attention to its appearance that we give to it in its purely useful capacity. The generous aid which it lends to us in the solution of our building difficulties and the manner in which, by its use, we are enabled to do so much that was hitherto impossible, surely demands that its worth shall cease to be covered by imitative and unsuitable designs. Who is the engineer or architect that has not had reason to be thankful for its aid, perhaps as a girder in getting over a troublesome span where intermediate supports would have been objectionable; or by its use as columns in the little lateral space taken up in proportion to the work done, and where by reason of its bulk stone would have been inadmissible, and in return the mean action is taken of covering up the iron girder with wood and cement, and by painting and sanding, making it look like a stone lintel, which could never have done the work. Or in the case of a column, by moulding it after a Classic model, totally ignoring the very palpable fact that by its lean shaft all the proportions of the model are lost. On no account should any of the Classic columnar Orders be applied to it, for if enough of iron is used to retain the usual proportions waste of materials is bound to occur, and, on the other hand, if the use is made economically the ratio of thickness to height is sure to result in a sickly and lean effect. The advantage of iron is that it enables us to do the work required with much less bulk than if stone, brick or wood were used; therefore it is contended that it is contrary to the ethics of good design to make it appear like those materials when doing its superior work. In the case of the girder or truss surely there can be no logical objection to their straightforward exposure. The rivets and the L irons could easily be left to make a presentable appearance. An example of a girder exposed is to be found in the front of a recent large building erection in Sydney, and it must be admitted that its calm, dignified and straightforward appearance is not unpleasing. The flanges and L. irons have been carefully worked, and the heads of the rivets left very clear; but beyond this there is nothing in the way of ornamentation, and none is wanted, for where it has to do laborious work a simple but effectual appearance is the best, and it would be entirely out of place fancifully to ornament it. Deference must of course be paid to the necessity for sheathing the iron columns and girders with fire-resisting material; but this is not always necessary, for there have been one or two examples of iron columns and girders so constructed and arranged that by means of a fusible plug in case of a fire, a continuous stream of cold water will circulate throughout them, provision also being made that all cradles and seating should have similar benefit; and an able paper was read before the Engineering Association of New South Wales touching on the subject, which will be found in the *Proceedings* of that Institute for 1892. Wrought iron is capable of lending itself to very delicate and artistic treatment, and recourse to it should always be taken to give the necessary contrast to the heavier and more substantial construction. Gates, grilles, railings, finials, etc., are excellent chances to treat in a light way, and the most beautiful results can be obtained. Every designer can appreciate the addition to the proportions of a building which a raised and curved roof makes, and the strength and pliability of wrought iron in every way conduces to the easy attainment of such roofs. Sir Gilbert Scott in *Gothic Architecture, Secular and Domestic*, expresses the opinion that "there can be no doubt that the iron roof is susceptible of exquisite beauty." And it would indeed be difficult to prove the contrary. But unfortunately it is seldom that even an attempt is made to gain such a result. It is, however, in its cast state that most of the anomalies exist. At the present there is a term—"cast-iron impudence," which is freely used, and actually it might be suggested that it had its origin in the glaring and impudent manner in which cast-iron ornament is plastered over our buildings. It is not going too far to say that almost 80 per cent of recent erections in the colonies have in some way been made to rely on this stuff for appearance, and yet at the same time it would be impossible to find more than about six different designs amongst the whole. In every city and town is to be found the cast-iron shop, the keeper of which has set out on the walls the same monotonous display of specimens to be found in every other place of a like nature. He calls each design by some fanciful but totally inappropriate name. He sells it by the foot, it is put up by the foot and the result is a never-ending array of yard after yard of cast-iron, soutterly bereft of any variety or beauty as to be positively offensive to a tasteful eye and totally stamp out even a spark of regard for cast-iron. It is not only the want of variety or beauty in the design, but also the roughness of the casting, no care being taken to preserve a good surface or sharp edges; and the casting very often appears a confused mass of dots and lumps. It must not be thought that the purpose of this paper is to entirely condemn the principle of treating it for ornamental purposes; but some improvement might be made with advantage in the habit of making in cast-iron an attempt to resemble, for instance, ferns or other vegetable forms. Cast-iron should not be used for purposes of ornamentation only, but rather primarily as meeting a necessity and then ornamented to make presentable. As an instance, might be taken a column in a store, the plain shaft of which together with a simple and unostentatious cap merging in a cradle with bracing studs, is far better and more in place than to have an elaborate thing in Corinthian style put in somewhere in the front, with no other reason for its existence than that it is intended to make a nice appearance; or again, would it not be far better to just have a little, but suitable wrought-iron work, judiciously used, than all the cast-iron fringes, crests, brackets and finials, which are so unmercifully used? Cast-iron is best used only when compressive strain is to be resisted, and in such cases it should be very unostentatiously beautiful. If used only for ornamental purposes the greatest care should always be exercised not to indulge in an excess which is so tempting on account of the ease with which such is produced. All materials which allow of being moulded or cast, and thereby easily multiplied, conduce to quantity in large proportion, to trouble in production, and human nature is so fond of display that the inevitable result is over bearing and debased ornamentation; not so much the consequence of itself in its parts being bad, as because of being in direct violation of the rule—"that of the best we may have too much."

* From a paper by Mr. Jas. Mangle, read before the Engineering Association of New South Wales.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

A decision has just been rendered by Judge Delorimier of the Superior Court upon a novel and important point. Mr. Alex. Hurtubise, against whom the late Mr. J. J. Brown, architect, brought action for $30,000 damages for injuries sustained by being run over on the public highway, petitioned for an order to compel deceased's family to allow an autopsy to take place, the petitioner's contention being that such an autopsy would reveal the fact that Mr. Brown died of diabetes, and not from the injuries received. The judge refused to grant the petition, on the ground that although Mr. Hurtubise had a real interest in the matter, still the court could not take upon itself to protect an individual interest by violating the general principle which makes the home of each family a castle that must be respected in its sanctity and privacy.

A movement is on foot to have a boulevard constructed of the width of 150 feet from the market on St. Lawrence Main street to St. Denis street, with the Monument Nationale at one end and the new Laval University building at the other.

A recent examination by the Inspector of Buildings revealed the fact that the spire of St. Andrew's church has shifted about six inches in a northeasterly direction. In consequence steps have been taken to anchor it more firmly.

Thomas Evans and Edward Reil have registered to carry on business as general contractors.

Upwards of $200,000 is said to have been expended last year in making extensions and improvements to hotel buildings in this city for the purpose of accommodating the crowds of visitors who were expected to stop over here en route to or from the World's Fair. The crowds have failed to put in an appearance, and the hotel owners are lamenting their fate.

Death is rapidly thinning the ranks of senior Montreal architects, three of whom have been called away within the last year. The last to be cut down was Mr. John James Browne, who died at his home in this city at an early hour on Thursday, the 3rd inst. Mr. Browne received serious injury by being knocked down by a horse and sleigh on the street in Montreal last November, and although for a time he rallied, the accident appears to have induced an attack of Bright's disease to which he eventually succumbed. Mr. Browne was born in the city of Quebec on the 12th of October, 1837, and was educated at the High School in that city. He began the practice of architecture when nineteen years of age, and obtained second and first-class certificates as the result of a post-graduate course under the celebrated engineer and architect, Lord Russell. He had an extensive practice in this city and province. He was elected a member of the Council of the Province of Quebec Association of Architects at the last annual convention. He was also a member of the Montreal Board of Trade and a Justice of the Peace. A wife, three sons and three daughters are his survivors.

LONDON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

A well-known contractor of this city writes: I observe in the London correspondence of the ARCHITECT AND BUILDER for July the statement that there is a good opening in this city at present for outside contractors, owing to the limited number of bidders and the large amount of work in progress and projected. Your readers are told that for want of competition the cost of buildings is maintained at such high figures as must tend to retard building enterprise. This is far from being a correct presentation of the situation in this city. The facts are that at present the number of resident contractors is more than sufficient to provide active competition in tendering for all contracts. As regards prices, they are barely sufficient to cover the cost of the work and leave a slight margin of profit to the contractor. Surely it is not desired that contractors should work for nothing. An attempt is being made by some of our local architects to introduce some of the features of modern American architecture into their designs, especially in residence work. The local contractors not having had experience with work of this class, do not know with any degree of definiteness what the cost of execution may be. In submitting tenders, therefore, they increase their bids for this class of work as compared with the work to which they have been accustomed, to the extent which they deem necessary to cover the extra cost of its execution. This is all the foundation that exists for the statement that prices have advanced or are higher than usual.

HAMILTON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Mr. George Webb, a well-known builder of this city, was recently summoned before the courts at the instance of the Building Inspector, on a charge of violating the city building by-law. The offence alleged consisted of covering with wood instead of metal the tower of a church building. Mr. Webb showed that the wood covering of the tower was cased with brick, whereupon the magistrate dismissed the case.

The expenditures of the Board of Works have already exceeded the appropriation by the sum of $10,000.

The residence of Mr. James Balfour, architect, was recently ransacked by burglars.

The significant statement appears in one of the daily papers that while the building permits for a given month aggregate $57,675, the actual building operations have been much more extensive. In other words the building by-law, which requires a permit to be obtained prior to the commencement of every building, is not enforced.

HANDY TABLES OF DIMENSIONS OF JOISTS AND RAFTERS.

FOR ready use in the office the following tables, submitted by H. Maack, Principal Academy of Architecture and Building, St. Louis, through the *Southern Architect*, will be found practical and time saving. No development of formula is required, but simple multiplication of the clear span in feet by the factor hereafter given will give the desired width of joists or rafters for any span for 2″ joists. For 2½″or 3″ joists, it will be required to use the formula, but in the common buildings 2″ joists are generally used and the free bearing length or span can be readily taken from the plans. It will therefore only be necessary to find the varying width or breadth, and this will vary according to the load or span.

The tables are computed from the formula:

$$h = \sqrt{\frac{p \times l \times 3}{k \times t \times 4}}$$

in which the letter

h = height, breadth or width of joists or rafters in centimeters.
l = length or span of joists or rafters between support in centimeters.
t = thickness of joists or rafters in centimeters.
k = safe load, for yellow pine 60 kg., and for white pine 50 kg. per square cm. of section area, with a safety factor of 10.
1 kilogram (kg.) = 2.2 pounds
1 meter (m) = 3′ 3⅜″ = 3.28 feet = 100 centimeters (cm.) = 1000 millimeters (mm.)

TO FIND THE BREADTH = H.

For ready use of the tables the value "l" is already transformed into feet, and the clear span or length of joists or rafters between supports = l, must be used therefore in feet only.

OWN WEIGHT OF CONSTRUCTION, AS JOISTS, CEILING AND FLOORING.

Per square foot—2″ × 10″ joists—16″ to center 12 lbs., 12″ to center 15 lbs.

Per square foot—2″ × 12″ joists—16″ to center 15 lbs., 12″ to center 18 lbs.

Per square foot—2″ × 14″ joists—16″ to center 18 lbs., 12″ to center 20 lbs.

Per square foot—2″ × 6″ ceiling joists and 1″ plaster and lath, 16″ to center 15 lbs.

Per square foot—horizontal measurement of roof, including wind and snow, 50 lbs.

The loads given in the tables include the load of the construction.

TABLE I.

FOR DWELLINGS AND FACTORIES USING LIGHT MACHINERY.

Supposed load on the square foot floor space = 80 pounds.

2″ joists 16″ to center; h = 1 ft. × .75 (¾)″ yellow pine or × .8 (4-5)″ white pine.

2″ joists 12″ to center; h = 1 ft. × .66 (⅔)″ yellow pine or × .7 (7-10)″ white pine.

TABLE II.

FOR STORES.

Supposed load on the square foot of floor space = 110 pounds.

2″ joists 16″ to center; h = 1 ft. × .9″ for yellow pine.

2″ joists 12″ to center; h = 1 ft. × .77″ for yellow pine.

TABLE III.

FOR DANCING HALLS, HAY AND FRUIT STORES.

Supposed load on the square foot of floor space = 150 pounds.

2″ joists 16″ to center; h = 1 ft. × 1″ for yellow pine.

2″ joists 12″ to center; h = 1 ft. × .9″ for yellow pine.

TABLE IV.

FOR SALT WAREHOUSES AND WORKSHOPS USING HEAVY MACHINERY.

Supposed load on the square foot of floor space = 175 pounds.

2″ joists 16″ to center; h = 1 ft. × 1.13″ for yellow pine.

2″ joists 12″ to center; h = 1 ft. × .98″ for yellow pine,

TABLE V.

FOR GRANARIES.

Supposed load on the square foot of floor space = 200 pounds.

2″ joists 16″ to center; h = 1 ft. × 1.2″ for yellow pine.

2″ joists 12″ to center; h = 1 ft. × 1.″ for yellow pine.

TABLE VI.

FOR WAREHOUSES IN GENERAL.

Supposed load on the square foot of floor space = 220 pounds.

2″ joists 16″ to center; h = 1 ft. × 1.25″ for yellow pine.

2″ joists 12″ to center; h = 1 ft. × 1.1″ for yellow pine.

TABLE VII.

CEILING JOISTS.

Supposed load of construction, *i. e.*, joists and plastering = 15 pounds per square foot.

2″ joists 16″ to center; h = 1 ft. × 24″ (¼)″ yellow pine, or × 3 (¼)″ white pine.

2″ joists 12″ to center; h = 1 ft. × ¼″ white or yellow pine.

TABLE VIII.

FOR RAFTERS OF FLAT AND HIPPED ROOFS.

Supposed load on the square foot horizontal = 50 pounds; this includes the construction, snow and wind loads. Measurement taken from roof plan, independent of slant of roof.

2″ rafters 24″ to center; h = 1 ft. × .6381 (⅔)″ for yellow or white pine.

2″ rafters 20″ to center; h = 1 ft. × .583 (3-5)″ for yellow or white pine.

2″ rafters 16″ to center; h = 1 ft × .5 (½)″ for yellow or white pine.

Collar beams must be inserted for hipped roofs, if rafters are longer than 12 feet; make same one-half the thickness of rafter, but the same width.

APPLICATION OF THE TABLES.

1st Example.—In a dwelling where joists have a clear span (l) = 16 feet, What is the proportionate width (h) for yellow and white pine, for 16″ to center and for 12″?

1st Answer.—16″ to center, yellow pine considered; Table I., shows for h = 1 × ¾″ = 16 × ¾ = 12″. Thus 2″ × 12″ yellow pine joists placed 16″ to center would answer our case.

2nd Answer.—12″ to center, yellow pine considered; Table I., gives h = 1 × .66″ or 1 × ⅔″ = 16 × ⅔″ = 10⅔″. In this case 2″ × 10″ yellow pine would suffice, spaced 12″ to centers.

3rd Answer.—16″ to center, white pine considered; again taking from Table I., our factor given for white pine 16″ to centers we find h = 1 × .8″ or 4-5″ = 16 × .8″ = 12.8″; therefore 2″ × 12″, although a little weak, will do.

4th Answer.—12″ to center, white pine considered; Table I., shows us h = 1 × .7″ or 7-10 = 16″ × .7″ = 11.2″; 2″ × 12″ should be used, 12″ to centers.

We should not forget to arrange one row of cross-bridging for every 7 ft. of span. In case we get results like answers 2 and 3, one additional row of bridging will make up for the fraction of an inch we neglect to make use of the nearest stock-joists. The bridging does not increase the strength of the joists, but mainly acts to hold them upright and from turning over sideways. In a later paper we will see how bracing with 1″ strips will increase the strength, sometimes employed for wide spans and when the time is too short to get special thicknesses cut by the mills.

2nd Example.—Find the dimensions of ceiling joists required for the span of 15 feet.

From the Table VII. we obtain the formula:

h = 1 × ¼″ yellow pine, or 1 × ⅓″ white pine, 16″ to centers; *i. e.*, 15 × ¼″ yellow pine, or 15 × .⅓″ white pine, 16″ to centers.

Thus 2″ × 4″ yellow pine, or 2″ × 6″ white pine would be right. If we try on 12″ centers, Table VII. shows h = 1 × ⅓″ for white pine = 15 × ⅓″ = 2 × 4″ white pine, 12″ to centers will answer this case satisfactorily.

3rd Example.—A hipped roof ½ pitch; find the rafters required. Table VIII. is needed. We find 1 × ⅔″, or 1 × 3-5″, or 1 × ½″ for the distance to centers, of 24″, 20″ and 16″ respectively. The house may have a width of 26 feet. To find the length of the rafters we use the Theorem of Pythagoras. "In a right angled triangle the longest side (hypothenuse) is equal to the square root of the sum of the squares of the two small sines," or $c = \sqrt{a2 + b2}$, developed from $c2 = a2 + b2$, where c = the longest side or hypothenuse, a and b the other two small sides (catheti.)

In our example ½ of width of the building = ½ of 26 = 13 feet is one cathetus and the other also 13 feet by ½ rise roof; thus the formula $c = \sqrt{a2 + b2}$ becomes when b = a, $c = \sqrt{a2 + a2} = \sqrt{2a2} = a\sqrt{2}$. This last expression is convenient if a is an irregular number, for the $\sqrt{2}$ is found in most any hand-book like Kidder's on page 8; gives: $\sqrt{2} = 1.4142$, this × a (= 13) = 18.38 feet length of rafters. The formula $c = \sqrt{2a2}$ would have been more convenient here for 2a2 = 2 × 13 × 13 = 338 and the $\sqrt{338}$ = 18.38 ft. found on page 13 of Kidder.

If only an approximate answer for the length of rafters is desired, which would fully satisfy our figuration, we may use the improper fraction 7-5 and multiply one, the equal small sides of our right-angled triangle, thus: 7-5 × 13 = 91-5 = 18 1-5 ft., near enough for our purpose, as we take only the nearest full feet (18) into consideration. h = 18 × ⅔″ = 12″, or 2″ × 12″ rafters, 24″ to centers. h = 18 × 3-5″ = 10 4-5″, or 2″ × 10″ rafters, 20″ to centers. h = 18 × ½″ = 9″, or 2″ × 8″ rafters, 16″ to centers.

The rafters being over 12 ft. in length, it will be required to insert collar-beams. If we get sufficient tie at the foot of the rafters to the joists, we may design the collar-beams 8 ft. above floor. On supposition that outside wall and top of rafter meet in floor height, we obtain the length of the collar-beams as follows: Whole height of roof 13 ft., less 8 ft to bottom of collar-beams = 5 ft. multiplied by 2 = 10 ft., the length of the collar-beams; for twice the rise = span by ½ pitch roofs. This last holds good in this particular case only, but proportion will solve it under all circumstances. Entire height to entire span as is partial height to collar-beam, *i. e.*,

$$13 : 26 = 5 : X$$
$$X \times 13 = 5 \times 26$$
$$X = \frac{5 \times 26}{13}$$
$$= 10 \text{ feet.}$$

PERSONAL.

Mr. Chas. A. Bradshaw, a well-known Toronto builder, died on August 5th, age 54 years.

Mr. J. A. Ellis, architect, of Toronto Junction, has lately returned from a visit to the United States.

Mr. Thomas Smarr, a well-known and respected builder of the city of Toronto, died on July 14th.

Mr. Ernest Wilby, who has spent the last two years in the study of architecture in England, has returned to Toronto.

Mr J. W. Gray, architect, of Toronto, was severely injured a fortnight ago by being thrown from a carriage at Brantford.

Mr. John Wilcox, builder, who had been a resident of Toronto for half a century, died at his residence in that city a couple of weeks ago.

Mr. Fuller, Chief of the Department of Architecture at the Dominion Capital, is enjoying with his family a period of relaxation in the lake district near Peterboro', Ont.

Col. Charles G. Otis, of the Otis Bros. Co., manufacturers of elevators, died at his residence in Brooklyn, on the 7th inst., age 62 years. Col. Otis had been in feeble health for a year or two past.

Mr. Richard M. Hunt, of New York, received from the hands of the President of the Royal Institute of British Architects, on June 19th, the Victoria Royal Gold Medal awarded him by the Institute some months ago.

SANITATION AND HEATING.

EFFECTIVENESS OF HEATING APPARATUS.

THAT there is a wide difference, as pointed out by the *Building Register*, in the effectiveness both of hot-water heating and steam-heating apparatus is a fact known to all well-informed men engaged in the heating trade, but in many instances this difference is accounted for by referring it to anything but the proper cause—namely, defects in the system of piping between the steam boiler or water heater and the radiators. The boiler may be good, the radiators may be the best in the market, yet the result is unsatisfactory. In most such cases it will be found that not enough study and care have been given to arrangement of pipes and radiator connections, to their proper sizes with reference to the surface they are to supply, to their pitch, to the supply in steam-heating pipes of proper relief pipes, to avoidance of traps in pipes, to provisions for expansion under the action of heat, and so on to the end of the chapter. These remarks apply to both large and small installations. Some of these defects are not always chargeable to the contractor who puts in the apparatus. Many buildings, large and small, can be found wherein, when first erected, the heating apparatus worked excellently, but in a year or two began to snap and pound vigorously, while its lack of vigor in heating some parts of the building became uncomfortably apparent to complaining occupants. What has happened during the interval between satisfactory testing and the failure to heat successfully is that the building has settled unequally, thus neutralizing, and in many cases often reversing, the inclination given by the fitter of the pipes and canting radiators so that their outflow connections are higher than their inlets. Examine the boiler; you will find there nothing to prevent efficiency. Radiators and valves, water-feeding and draft-regulating appliances may be all in first rate working order. The fault is that the piping has been disarranged because the building has settled, and settled unequally.

DIRECT-INDIRECT RADIATORS.

OUR German exchanges advertise something which seems to us, says the *American Architect*, to be worth the attention of architects and designers here, in the shape of direct-indirect radiators, formed, not of vertical tubes or castings, as is usual with us, but of horizontal coils. The idea is not new. We have ourselves employed the same arrangement, and have seen it used by others, but the fact that a manufacturing house finds it worth while to make and send out such coils in large quantities suggests the probability that, with a little study, coil radiators might be made with castings put together with bolts as vertical radiators now are, which would heat better, particularly for direct-indirect systems, and be more ornamental. It must be confessed that, so far, no beautiful objects in the shape of vertical radiators have made their appearance in the market. We do not say that they cannot be made, on the contrary, it is possible that a delicate colonnade design might be successfully adapted to such radiators; but the surface-ornamentation hitherto employed has only increased the desire of architects to conceal appliances of the sort as much as possible. With coils, it seems to us that much more might be done. In the German examples, the coil is a flattened spiral, the fresh air introduced from out of doors being brought up through the middle. This is a good shape for circulation, as well as for heating. It is well known that horizontal coils heat much more air, for a given surface, than vertical tubes, and it would be easy, in a cast radiator on this system, to arm the hollow interior of the coils with pins, which must increase their efficiency.

A new hospital building has recently been completed in Owen Sound from the plans of Mr. J. Forster, architect, of that town. Accommodation has been provided for seventy patients and the necessary staff of attendants. The building, which cost $10,500, is three stories in height with a basement, and is constructed of brick. Mr. Alex. Greene was the contractor.

DECORATION AND FURNITURE.

ON SOME OF THE ARTS ALLIED TO ARCHITECTURE.

MR. WALTER CRANE, in an excellent paper on the above subject, says:

I fail to see how any art can be wholly taught or learned on general principles, since it is of the nature of art to address itself to particular problems, the conditions of which constantly vary. Certain general principles have been evolved out of collective practice of more or less value no doubt in a general way, but they must always be liable to qualification in their adaption to particular cases.

Nothing of the nature of art can be formulated as an exact science, happily, or the limits of its invention and variety would soon be reached. Art, however, has its scientific side, though the science of art is not exactly scientific or theoretic, but practical, and rather consists in recognizing particular necessities of conditions and materials, and the realizing that the frank acknowledgement of the nature of these conditions and materials leads in all the varieties of design, in association with craftsmanship and architecture, to the highest beauty.

The peculiar beauty of a stained-glass window, for instance, is entirely dependent upon this frank acknowledgement of conditions. A screen of transparent color, a pattern defined and united by leads and held in position by iron bars. Directly any attempt is made to overstep its natural limits—to make it look like a painted picture, to get chiaroscuro and vanishing points, or try to ignore the leading as an essential condition of its existence, the charm and joy of it is lost. There is a distinct character and beauty both in plain-leaded glass, throwing a pleasant network of simple geometric lines over the blankness of window panes. Henry Shaw, in his glazier's book, gives a great variety of delightful leading patterns.

Now, any design for a colored-glass window should, in the first place, be a good arrangement of lead lines, I think, a good pattern in short, whether figure subject or not; and, secondly, a good pattern considered as an arrangement of color or jewelled light.

The artistic designer and maker of a wrought-iron gate, grille or railing, whatever phantasy he might introduce, would never forget the essential requirements of a gate, grille or railing. He would never forget the architectural relation of his work, or rather he would make the chief beauty and inventiveness of his treatment of wrought-iron spring out of that relation.

The practice of modelling in clay designs intended to be carved in wood has, it seems to me, been most destructive of the beauty and character of true wood carving. The same may be said of stone and marble; the essential spirit and go of the thing, the characteristic touch and treatment with each material, in which the designer works, claims as its own, and which is its own particular reason for existing—these are, of course, lost, or turned out of recognition when a copy is made of something already existing in a material and produced by a method totally different.

Much better keep to simple mouldings and plain paintings than bring in ornament which has no character or meaning of its own. We must not confuse the mere spreading of ornament with decoration in its true sense, for design in all its forms may be said to be governed by an architectural instinct of its own, which makes it a harmonious part of the building with which it is united, and which unites it, and puts it in harmony with itself.

William Morris, in calling attention to the work of the designers of the past, recognizes the subtle sense of truth and simplicity, the delight in the beauty of nature around them, which was a perpetual tonic to the toil-pressed craftsman, and without which, no art, past or present, can have meaning or endurance. He says, speaking especially of early Persian art, which in its best development, was decorative art: "In their own way they meant to tell us how the flowers grew in the gardens of Damascus, or how the hunt was up on the plains of Kirman, or how the tulips shone among the grass of the mid-Persian valley and how their souls delighted in it all, and what joy they had in life; nor did they fail to make their meaning clear to some of us. One who has devoted much attention to the study of Greek art, lately remarked on the relation maintained in this masterpiece of mural sculpture between the relieved figures and the ground space; each piece of relief is balanced by an empty space of the same extent, though, of course, different in shape, so that could the *relievo* be compared with the *basso* in the whole design, they would be found to correspond in extent."

PUBLICATIONS.

The name and good-will of *Metal*, of New York, have been sold to Mr. David Williams, who will amalgamate the paper with the *Metal Worker* and the *Iron Age*.

Messrs. S. E. Hendricks & Co., 54 Broadway, New York, have just issued the third annual edition of "Hendricks' Architects' and Builders' Guide and Contractors' Directory of America." The book contains nearly 700 pages and 170,000 names and addresses arranged under 800 classifications. It appears to have been compiled with care, and should prove valuable to architects, manufacturers and supply firms.

LIFTING UP A MASSIVE BUSINESS BLOCK.

THE World's Fair is full of wonderful sights, but it contains nothing so amazing, so thrilling to an observer, or more interesting to the builder, than the scene on Monroe street, Chicago, where a massive stone and brick business block is being raised up bodily a distance of fourteen feet for the purpose of interposing an additional story. The building measures 50 x 106 feet, is six stories in height. The thickness of the walls was inadequate to support an additional story above, and the only alternative was to interpose one story at the ground level, the foundation being sufficient to carry one additional story.

The weight of this building above and including the main floor was found to be 11,440,000 pounds or 5,720 tons, in round numbers twenty-seven pounds to the cubic foot. There are used in the raising of this building 1,800 three-inch jack screws. To operate these screws 132 laborers are required, each one having charge of from eight to twelve screws. At a given siginal on a shrill whistle each man, with an iron bar four feet long, gives each screw a one-quarter turn. The pitch of the screws being five-eights of an inch, each one-quarter turn raises the building three-sixteenths of an inch, and it is found that the immense load of 5,720 tons can be raised three inches an hour. When the screws have been turned from their blocks twelve inches, new support is required, which is secured by a blocking of 6x6 inch timber. The screws, which are twenty-four inches long, are then slackened, the load placed upon the new blocking and the screws set for another turn. At no time is there more than one of the group of twelve screws without a load.

Experience has proved to these self-taught screw engineers that the limit of weight at any time given to one screw should not exceed five tons, although it is known that a strong man with a four foot lever can raise three times this amount. An experiment was once tried as to the breaking strength of one of these screws and it was found that the flange which supports the screw, broke at the extraordinary weight of fifty-four tons. The weight of the building being 5,720 tons and there being 1,800 screws, the proportion of the weight upon each screw is three tons, so that the factor of safety in this piece of work is about eighteen. During the raising of this building careful records are taken and frequent measurements are made to ascertain whether or not the building is raised perpendicularly from the point from which it started. Should any laborer neglect to give the proper turn to the twelve screws under his charge, the result is at once shown by these measurements. This system also insures the exact vertical raising of the building, assuming, of course, that it starts from a level surface. As soon as the building is raised to the intended height—14 feet and 8 inches—the work of building up with steel columns and girders and masonry will be commenced and the building lowered onto its new supports; the interior will then be completed as in an ordinary work.—*Stone.*

TIN ROOFS.

THOSE who are interested in the subject of free trade versus protection duties will find an interesting problem for solution in tin plate and its application for roofing purposes, writes Arthur Seymour Jennings in the *Plumber and Decorator*. Probably one-half of all the roofs in the United States of America are covered with tin plate. Most of it is made in Wales, is exported into America, and a duty is exacted. The subject of tin plate has been discussed at length in the papers, especially in connection with the notorious McKinley tariff; and buckets full of ink have been wasted in trying to arrive at a clear understanding as to whether the American Government are best serving the people in taxing an import so widely used, considering that the material is not made at all in the States, or at least to any extent. Our readers may be familiar with the fact that there have been one or two attempts to start tin plate factories in the States by the aid of workmen obtained from England.

But it is not to enter into a question of tariff that this article is written, but rather to call attention to the somewhat remarkable fact that tin plate, although made at home, is not used at home for roofing purposes. That it forms a very economical roof-covering, the first cost of which is low, and the durability of which is considerable, will readily be conceded by those who have had an opportunity of examining it in use. Why then should it not be used in England? Of course, it can only be applied to roofs that are comparatively flat, but then we have very many flat roofs that are covered with zinc, sheet lead, or copper.

At first thought a number of objections to the use of tin plate will suggest themselves. It may be said that it would not stand the climate, that flat roofs are objectionable in any case, and that even zinc roofs are more frequently in bad order than they are in good. In answer, we may point out that the climate of the United States is much more severe than that of England. In few localities east of the Rocky Mountains is the temperature less than 100 degs. sometimes in summer, or more than several degrees below zero sometimes during the winter. Broadly speaking, it may be said that anything that will stand the climate of America will prove durable in England. This is leaving out certain limestone and other materials that are likely to be injuriously affected by the action of sulphuric acid contained in the air when large quantities of soft coal are burnt, such as is the case in English cities.

Flat roofs are, of course, objectionable, but they are nevertheless a necessity, and if they are to be covered the main object is to render them permanently watertight at the lowest possible cost. The writer claims that this can best be done by the use of tin plate.

As to the durability of tin roofs. When properly laid and painted periodically, they last certainly as long as zinc, in fact, it is claimed that, if the painting is done every second year, they will last indefinitely. The tin is laid without rolls, and usually without laps, the joints being simply soldered together. The usual flashings to the wall are provided, but that is all.

The durability of a tin roof depends largely upon the paint. In the best roofs the under surface of the tin is painted with a single coat and the upper surfaces with three coats. Before the paint is applied any resin adhering is scraped off, and then the whole of the surface is washed clean with benzine to make it entirely free from grease. Some roofers allow the tin to become rusty before applying the paint, on the theory that this will afford a better hold. This practice is, however, entirely objectionable, because the rust once started continues. The cost of painting is not large as a cheap paint is used, made principally of oxide of iron or metallic brown. The application of it does not require the employment of particularly skilled labour.

Considered altogether, it would appear that the merits of tin roofs should claim more attention from house owners and architects than they receive at present.

USEFUL HINTS.

The finest kind of iron tubes ever used to convey gas, steam or water, were seamless drawn steel and brass tubes of almost any diameter and thickness.

HARD AND INATTACKABLE CEMENT.—"Kosmos" gives the following formula for the composition of a cement which sets in four or five days, when it becomes so hard as to scratch iron, serving to cover terraces, line fountain basins, and connect blocks of stone. Grind to a fine powder ninety-three parts of crushed brick or well-burnt clay with seven parts of litharge, and mix the powder with sufficient linseed oil to give the consistence of mortar. Before applying the cement, the parts to be covered must be damped with a wet sponge, and if any cracks should show themselves, they must be stopped up with cement.

PRESERVATION OF TIMBER FROM DAMP.—The following preparation is recommended by the *Genie Civil* for preserving timber from the ill effects and deterioration due to damp, while at the same time giving it a clean and pleasing appearance: Sulphur 500 parts, resin 375 parts, and fish oil seventy-five parts are melted together; and, when they are completely dissolved, a small quantity of red or yellow ochre or iron oxide, ground in linseed oil, is added for colouring, the whole being stirred vigorously to ensure a thorough mixture. Two coats of this paint in a boiling state are laid on, the first being allowed to dry thoroughly before the second is applied. It is said that timber thus treated will resist steam and fog as well as damp

HOW TO DRILL GLASS.—A writer in the *Scientific American* describes how to drill a hole in glass: Take a small common three-cornered saw file and break off an inch of the end of it. Then take to a grin stone and grind a blunt point on it, being careful not to hurt the temper. Leave the file in the handle and bore just like you would with an awl. The point of the file should not be longer than the file is thick. Use turpentine as a lubricant, and keep the cutting edges on points of the file sharp with an oil stone. I have bored holes two inches deep in a short time by hand in glass by this method. In boring a plate, I have found it best to bore from both sides, using very light pressure toward the last, always laying the plate solid on a paper bound book.

THE HOLDING POWER OF NAILS.—Relating to tests as to the relative holding power of cut and wire nails, we have, says the *Iron Age*, the following communication from a correspondent in India, who alludes to the effect of time on the holding power of wire nails: "In regard to the tests to be made as to the holding power of cut and wire nails, I wish to say that to make the tests of any value or significance, the work after being nailed should be allowed to stand for a week or two and the nail then drawn. It has been my experience that cases nailed with cut nails are easier to open with a nail puller than the same cases in which steel nails have been used. The cut nail after starting comes out easy, whereas the wire nail holds its full length. Carpenters also say that in taking off shingle roofs that have been nailed with wire nails the shingles break and the nails all remain in the sheeting.

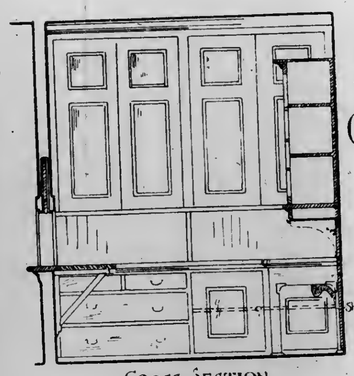
DISPOSITION OF CONCRETE.—When concrete is used to obviate the yieldingness of the soil to pressure, expanse or extent of base is required to answer the end, and to secure this effect, says the *Builder's Reporter*, the concrete being widely spread, should be thick or deep only with reference to its own power of transmitting to the ground the weight of the wall to be built upon it, without breaking across or being crushed. But when concrete is used as a substitute for a wall in carrying a wall down to a low level, it is in fact a wall, wide only in proportion to its comparative weakness in the absence of manipulated bond in its construction, and incased by the strong soil within which it is placed. Whether the proper object be the attainment of a sufficiently expanded base upon a weak soil, or of the sufficient depth below ground in a strong soil, it may be, to exclude meteoric influences, the erroneous notion is that a foundation is rendered strong in the use of concrete by depth rather than by extent of base, and in consequence of this notion heavy buildings are sometimes jeopardized by the friable concrete foundation being placed on its edge instead of being laid flat to cover the breadth of soil necessary to withstand the weight of the superstructure. Concrete, indeed, is at all times more safely to be regarded as a substance to be placed as a layer than as a substance to be set up as a wall, for although with good materials, careful manipulation and patience, excellent erections as walls may be made of concrete, as erections in the same form may be made of tempered clay, neither concrete nor tempered clay is to be regarded as a proper substance with which to form the lofty walls of buildings in towns.

Messrs. P. G. Waters & Son of Hull, Que., have just completed the construction, for the Public Works Department at Ottawa, of what is said to be the largest lifting dredge in America. Its total length is 152 feet; width, 30½ feet; height, 14 feet, the well being 91 feet 9 inches long and 6 feet wide. The machine is capable of dredging to a depth of 50 feet. It will cost in the neighboorhood of $70,000.

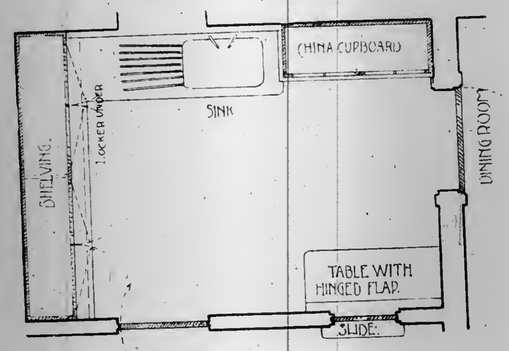
CANADIAN ARCHITECT AND BUILDER:

COMPETITION FOR A SERVICE PANTRY SUBMITTED BY "SPERO MELIORA"

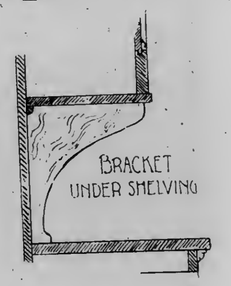
LONGITUDINAL SECTION

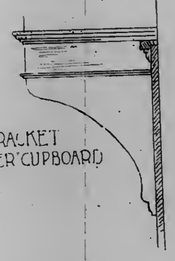


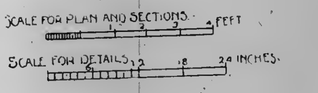
CROSS SECTION.

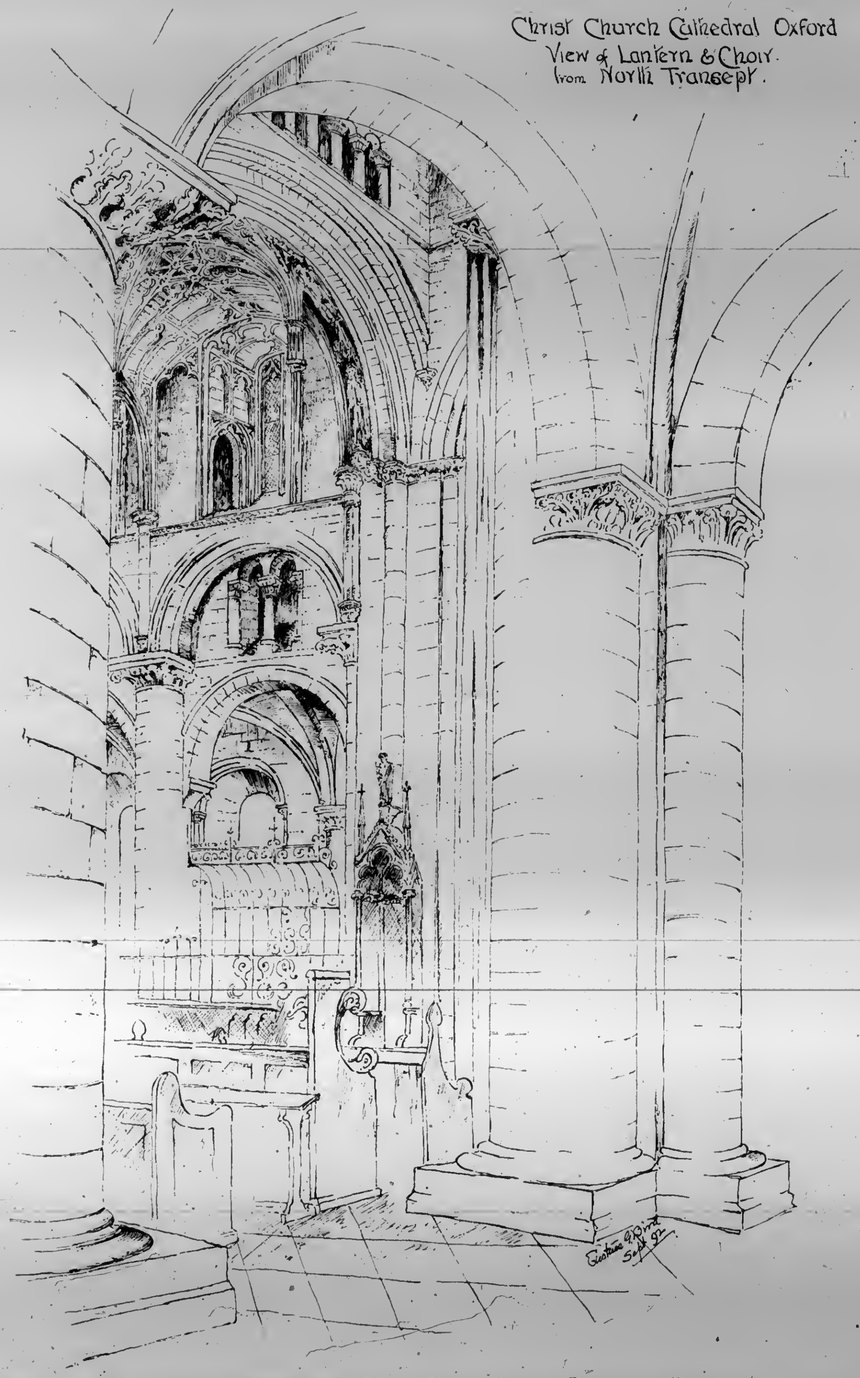


PLAN









Sketch of Lantern and Choir, Christ Church Cathedral, Oxford.

By Eustace G. Bird

Competitive Design for St. John's Episcopal Church, Toronto.—Awarded Second Prize.

J. Francis Brown, Architect, Toronto

Queen's Hotel, Montreal.—A. F. Dunlop, Architect.

CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—No. IX. SEPTEMBER, 1893 { PRICE 20 CENTS / $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
64 TEMPLE BUILDING, - MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and in doing so, should give both the old and new address.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	D. B. DICK, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	JOHN E. BELCHER, Peterboro'.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

DAVID EWART	Ottawa.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
FRANK DARLING,	Toronto.
W. A. EDWARDS	Hamilton.

REGISTRAR AND LIBRARIAN:
W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	V. ROY, Montreal.
1ST VICE-PRESIDENT	J. NELSON, Montreal.
2ND VICE-PRESIDENT	H. STAVELEY, Quebec.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
M. PERRAULT	Montreal.
A. F. DUNLOP, R.C.A.	Montreal.
J. J. BROWNE	Montreal.
J. HAYNES	Montreal.
D. OUELLET	Quebec.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
GEO. MOIR, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. J. HILL.
JOHN ALDRIDGE.
JAS. CRANG.
J. LISTER NICHOLLS.
WM. BOOTH.
JAS. ISAAC.
JOHN LOGAN.
WM. PARK.
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

THE by-law under which $155,000 was expended in the erection of new County buildings at Woodstock, Ont., has been declared informal, a vote of the ratepayers not having been taken upon it as required by law. A special meeting of the County Council has been called to frame a new by-law.

THE young architect should be taught to regard the ability to climb a ladder or a series of ladders as one of the essential qualifications of his profession. Without this ability he is not in a position to see for himself that the work on the parts of his building which can be reached only by scaling a ladder, is being properly carried out. Some architects are lacking in this requirement, and rather than take the chances of a fall, are content to take for granted the quality of the work at the top of the ladders.

THE passenger elevator, which has come to be such a universal and highly appreciated feature of every important office building in America, is but little known in Europe. The disappointment in this respect of the Canadian who visits England and is continually obliged to climb stairs is in inverse ratio to that of the European visitor to Canada, who is delighted to find himself carried from bottom to top of the highest buildings without exertion and within the period of a few seconds.

AMERICAN architects are sharing the burden of the depression which at present exists throughout the United States. In New York, Chicago and other large American cities, the staffs are being greatly reduced in architectural offices. Some Canadian draughtsmen employed in American cities have been so fortunate as to be retained in their situations, whilst others have been deprived of them, and are finding their way back to the Dominion where, unfortunately, the chances for employment are none too frequent.

ANOTHER derrick broke down while under strain in Toronto the other day, one of the chains striking and seriously injuring an attendant. The frequency with which accidents of this character have recently occurred should lead contractors to be more careful to see that derricks are sufficiently strong for the work which they are required to perform. If greater care is not exercised the Legislature should step in and protect the lives of workmen. Not alone in Canada but in Great Britain and Australia, accidents from this cause have become frequent, and the necessity of enforcing greater carefulness in order that they may be avoided is properly engaging attention.

A COMPANY has been formed with the object of erecting a crematory in the City of Toronto. The cost of the building and equipment are placed at about $3,000. A description of the design of the proposed building and of the process of incineration of human bodies, has appeared in the daily press. The amount which is proposed to be risked on the experiment is small, and it is perhaps well for the investors that it is so. The outlook for the success of the venture does not appear to us to be very encouraging. We were recently afforded some particulars concerning the crematory at Buffalo which go to show that the institution has not been a profitable one, the favor bestowed on the new method having been of a very disappointing character. If such has been the result in an American city, there is less reason to expect that so important a deprature from established usage will meet with approval in a community where the people are known to be more conservative in their views.

WITH the close of the vacation and the approach of the long evenings incident to autumn and winter, the present would seem to be a fitting time to consider the proposal which has been made that an Architectural Club, composed of architects and students, should if possible be established in Toronto. The desirability of forming a local organization which would provide means of social relaqation as well as profitable instruction for the architects and students of the city, and which would receive the united support of these classes, was clearly set forth in the letter by Mr. A. H. Gregg announcing the dissolution of the Toronto Architectural Club at the close of last winter. We hope that Mr. Gregg will further endeavor to enlist the co-operation of those who should be interested in an endeavor to give practical shape to the idea.

RECENT legislation and the increased caution exercised by the loan companies is strongly tending to force out of the ranks of the builders those who possess little or no capital. These causes, aside from the lifeless condition of the real estate market, are operating to check speculative building in Toronto. Under present conditions the loan companies will not advance money to the builder until his building is ready to be roofed in, and not then even unless he can present a statutory declaration in accordance with the provisions of the amended Mechanics' Lien Law, showing that not more than fourteen days wages are due to his employees. Should the mortgagor fail to satisfy himself on this point before granting a loan, the claim of the employees for arrears of wages is given priority over the mortgage. Under clause 6 of the amended Mechanics' Lien Act, a similar declaration is required for the protection of the owner before payments are made to the builder on account of the work done on his contract. All this means that the builder must have the means to purchase considerable material and pay the wages of his workmen until his contract is well advanced.

WE are pleased to observe that the remarks recently printed in this journal anent the improvement of the water front of the City of Toronto, are seconded in an editorial which has appeared in the Toronto *Globe*, the writer of which says: "On the waterfront is a great stretch of property, from Yonge to York street, affording admirable dockage for the steadily-increasing fleet of passenger steamers that make their head-quarters in Toronto. They carry hundreds of thousands of passengers yearly, many of them tourists, who spend large sums in Toronto. These visitors obtain their first impressions of Toronto, in many cases, from the temporary and ugly sheds around the wharves. First impressions last. The Mayor and Council should see to it that the present season ends all this. The land in question was, after a bitter fight with the C. P. R., reserved for public docks. Full possession of it will be secured in a few weeks at latest, and before the end of the year new and substantial wharves should be build, the place reserved for a public square fixed upon, and reclamation work begun. It will be too late to build the wharves next season before lake traffic opens. The work, if done now, will pay the city a large dividend and will do much to expand the already large lake travel."

THE untiring energy of Mr. E. A. Macdonald has once again revived the Georgian Bay canal scheme. With much adroitness he has presented a tempting prospectus—a ship canal and shortened navigation; a power canal with an unlimited supply of water capable of developing more electrical energy than Toronto can use for many a long year; and Lake Simcoe—a happy solution of the water question. The canal question, with shortened water route to the north west lakes, will always present attractions: there are many reasons why the question should be carefully debated; there is good reason for believing that shortened water routes will be acceptable to the commerce of the country. The present canal project alone, (independently of the water power and supply), is one of immense magnitude. To bring the level of Lake Huron to the south side of the water shed known as the Oak Ridges, will require cuttings from 150 to 180 feet deep. When Lesseps tried to do this on his Panama canal, he brought down the whole country side into his canal. In the construction of the Manchester ship canal in England, the route was much better known than the country between Toronto and Collingwood. It had been carefully surveyed and was thoroughly examined. There were ample data at hand to determine the topography and geology of the route; the promotors were in possession of the fullest possible information before the work was commenced. Unforseen difficulties encountered during the construction caused the ruin of the company, who had to appeal to the City of Manchester for a very large sum of money to help them along. The Georgian Bay canal and aqueduct scheme is in its present form a visionary proposal, projected by some unknown philanthropic American capitalists for the special benefit of "land poor" Toronto. It is one with which the City of Toronto should have no dealings till it comes recommended by the Board of Trade and some large financial institutions.

MR. SALEY, editor of the *Northwestern Lumberman*, presented a paper to the International Forestry Congress at Chicago, entitled, "Ignorance Concerning Woods." It may interest architects to read his opinion as to their knowledge of the qualities of the various kinds of wood employed in building. It is contained in the following extract: "If I were to arraign more severely one class of men than another for their ignorance concerning woods, it would be our architects, for the reason that it is their business to know. They can tell us about the wearing quality of different stones, the crushing strength of this material and that, but when it comes to any specific knowledge of the lumber used inside of our houses for doors, casings, floors, mopboards and possibly ceilings—objects which are constantly before our eyes—they are wofully ignorant. When furnishing a fine house you select for one room furniture, carpets and draperies of colors to blend, and for adjoining rooms other shades to carry out a general idea of harmony. If the upholstering of the furniture, the carpets, or the portières were to turn another color the harmony would be destroyed. So it may be destroyed through lack of knowledge on the part of the architect. Were you to ask the question, 'I desire to finish my front parlor in one kind of wood, my back parlor in another, the reception-hall in another, my library in another; now as these rooms are practically one, what woods shall I use in order that the harmony may be preserved after the house shall have been in use for years?' I am fearful you would fail to find an architect who could answer it. Architects pay little attention to these vital points, which are really most intimately connected with their business—in fact, are and should be regarded as a part of their business. I am not aware that an architectural journal has given a line to this subject, and the furniture papers are equally dumb." The above criticism could not be fairly applied to Canadian architects, the majority of whom have at least a fairly satisfactory acquaintance with the different varieties of wood. That this acquaintance might with advantage be improved is, however, not to be disputed, and it is also a fact that in no other country can the knowledge be more easily acquired. In this connection we would express the hope that the valuable series of tests of native building stones conducted last year at the School of Practical Science, Toronto, under the direction of a committee appointed by the O. A. A., will in the near future be supplemented by a series of tests under similar conditions, of native woods.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The annual meeting of the above Association will be held in the Legislative buildings, city of Quebec, on Thursday, the 28th inst. There will be held both forenoon and afternoon sessions: one of the principal subjects for discussion will probably be the tariff of charges which the Association has asked the legislature to authorize. It is expected that papers will be read by Quebec and Montreal members of the Association. In the evening the annual Association dinner will be held at the Florence Hotel, invitations to which have been extended to members of the Quebec Government, the Rector of Laval University, the Mayor of Quebec, officers of the Ontario Association of Architects, and representatives of the press.

Mr. Thos. Beatty, a respected member of the Toronto Builders' Exchange, died at his residence in Toronto a fortnight ago. The members of the Exchange in a body attended the funeral.

CORRESPONDENCE.

[Letters are invited for this department on subjects related to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

ENGLISH STAINED GLASS FOR CANADA.

Three very large and handsome windows of stained glass have just been completed by a local firm (Messrs. Wails & Strang of Westgate-road) and forwarded for shipment to Halifax, Nova Scotia. They are designed for St. Paul's, Halifax, the oldest, largest and most wealthy church in Nova Scotia and commemorate the late Judge of Equity of the Province, John W. Ritchie one of whose brothers is a judge of the Supreme Court of Nova Scotia, and another Sir William Ritchie, recently deceased, was Chief Justice of Canada. These windows are to be erected in the east end of the chancel of the church, and from very superior examples of the glass stainer's art. The subjects are drawn from the life of the Saviour, the central window representing the Ascension, and those to the right and left the bearing of the cross and resurrection respectively. It is interesting to know that this particular industry of Newcastle is largely represented in Canada, the firm in question having numerous examples of their art in Nova Scotia, New Brunswick, Toronto, and throughout the Dominion generally.—*The Newcastle Chronicle.*

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—The enclosed clipping from an Englsh newspaper has come under our notice, and we think merits attention. While every one with true artistic instincts would welcome undoubted specimens of the work of the best English designers in stained glass, it seems a cause for regret that when commissions of this kind represents a moderate outlay of money, it should not be spent in Canada. Work such as the firm in question does can be and is easily surpassed by Canadian firms. It is surely time that the idea, so prevalent formerly in other lines, that an imported article is necessarily superior, should have been exploded also in this branch of work as it has in many others.

Yours truly,

ELLIOTT & SON,
94 Bay Street, Toronto.

OBJECT LESSONS FOR STUDENTS.

TORONTO, Sept. 12, 1893.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—I beg to submit herewith a few observations and queries touching work in course of erection as a means of education to students of architecture.

Competent builders must be, first of all, practical men. The practical side of the work does not enter so largely into the essential qualifications of an architect, but the more practical architects and draughtsmen are, the more pleasant will be the relations of all branches of the "allied arts," and the more satisfactory will be the results of all their efforts.

In obtaining the practical knowledge so much to be desired, all students of architecture will no doubt regard works in course of erection as the most helpful. But to what extent do students avail themselves of this help, and to what extent is it available in proportion to the great benefits which should be derived therefrom? An individual draughtsman with ambition, energy, perception and common sense, will occasionally betake himself to some particular job for the purpose of gathering some bits of information. So, also, an opportunity is sometimes afforded to students or architects to visit a special work in a body, under the guidance of an experienced head, thus making such a visit of great interest and profit. But the writer believes that such visits as those referred to constitute a very small part of the attention which should be given to works in course of erection; and I desire to mention one circumstance which I believe operates more than any other to discourage and limit the use of this kind of study. This restraining influence is the fact that all works of such a nature as to be interesting to the student are hedged about more or less with notices of "No Admittance," etc., and a general air of exclusiveness which is not at all conducive to quiet and peaceful observation. I know it is necessary to keep the general public outside of certain limits, to carry on work. Should one venture to penetrate a little beyond this limit, he is very likely to be made to understand that he is regarded as an intruder, and an interference with the progress of the work.

Generally, by going to more of less trouble, a student can get permission to make a solitary visit, or possibly more, to an attractive work. But would it not encourage students to seek out these attractions more frequently if the privileges sought were to be expected as a matter of common courtesy to the profession, instead of being obtained as a special favor?

There are at all times works going on in this city which would be of very great interest and value as objects of study could one but feel at liberty to spend a few minutes on them now and again while passing and repassing, as they are progressing. The City Hall and Court House and the new Drill Shed might be cited as splendid examples of first-class work. Of particular interest to some students would the iron roof trusses of the Drill Shed be in their present stage. Will anybody pretend that these and other works are benefitting as they should the students of architecture of the city?

Suppose it should be announced throughout the province that Toronto proposed to expend two millions of dollars or so in the next five years in providing the best possible object lessons for students of architecture, would it not create great enthusiasm? And is not just such work being done without any regard for its utility in the direction here suggested?

Now I believe, that if it was generally understood throughout the building trades, and among architects and students, that a special uniform card or badge, presented at the entrance to any work, public or private, would secure cheerful admittance and courteous treatment within reasonable limitations, students would make ten such visits for every one that is now made. Would not such an arrangement be worthy of the kindly consideration of architects and builders, with a view of placing practical knowledge within easier reach of those interested, in some such way as here suggested?

STUDENT.

ILLUSTRATIONS.

DESIGN FOR A SMALL TOWN HOUSE.

The house comprises parlor, dining room and kitchen on ground floor, four bed rooms and bath room on first floor, and two bed rooms and store room in attic, besides closets, pantries, &c. It is of frame construction. Externally the entire building may be shingled, or if desired, clap boards may be used up to the water-table above ground floor.

If cedar shingles be used, they will need no staining, but the window sash and frame and all other external woodwork should be painted white. Interior wood work, if of pine, should be painted white or in light tones to harmonize with the decorations of the various rooms.

A sheet of details to accompany this design will be published in the ARCHITECT AND BUILDER for October.

This house would cost, according to local conditions, from $2,000 to $2,500.

HOUSE ON ST. GEORGE STREET, TORONTO, FOR MR. ALEX. MCARTHUR.—D. B. DICK, ARCHITECT.

In this house all the cut stone work, also the coursing and squared rubble, are of brown Credit Valley stone, and the gables are tile hung. The house contains 4 public rooms and 9 bedrooms and dressing rooms, exclusive of those for servants; also 2 bathrooms. The principal rooms, the bathrooms and the main halls and staircase, are all finished in polished hardwoods of different kinds, including quarter cut white oak, mahogany, bird's eye maple, cherry and chestnut. The windows are finished with sliding shutters. The house and conservatory are warmed by hot water, and the lighting throughout is by gas and electric light combination fixtures. The total cost was about $25,000.

CARVED PANELS IN THE RESIDENCE OF MR. DUNCAN MCINTYRE, MONTREAL.—W. T. THOMAS, ARCHITECT; H. BEAUMONT, SCULPTOR.

ERSKINE CHURCH, MONTREAL.—A. C. HUTCHISON, ARCHITECT.

PERSONAL.

Mr. A. E. Wells, who during the last year has been in the office of a New York architectural firm, spent his vacation in Toronto and at Niagara-on-the-Lake.

The marriage is announced at St. Southsea, Eng., on the 3rd of August, of Mr. E. W. Rathbun, president of the Rathbun Co., Deseronto, Ont., to Miss Aileen Blair.

Mr. Richard Bond, who was one of the pioneers in railroad construction in Canada, died at his daughter's residence in Toronto on the 12th of August, aged 82 years.

TO MAKE POSITIVE COPIES OF DRAWINGS.—The paper to receive the impression is coated with a two per cent. solution of bichromate of ammonium, to which a little grape sugar has been added and then dried in the dark. The sheet containing the drawing is laid upon the prepared paper and exposed to the light until the paper has assumed a gray color. It is now dipped into a 1 per cent solution of nitrate of silver, one-tenth of the volume of which consists of acetic acid. The positive image developed thereby becomes dark brown on drying.

QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require on lines consistent with the objects of the paper. Every effort will be made to furnish satisfactory answers to all such inquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

A Nova Scotia subscriber, "H. E. G.," writes: Can you give me the name of the Professor in Architecture in the School of Practical Science, Toronto. I desire to apply for particulars regarding tuition, etc.

Ans.—Address Mr. C. H. C. Wright, Lecturer in Architecture, School of Practical Science, Toronto.

THE DORIC ORDER.

IN the Doric order, the number of channels is either sixteen or twenty,—afterwards increased in the other orders to twenty-four; for they are invariably of an even number, capable of being divided by four; so that there shall always be a center flute on each side of the column, that is, in a line with the middle of each side of the abacus. Doric flutings are much broader and shallower than those of the Ionic or Corinthian orders; broader for two reasons,—first because they are fewer in number; and secondly, because there are no *fillets* or plain spaces left between them on the surface of the shaft. Their proportionately much greater shallowness, again, may be accounted for equally well; were the channels deeper not only would they seem to cut into the shaft too much, and weaken it, but also produce much too strong shadows, and another inconvenience would be occasioned, for the *arrises* or ridges between the channels would become very sharp and thin, and liable to be injured. The mode of fluting Doric columns with more *arrises* between the channels instead of fillets, has been retained by the moderns as characteristic of the order; but, as the order has been treated by them, it is little better than a mere distinction, with very little regard to general character. In the original Doric, almost every part is marked by breadth or by flatness, or by sharpness. There are no curved mouldings or surfaces, except the *cymatium* of the cornice and the *echinus* of the capital, which last is generally kept exceedingly flat. The breadth and shallowness of the channels, and the flat curves in which they commence and terminate, are therefore in perfect keeping with the style in other respects; so also are the sharp arrises or ridges between the channels or flutings on the surface of the shaft, they being expressive of a severe simplicity. The same remark applies to the horizontal annular narrower channels or more incision immediately beneath the echinus of the capital, and lower down, which last are just the reverse of the projecting astragal or convex mouldings given to the Doric capital by the moderns. Why such horizontal channels or grooves should have been cut in the very thinnest and weakest part of the column, where they diminish instead of adding to strength, it is not easy to say, except that they were merely for the sake of effect,—of producing shadow, and increasing the proportions of the capital to which they belong. We leave others, should any be so disposed, to object that the lowermost groove or grooves, as the case may be, give the capital the appearance of being a separate piece, merely joined on to the shaft, without such joining being concealed. Looking at it differently, we will rather say that such groove is intended to mark to the eye the commencement of the capital, the proportion above it of the shaft being thereby converted into the *hypotrachelium* or necking of the capital itself, which is thus enlarged in appearance, without being actually increased, and rendered unduly heavy. It is not, however, every example of the order that has such necking; while in some the groove separating the capital from the shaft is diminished to a mere line,—which looks like a joining not intended to show itself,—in others it is omitted altogether. With respect to the echinus we have little more to remark than that its office—which it performs admirably,—is by expanding out, to connect the diminished upper end of the column with the overhanging abacus; and the former being circular and the latter square, but adapted to each other in size, a beautiful combination is produced of a circle inscribed within a square; and the result is variety, contrast, and harmony. In its profile or section—by which latter term is understood the contour of any moulding or other member,—it is usually very flat, little more than a portion of a cone (turned downwards), with scarcely any perceptible degree of convexity, except just beneath the abacus, where it is suddenly rounded and diminished, so that the abacus does not seem to press upon or compress it too much.—*Granite Cutter's Journal.*

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The Building Inspector for the city of Montreal is a most efficient officer, and might well be taken as an example by the inspectors in other Canadian cities. Scarcely a week passes in which he does not figure as the prosecutor of persons who violate the city building ordinance. He has just entered actions against a number of individuals and corporations for having neglected to take out permits for new buildings. I have noticed by the ARCHITECT AND BUILDER that the by-laws of Toronto Hamilton and other cities are not complied with in this respect, and that no determined effort on the part of the Inspectors appears to be made to enforce the law. Building laws, like laws of other kinds, are valueless if not enforced.

The contractors for public works have been complaining for some time past of the scarcity of workmen, and in some cases have sent into the country to endeavor to secure laborers. Notwithstanding this condition of affairs, the local unions have petitioned the Council against allowing the employment of outside workmen. Such a dog in the manger spirit deserves no encouragement.

A petition is being largely signed by the citizens for presentation to the City Council asking that the Chateau de Ramezay opposite the City Hall be purchased by the city and used as a public library and museum. The petition states that the Chateau is one of the few remaining buildings of the old regime, and by reason of its historic importance as a monument of old Ville Marie, should be preserved.

Several actions at law have arisen out of the construction of a large chimney for the Royal Electric Company. The design for the chimney was prepared by Mr. McLea Walbank, architect. Mr. Alex. Wand was the contractor for the work. Owing as it is alleged to defects having been discovered subsequent to completion, a portion of the chimney was torn down and rebuilt. For this purpose it is said the plans were modified. Mr. Wand brought an action for the value of his work, but the case was dismissed. Now the company has brought suit for the cost of demolition and reconstruction of the chimney on the new plans; and Mr. Wand is suing the architect, on the ground that the loss and damage were not caused through any fault of the workmanship, but through defective plans.

From the twenty-five designs submitted by artists for the statue to be erected on Dominion Square to the memory of the late Right Hon. Sir John A. Macdonald, the Design Committee acting with the advice of experts, have chosen that of Mr. Geo. E. Wade, the well known London sculptor. The statue will cost $20,000, and is to be ready to be unveiled during the autumn of 1894.

Messrs. Vanier & Keefer, the engineers appointed to report on the means which should be adopted to improve the efficiency of the Montreal city water works, has recommended the expenditure of $100,000 in new plant and improvements, including a 10,000,000 gallon pumping engine and a new engine for the high level service.

OTTAWA.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The total expenditure on the erection of new buildings and on improvements to existing buildings in this city during the last year is stated at $350,000. This is about equal to the amount expended in 1892, and considerably less than in some previous years. In view of the scarcity of dwellings of moderate size and the high rentals which owing to this fact must be paid by those who are not fortunate enough to own their own houses, a good opportunity appears to exist for builders to make money by erecting a number of dwellings of the class mentioned. Enquiry reveals the fact that rents are very much higher in Ottawa than in Toronto.

While writing on this subject I may also refer to the excessive water rate which is imposed in this city. I was recently informed by a gentleman residing here, and who is the owner of property in Toronto, that the cost of water in Ottawa is more than double what it is in Toronto. It is difficult to understand why this should be the case, seeing that in this city there is no expensive pumping plant to be maintained, such as exists in Toronto. It would seem that large profits are being derived from the sale of water, and are applied to pay the expense of other departments of the public service. If so, the principle is a wrong one, and the citizens should insist on each department being maintained on a distinct footing.

Building operations at Stratford, Ont., during the present year are said to be 50 per cent. in excess of 1892.

TECHNICAL REQUIREMENTS OF ARCHITECTS.

WHAT to specify is a question that often gives rise to some hesitation in the minds of many architects. They can design with tolerable completeness in the main structure, its general accommodation, the plan of its floors; but when the fittings and details have to be considered, the extent of the architect's knowledge is reached. The rest is technical and precise; it is thought to have no connections with, or relation to the design. Many in the profession think that their proper and legitimate work is accomplished when they have prepared the design, and that they have nothing to do with questions of heating, lighting, or ventilation; what kind of appliances and fittings are to be provided and fixed. If we should ever come to view the art in this light, we should be ignoring completely all opportunities of making architecture commensurate with the progress of science and the development of our industries. This view of restricting the building art would be to keep architecture back, and to prevent her from controlling and moulding the agencies which affect our civilization and material wants. If art is really to direct the fashioning of our commonest objects, of our chairs and tables, and to permeate the everyday objects of our domestic life, it is the true office of architecture to bring everything that contributes to the convenience and comfort of our buildings under her influence. The radiator, the heating stove, the electrolier, the gasolier, the ventilating inlet and outlet, even those appliances by which we perform the commonest functions of life or of trade, fall rightly under its influence. If we think aright, what has been called the "hierarchy" of art implies a descending scale. The modes of classification adopted, such as that which makes Architecture, Sculpture, and Painting the primary trinity, have apparently excluded the useful arts. These three primary arts represent an ascendency of thought and feeling from the structure raised by the architect to the more idealised and ethereal productions of the sculptor and painter; the material yields to the spiritual. But does not architedture represent more than the mere outside shell of the building? Does it not descend to every fitting and contrivance which finds a place in the building? We have too long set a limit to architecture, and we have not considered that it commences at the very beginning of the conversion of the raw materials, and also includes everything besides floors and walls, doors and windows.

These thoughts are necessary to help us to see the universality of the art of the architect, that his work is wider and deeper than that of making an embellished building of brick or stone, and then leaving it to be finished and made convenient, or comfortable, or healthy by the fitter or engineer. Specification ought to imply selection. What to select is as important a question to the architect as how to design, because the exercise of his knowledge and taste may be, and is often, quite as much called into requisition by one as the other. For example, in looking over an illustrated catalogue, or the stock of goods in a showroom of an ironmonger, the architect has to call into exercise many of those very faculties he uses in designing the given article. If it is a drawing-room stove, he has to look to see whether the construction is likely to be economical in the use of fuel, whether the firebrick back is of good form for radiating the heat, and the opening for smoke shaped so as to avoid eddying currents and smokiness. He chooses the one which he thinks will be the best; he will avoid the more ornamental patterns, or those which are unnecessarily showy with cast ornament tiles and brasswork. But if the stove is merely specified in the usual terms, and the selection is left to the employer or to the builder—a mode often adopted—a very different result follows. Probably the most showy and the least efficient as a fuel economizer and heat radiator will be selected. To specify and not to select is an imperfect procedure, calculated to bring discredit on the architect, while it only gives temporary pleasure to the employer. In matters requiring scientific knowledge, the architect's opinion may be asked—say, for example, a heating apparatus, or a ventilating exhaust; but in artistic things, like ornamental gas-fittings or tesselated paving, the selection is often left to the client, who thinks himself quite as good a judge in matters of taste. The provisional sum inserted in specifications has at least the effect of preventing a contractor supplying inferior articles. An amount may be provided for a mantel piece or any decorative work, but unless the architect has a voice in the design, even this mode of provision may be rendered of little value. Most specifications are two discursive and inexplicit, and architects unfortunately attach little importance to inventions and appliances, imagining that it is not their principal business. The great evil of this indifference to fittings and details is that the makers cater to please the public taste, for if there is no one to select and examine that knows something about the matter, they have no encouragement to make valuable improvements, or to expend capital in the production of artistic designs.

Three principal classes of goods comes under the notice of the architect in specifying. The first are the structural requirements and materials, in which we may include inventions to prevent the rising of damp in walls, damp-proof courses, materials for building walls, floors of fireproof construction, window-sashes, iron work; a second class comprehends the various internal fittings of buildings, like sanitary, gas, electric-light fittings, heating and ventilating appliances; and the third class artistic and decorative details.

Certain principles of specification are necessary to be observed: (1) An architect must know what he wants, for if he does not, he is likely to be contented with anything that first offers itself to his mind. Many of those who write specifications depend on illustrated trade catalogues for their information; they select a certain article or pattern, and name it in the specification, because they have not made up their minds, or do not know exactly what they require. If, for example, an architect is carrying out baths and warehouses, he should know what kinds of private baths to specify—whether porcelain baths with glazed rims, whether cased, what hot and cold water fittings, what apparatus for shower or spray is to be fixed, what other necessary fittings—like electric bells, foot grid, wall lining, coat and hat pegs, and mirror—are to be provided. What he wants can only, therefore, be answered by a knowledge of the requirements of baths, and surely this it worth finding out before referring to a trade catalogue. In warming and ventilating it is absolutely necessary to find out the conditions of the building, how it is affected by cold winds, by cold surfaces such as glass, and to find out what proportion the heating surface must bear to the cubic feet of air necessary to be warmed. To specify without such knowledge is to leave all in the hands of the engineer or contractor, who may be tempted to take a very inadequate estimate of the requirements. (2) How to obtain it. The name of a firm is often a sufficient guarantee of skill and good workmanship. The architect may adequately supply his own deficiency by naming firms of repute to execute these works. The "approved apparatus" of the contract is often left to someone who has no reputation, and no one is responsible for its efficiency. But by naming any one of the firms which are known to do satisfactory work, the architect obtains at least competent experience and the guarantee of a responsible name. There are a few ways open to the architect. One of the best is to consult the pages of a respectable professional journal, where he may find lists of makers and vendors of building specialities. Our own Directory of the Building Trades may be of value. The larger firms whose special branches have a wide repute take care to draw attention to any improvements of manufacture or new appliances which they bring out, and the architect of to-day, if he desires to keep himself "up to date" with materials or improved systems, will find it necessary to make himself acquainted with them, or the catalogues and descriptive literature of well-known firms. Technicological museums are another means by which the profession and the tradesman can be brought to know each other's wants. An instance of a sanitary museum equipped with appliances for the instruction of builders we lately noticed instituted by the Hornsey Local Board. Attached to it is a library and testing room. The builders' "Exchange," so common in America, is a means of mutual benefit; and in connection with our technical schools and architectural schools, as that of King's College, a start has been made to collect typical specimens of manufactures and fittings, though very incomplete at present. The way of all others the most practical is to visit buildings and establishments where systems and goods have been produced, and to obtain experimental evidence of the actual working and effect. Firms of manufacturers often give the profession and Press opportunities of seeing for themselves the operation of improved appliances, though there is naturally a limit to this, as it is not always convenient to inspect public and private establishments in working order. These are some of the ways by which the practitioner may learn the value of specialities. In the artistic class he is more free, not being hampered by technical points and want of experience. What and how to specify is not the least onerous and responsible of the architect's duties, for it implies a wide knowledge of details, and a general acquaintance with the principles of science, more especially of hygiene, pneumatics, heat, and the laws of light and sound.—*Building News.*

DECORATION AND FURNITURE

LEADED WINDOWS.

THE increasing love of picturesqueness and quaintness in our dwellings has caused us to revive and admire in the present day many of the old customs and fashions of our remote forefathers. Strangely, too, says *Furniture and Decoration*, we have thus often reproduced from sheer choice those very things that were made some centuries ago from absolute necessity. In no matter

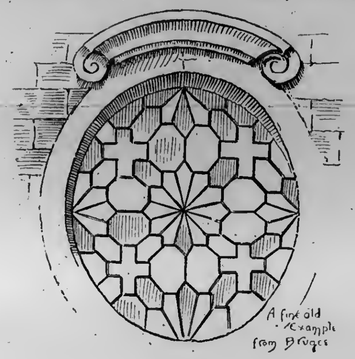


FIG. 1.

of household is this peculiar fact more demonstrated than in the present revival of leaded windows.

In olden days when glass was dear and difficult to make in large pieces the subtle cunning of "ye skilful glazier" prompted him to join his little bits of glass into a large window by means of grooved leads. Into these "cames" he set his small panes, adding piece to piece, until by dint of such conjunctions he produced a lattice or sliding window to fit the wall opening which it was his mission to fill.

Now these old leaded windows—even the simplest of them, as seen in some of the country cottages at the present time—are remarkably picturesque, and many of them are admirable lessons in design, and bespeak much gifted thought upon the part of him who first invented them. It is no wonder then that they are nowdays so assiduously studied and revived, and it is well that such charming and homely embellishments to the modern house should continue to be regarded with the admiration that they deserve.

The several fine old examples of leaded windows which appear on this page have been collected from various places at

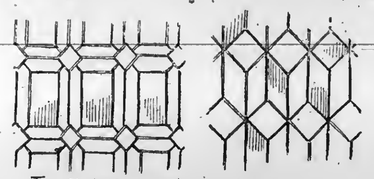


FIG. 2.

home and abroad, hence they are considerably diversified in character. The first sketch shows a delightful old window which we noted some time since in the sleepy silent town of Bruges. It is an example designed with consummate skill, and may be regarded as a standard of excellence in its particular style.

Figs. 2 and 3 are rough notes of two leaded windows existing at Moreton Hall, Cheshire. The first of these is simple and formal, but the second is more fanciful, and is evidently intended to illusively convey an idea of projection by the geometrical arrangements of the diamonds and straight bars.

The next example (Fig. 4) diverts our attention in the direction of French art, and will doubtless be useful to our conferes

FIG. 3.

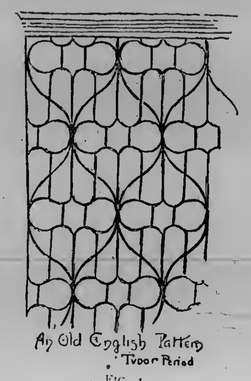


FIG. 4.

as a *bona fide* specimen of leaded work of the Louis Quinze period. It should not be forgotten that in much of the leaded work of that period, gilt was largely employed to enhance the effect.

The next sketch (Fig. 5) presents us with a beautiful specimen of old Tudor work. The flow of the lines and the consequent dropping of the pattern, the evident strength of the judiciously joined glass, are points that must at once commend this example to our attention. There is just sufficient Gothic feeling in it to make it interesting, whilst the abundance of easy curves in its outline make it agreeable even to the taste of those who dislike mediæval art.

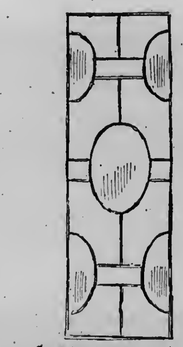


FIG. 5.

The last illustration is interesting, not only because of its design, but also on account of its associations. It is a sketch of a small window in Michael Angelo's private study in his house, or rather palace, at Florence. Whether it was designed by the great master or not it is impossible to say, but that it was in his house will be, to most of us, a sufficient recommendation of its beauty.

LEGAL DECISIONS.

MORRIS V. THARLE.—Judgment of the Chancery Court on appeal by the plaintiff from an order of Meredith, J., in Chambers, upon appeal from a Master's certificate, disallowing the claim of the plaintiff, a material man, to establish a mechanic's lien upon the land of the defendant Ryan, upon the ground that the registration was late, having regard to the times of the supplying of the materials. The court held that the plaintiff's sub-contract with the defendant Tharle, the contractor, must be considered a continuing contract for the supply of all the goods, and although some of the articles supplied were not within thirty days of the registration, the plaintiff was entitled to the benefit of his lien. Appeal allowed with costs, to be added to the plaintiff's claim.

SPANISH GLASS.—The first mention of glass works in Spain is found in Pliny and the next allusion to this is in the works of San Isadore, who lived in the seventh century. Glass was made to a great extent in the Spanish Peninsula during the Roman period. The manufacture had ceased to exist in the seventh century. There are no specimens of Spanish glass of the Visgothic period, but from the eighth to the fifteenth century it is inferred that the industry of glass making became as important in Spain as that of pottery. No specimens of the earlier period, however, have reached our time, and we must judge of what it is from the glass vessels belonging to the Renaissance period, which preserve their oriental form and are of a different style to that of Venice and other localities in Europe.

PAINTERS' MEASUREMENTS.

IN England the custom is to employ a clerk quick at figures, whose duty it is to take off, from the plans and specifications, an accurate list of all the materials and labor required in the performance of the work, setting down in each case the number of yards or feet, as the case may be, of each item. In the case of painting, the figures obtained for the carpenter and joiner prove of service also for the work to be done by the painter. The following is a table that is intended to indicate the method of measurement of painters' work, *and also the order in which the various items may be taken.* A similar table added to, or changed, as might be necessary to suit American methods of construction, would be very useful to have on hand when getting out estimates, as it would insure nothing being left out. The table which follows accurately indicates the English practice :

Lead, in oil on white work, at	——	per yard super.
" " cement "	"	" " "
Ornamental railings, etc.,	"	" " "
Skylights,	"	" " "
Skirtings, 12 in. girth and under, at	——	per ft. rm.
Strings, " " "	"	" "
Chair rails, " " "	"	" "
Hand " " "	"	" "
Balusters, " " "	"	" "
Newels, " " "	"	" "
Rain pipes, " " "	"	" "
Ornamental heads,		" number.
Ears		" "
Shoes,		" "
Eaves, gutter,		" foot run.
Stopped ends,		" number.
Outlets,		" "
Swan necks,		" "
Cement reveals (jambs)		" foot run.
Cornices under — girth		" "
Window sills, "		" "
Coping edge, "		" "
Stone strings, "		" "
Stone plinths, "		" "
Iron castings, "		" "
Grate bars "		" "
Sash squares,		" dozen.
Sash frames,		" number.
Small "		" "
Two-light casement frames,		" "
Four " " "		" "
Sash squares,		" dozen.
Brackets,		" number.
Finials,		" "
Step ladders,		" "
Dressers,		" "
Chimney pieces,		" "
Four oils and extra finished varnish, gray,		" yard super.
Grainer; extra grain for wainscot and twice varnish,	"	" "
Grainer; extra grain enrichment for brackets 4 in. wide,	"	foot run.
Stainer; stain to an approved tint and twice varnish with the best copal varnish,	"	foot super.
French polisher; French polishing,	"	" "
French polishing to hand rails,	"	foot run.
Gilder; gilding on flat surface,	"	foot super.
Gilder on carved work, stating height and description,	"	foot run.
Molded work, stating girth,	"	" "
Boards, etc., " "	"	" "
Carved caps,	"	" "
Brasses and simple items of a similar nature,	"	" "

A FAVORABLE COMPARISON.

MR. James A. Macdonald, architect, Regina, Assa., writes as follows : "Enclosed please find $2, for which please send to me for one year the CANADIAN ARCHITECT AND BUILDER. I have been taking your paper through the news dealers, and like it very much, as I consider it compares very favorably with the best American publications of the same class."

A FRENCH METHOD OF WARMING HOUSES.

To sum up these new methods, the teachings of M. Somesco, suggest that the natural porosity of the walls, especially the outer walls should not be destroyed. These walls should be decorated, not with paper and paint, but with porous, non-conducting substances, such as wooden drapery. The outer walls on the side nearest to the inner surface should be hollowed throughout, thus constituting a double wall, with a space of about four inches between the two walls. A heating contrivance, of whatever description may be found most expedient or economical, should be placed in the basement of the house. A warm-air chamber or shaft traveling round the base of the outer walls should supply to the hollow in the walls air taken from the outside and warmed at the point of admission in the wall to a temperature of from 100 degrees to 120 degrees Fahr. This should maintain the temperature of the inner wall at from 80 degrees to 90 degrees Fahr. Then he considers, the walls will radiate sufficient heat through the rooms to enable the inhabitants to constantly open the doors and windows, and to breathe cold, fresh, outer air without inconvenience. As a rule fires will be unnecessary, dampness will be completely banished from the house, and to maintain some moisture in the air it would, he thinks, be expedient to decorate the house with numerous evergreen plants. The inhabitants should then be able to benefit by unlimited ventilation, and could breathe pure, cold, and fresh air, coming upon them directly from the outside.—*Popular Science Monthly.*

NUMBER OF SLATE IN ANY NUMBER OF SQUARES, FROM ½ UP TO 60 SQUARES.

12 ×	14 ×	16 ×	18 ×	20 ×	22 ×	24 ×	½ Sq.	1 Sq.	2 Sq.	3 Sq.	4 Sq.	5 Sq.	6 Sq.	7 Sq.	8 Sq.	9 Sq.	10 Sq.	11 Sq.	12 Sq.	13 Sq.	14 Sq.	15 Sq.	16 Sq.	17 Sq.	18 Sq.	19 Sq.	20 Sq.	30 Sq.	40 Sq.	50 Sq.	60 Sq.
12	12	12	12	12	12	16	43	84	171	256	343	428	515	600	685	772	857	943	1029	1115	1200	1286	1372	1458	1543	1629	1715	2572	3429	4286	5143
10	12	14	14	14	16	16	49	98	196	294	392	490	588	686	784	882	980	1078	1176	1274	1372	1470	1568	1666	1764	1862	1960	2938	3918	4897	5877
8	10	12	12	14	14	16	58	117	234	351	468	585	702	819	936	1053	1170	1287	1404	1521	1638	1755	1872	1989	2106	2223	2340	3510	4680	5850	7020
7	8	10	12	12	14	14	68	136	273	409	546	682	819	955	1092	1228	1365	1501	1638	1774	1911	2047	2184	2320	2457	2593	2730	4095	5460	6825	8190
6	7	8	10	12	12	14	78	156	312	468	624	780	936	1092	1248	1404	1560	1716	1872	2028	2184	2340	2496	2652	2808	2964	3120	4680	6240	7800	9360
	6	7	8	10	10	12	87	175	351	526	702	877	1053	1228	1404	1579	1755	1930	2106	2281	2457	2632	2808	2983	3159	3334	3510	5265	7020	8775	10530
		6	7	8	10	10	98	196	392	588	784	980	1176	1372	1568	1764	1960	2156	2352	2548	2744	2940	3136	3332	3528	3724	3920	5880	7840	9800	11760
			6	7	8	9	109	218	437	655	874	1092	1311	1529	1748	1966	2185	2403	2622	2840	3059	3277	3496	3714	3933	4151	4370	6555	8740	10925	13110
				6	7	8	131	262	524	785	1048	1309	1570	1833	2094	2356	2618	2880	3141	3403	3664	3926	4188	4449	4711	4972	5234	7850	10465	13080	15695
					6	7	145	290	581	872	1163	1454	1745	2036	2327	2618	2909	3200	3490	3781	4072	4363	4654	4945	5236	5527	5817	8725	11630	14535	17445
						6	187	374	748	1122	1496	1870	2244	2618	2992	3366	3740	4114	4488	4862	5236	5610	5984	6358	6732	7106	7480	11220	14960	18705	22441
12	14	16	18	20	22	24	½ Sq.	1 Sq.	2 Sq.	3 Sq.	4 Sq.	5 Sq.	6 Sq.	7 Sq.	8 Sq.	9 Sq.	10 Sq.	11 Sq.	12 Sq.	13 Sq.	14 Sq.	15 Sq.	16 Sq.	17 Sq.	18 Sq.	19 Sq.	20 Sq.	30 Sq.	40 Sq.	50 Sq.	60 Sq.

Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq. Sq.
½ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 30 40 50 60

USEFUL HINTS.

The following are the recipes of body and white glaze:—White body—74 lb. china clay; 18 lb. flint; 17¼ lb. stone; 3½ lb. plaster. All must be mixed together dry, before adding water, on account of the plaster. Dip the brick at 30 oz. to the pint slop, and pass the body twice through a fine sieve. White Glaze—19 lb. felspar; 6 lb. stone; 1½ lb. whiting; ¾ lb. flint; ½ lb. plaster; 2½ lb. best flint glass; 12 oz. white lead. Mix as above.

Conrad Mischler writes to the *Painters' Magazine*: "I have been painting iron work for the last 18 years and find that by using Venetian red, and brandon, thinned with raw linseed oil and japan, the article painted will stand the weather much better than when painted with any other. I painted two bridges some years ago which were not painted again until I did them after. One I painted with V. R. & B., as it is called, the other with red lead. The one painted with red lead was blistered and peeled to a great exient, while the other was in a very good condition. I painted them both over with V. R. & B., and they stand to-day looking almost as they did after being painted. Some ten years ago I painted the Fall River Railroad bridge with the V. R. & B. This bridge has iron beams in the water which I painted to low water mark, between tides. It has not been touched since, and has stood the wear of the water splendidly. I also painted an iron door with the same years ago, only giving it one coat. It is used every day by shop hands, and is clean and smooth to-day. I first clean the article thoroughly, and then use the V. R. & B. for the first coat, using for the next whatever color the party having the work done may desire. It has never failed to do everything expected of it, and has always given satisfaction. I have used red and white lead and experimented with all kinds of paint."

WEIGHT PER SQUARE FOOT OF SHEET IRON.—It will be interesting to those who have anything to do with sheet iron boiler plate or similar material to have an easily remembered rule for finding the weight per square foot of material they are working with. The *Ironmanger* says that it has been found by experience that a square foot of iron plate ⅛ inch thick weighed almost exactly five pounds, and this forms a basis for a very simple and easy rule. As a square foot of iron ⅛ inch thick weighs five pounds, a square foot of ¼ inch iron will weigh ten pounds, and we can say that the area of any sheet-iron (or plate iron) in square feet multiplied by the thickness in one-eighths and multiplied by five will give the weight of the piece. There is a piece of tank iron 5-16 inch thick, 3 feet wide and five feet long, how much does it weigh? The area will be 3 feet by 5 feet, or 15 square feet. Now how many eighths is 5-16 of an inch? Since ⅛=2-16 and 2 is contained in 5 2½ times, we say 5-16=2½ eighths, or 2½ times five pounds=12½ pounds per square foot, and as there are 16 square feet we have 15 by 12½ =1,875. Where the thickness is even eighths of an inch, it is much simpler; but even this is not a hard thing to do as shown. If it is desired to use this rule for other than iron, we simply find the difference between the weights of the two metals per cubic inch and find what a square foot ⅛ inch thick will weigh, then work as shown above.

ZINC IN ARCHITECTURE.—Copper plating sheet zinc for building purposes has recently been tried abroad with considerable success, the process being especially recommended where mechanical wear takes place. The zinc combines very well with the copper. The galvanic method of copper plating is advantageously used, but the zinc may also be coated with copper by ordinary means. In the first place the sheet zinc is cleaned with soda from any adhering dirt or grease, and is also purified by a weak acid bath from the covering of zinc oxide. There are then dissolved in twenty-four parts of water one part of refined verdigris and twelve parts of tartar, being heated to boiling point, after which three or four pints of Spanish white are added. The Spanish white is here decomposed and is precipitated as lime tartrate. The dark blue liquid is poured off and filtered, and can be used either as a bath for the sheet zinc or for the production of copper-plating paste. The first mode of action is the more recommendatory, as the fluid forces its way into the corners and angles of the zinc articles and is uniformly distributed all over. If it be desired to coat an immovable zinc object with copper, the article, after being cleaned, is painted with the copper solution and chalk compound, and, after drying, brushed. This very simple operation would likewise prove of value for architectural purposes where it is desired to remedy the generally unpleasing effect of zinc adornments.—*American Artizan.*

ENAMELLING SLATE BRICKS, &C.—Some five years ago, when first the manufacture of bricks and tiles from slate waste commenced to be made in North Wales, says the *British Clay Worker*, the white glazed brick was successfully produced by the following process and recipes:—The process is called the Biscuit-brick process—that is, the firing of the brick only slightly at first, all care being taken in setting and drawing the bricks so as not to damage them in any way. The bricks need to be fired at about half the customary heat for the first fire; they must then be taken to the dipping-house to be dipped in the body and glaze. Having everything in readiness, dip the part required to be glazed in clean water; you then pass on the brick to the next hand, whose dip will be the white body; then on to the next hand whose dip will also be the white body; again, pass on the brick to the fourth hand, whose dip will be to the glaze. Allow the brick to dry a little; then take a knife and scrape off all body and glaze that may have run over the side of the brick. The brick can then be set in the kiln to be fired again. The slate waste, however, is a ticklish material and will not stand a hard fire. The heat it will take is a good red clay heat; it will thus be seen that a down-draft kiln will not do for glazing slate waste. It must be fired in a kiln where all the flash heat can be kept from the brick—the kiln generally used is the Simmer muffle-kiln. The kiln itself when set with bricks is almost a box-kiln. The bricks must be fired gently at first, and when on full fire it must not be neglected or allowed to sink too low. The firing should be continued until the glaze has run bright.

MANUFACTURES AND MATERIALS

QUALITY OF SHINGLES.

TOUCHING on the shingle question in a paper on "Ignorance Concerning Woods," read at the International Forestry Congress, Chicago, Mr. Saley said: There are builders who really believe that the old-fashioned white pine shingle is out of the race. Cypress, red cedar and red wood are in fact supplanting it, but not for the reason that they are driving from the markets a poor roofing material. This shingle controversy is really amusing. Manufacturers tear from old roofs the kinds of shingles in which they are interested and hold them up to illustrate how durable they are. The fact is that a shingle of any of the woods named, or even of a meaner wood, would keep our heads dry as long as it will be necessary to protect them from dampness. To make shingles last still longer, lower, as some would say, the grade of them. That may sound paradoxical, and I am not aware that the theory holds in any other line. "A good thick shingle" is a term often heard. My preference would be to cover a building with a good thin shingle. A shingle, as a rule, wears out instead of rotting out, and the thinner the butt over which the water runs and drops on the shingle below, the longer the shingle underneath will last. A steady dropping, it is said, will wear away a stone, and the shorter distance the water falls the longer the stone will last. This philosophy applies with great exactness to the durability of shingles.

THE Stanstead Granite Company has been incorporated.

A charter of incorporation has been granted to the Wright Cement Co., of Hull, Que.

The Danville Slate Co., of Danville, Que., will it is said seek a market among the school-slate manufacturers in Germany.

The Rathbun Co. of Deseronto, lately purchased from Mr. E. B. Eddy, of Hull, machinery for the manufacture of patent lath and sheating.

A train comprising fifteen cars loaded with British Columbia shingles was recently despatched from Vancouver over the C. P. R. to Eastern Canada.

Steps are being taken at Quebec to organize a company with a capital of $100,000 to manufacture at St. Francois, pulp boards for interiors of buildings and furniture.

The Canadian exhibit of brick-making machinery at the World's Fair has attracted great attention and is constantly examined by United States and foreign experts.

A representative of the National Wall Paper Association of the United States, recently interviewed the Customs Department at Ottawa regarding the import tariff on wall paper.

The St. Johns Stone Chinaware Co., whose works at St. Johns, Que., were destroyed by fire some months ago, express their intention of rebuilding on the same site provided the town will grant them a bonus of $25,000.

The Rosedale Pressed Brick and Terra Cotta Co. has lately been organized in Toronto. The Company have leased a deposit of clay 27 acres in extent on the banks of the Don, and have erected buildings thereon. The necessary plant has been ordered, and manufacturing will shortly be commenced. Mr. John Flett is President of the Company, and Mr. J. V. Wright, Managing Director.

Artificially stained bricks of a rich chocolate color, and others made from clay mixed with soot, have been sometimes sold as black for ornamenting walls with diapers, checquers and strings. The latter description are very inferior, while surface-washed imitations weather indifferently. The *British Clay Worker* states that a little manganese and much iron in clay raised to an intense heat will produce bricks of no fleeting blackness.

Messrs. McRae & Co., of Ottawa, have secured control for Canada, of a German patent for seasoning and staining beech and birch woods. By the new process the sap is sweated out of the boards by being placed, in a green state, in steam chambers for twelve days, and subsequently for three days in a drying chamber. The wood is then by a chemical application stained a rich walnut color. Beech and birch thus treated have met with a favorable reception in the European market, to which part of the product of the Canadian kilns will be exported.

Library Panels, Residence of Mr. D. W. McIntyre, Montreal.

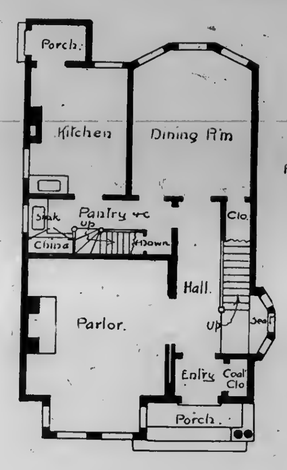
W. T. Thomas, Architect. | H Beaumont, Sculptor.

Dining Room Panel, Residence of Mr. D. W. McIntyre, Montreal.

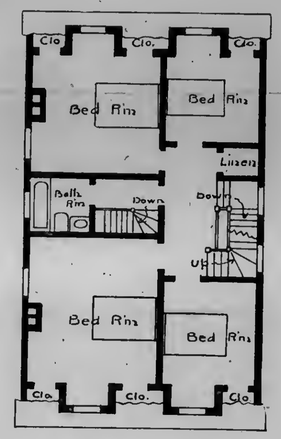
W. T. Thomas, Architect. | H. Beaumont, Sculptor.

A SMALL TOWN HOUSE.

Scale ——— 1 ——— 8 ft.



Note:- Two Bed Rooms and Lumber Room in Attic.



Elevations.

HOUSE ON ST. GEORGE STREET, TORONTO, FOR MR. ALEX. MCARTHUR.

E. R. Dick, Archt.

ERSKINE CHURCH, MONTREAL.

A. C. Hutchison, Architect.

CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—NO. X. OCTOBER, 1893 PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
64 TEMPLE BUILDING, - MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	D. B. DICK, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	JOHN E. BELCHER, Peterboro'.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

DAVID EWART	Ottawa.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
FRANK DARLING,	Toronto.
W. A. EDWARDS	Hamilton.

REGISTRAR AND LIBRARIAN:
W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	J. NELSON, Montreal.
1ST VICE-PRESIDENT	CHAS. BAILLAIRGE, Quebec.
2ND VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
SECRETARY	JOSEPH HAYNES, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. GENDRON,	Montreal.
J. B. BERTRAND	Quebec.
ERIC MANN	Montreal.
J. VENNE	Montreal.
G. E. TANGUAY	Quebec.

AUDITORS—THEO. DAOUST, J. F. PEACHY.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.	J. LISTER NICHOLLS.
GEO. MOIR, 1st Vice-President.	WM. BOOTH.
GEO. OAKLEY, 2nd Vice-President.	JAS. ISAAC.
JOHN BARNARD, Treasurer.	JOHN LOGAN.
WM. J. HILL.	WM. PARK.
JOHN ALDRIDGE.	H. MARTIN.
JAS. CRANG.	

JOHN L. PHILLIPS, Secretary.

A CENSUS Bulletin recently issued by the Dominion Government shows that the workers in wood in the Dominion number 78,604; in stone, 30,856; in wood and stone combined, 10,201; and in metals, 49,476. The number of carpenters and joiners is 45,760; stone masons, 10,312; and painters and glaziers, 10,202.

THE evening classes in connection with the Toronto Technical School were resumed a fortnight ago. The attendance on the opening night was very large, and advantage is being taken to so great an extent of the instruction offered that the need of more commodious quarters is one with which the management will be confronted at an early date. The success which has attended the founding of this school is most gratifying to the advocates of technical instruction for the artisan classes.

THE annual report of the Ontario Bureau of Mines shows that there was produced in this province during the last year, common brick to the value of $980,000; plain pressed brick, $198,350; fancy pressed brick, $32,253; drain tile, $100,000. The value of stone quarried reaches $880,000. Cement to the value of $86,000 was placed on the market. The production of lime is valued at $350,000. Of a total mineral production of $5,374,000, $2,526,603 consisted of materials for use in architectural and engineering works.

IN view of the great scarcity of black walnut, once so plentiful in Canada, Mr. Joly has proposed to the farmers of Quebec that they should cultivate the walnut tree, as has been done in some of the Western States. The nuts after being left out all winter in heaps, covered with earth and straw, are in the spring planted two inches below the surface of the ground. The walnut tree is said to have a rapid growth. Mr. Joly's suggestion seems to be a valuable one, and we hope will receive the attention of the Forestry Department of the Government.

A French blacksmith named Ferdinand Allard, residing at Levis, Que., is said to have discovered a process of tempering copper. A small cannon tempered by his process is said to have been loaded to the muzzle with the most powerful powder driven in with a sledge and exploded without causing the least expansion of the barrel. A plate of copper three-eighths of an inch thick showed only slight indentation from the impact of rifle bullets fixed at forty yards distance with a force of two thousand pounds, while a hardened steel plate two inches thick was shattered to pieces from the same cause. The inventor of the process is confident that the most powerful projectile could not penetrate a ship the sides of which were protected with a 14-inch plate of copper which had been thus tempered.

IF we may judge by the published reports, the city of Winnipeg has become rid of the incubus imposed on her progress by the wild-cat speculation which a few years ago ran riot in that city. To all appearances the city has entered on a period of rapid and healthy development. The volume of building operations during the present year is stated to be about $1,884,450. This is as nearly as possible double in extent those of 1892, the aggregate of which was $900,000. The buildings erected this year consist largely of residences, for occupation by the owners. There is said to be a steady demand also for houses for renting purposes. The character of the residences built this year is said to be greatly superior to that of buildings of the same class formerly erected. There is said to be much demand for a better class of buildings for business purposes, and to meet

this the erection of a number of business blocks is in contemplation. It is anticipated that the coming year will witness even greater activity in building than that which has marked the present one.

THE new Board of Trade building in Montreal was formally opened a fortnight ago by our newly arrived Governor General, Lord Aberdeen. The occasion was marked by a banquet at the Windsor. Among the invited guests were many prominent lights in the commercial and political world. There was a great deal of speech-making. Properly enough much was said regarding the commercial interests of Montreal and the Dominion, and in praise of the part taken by the Montreal Board of Trade in the promotion of those interests. Singular, however, appears the fact that little or nothing was said about the new building itself, the completion of which was presumably the object of the gathering. Nor does a word appear in the report of the proceedings in commendation of the architect who designed and superintended the erection of the structure. There is nothing in the published report of the proceedings to show that he was even invited to take any part whatever in the opening ceremonies. We are at a loss to conclude whether the building is deemed unworthy of praise, or whether on payment of the architects fees, all the credit of the undertaking is supposed to revert to the financiers.

THE citizens of Toronto have been looking long and anxiously for indications of a return of the prosperity and steady progress experienced prior to the real estate boom, and the time of depression which followed in its wake. Architects and builders have naturally been amongst those who have watched most closely the situation, and will have reason to feel dissatisfied with the report of the assessors that the population has decreased during the year, and consequently that there are more vacant houses. Several errors have already been found in the report, and so little dependence is placed on its correctness, that a special police census has been ordered to be taken on the 1st of November to determine the actual condition of affairs. The opinion among architects and builders with whom we have discussed the subject appears to be that many of the houses which were vacant a year ago are now tenanted, and in consequence a moderate amount of building for residence purposes may be anticipated during the coming year. It is to be hoped that the result of the census will show this view to be the correct one. In any event, it can be said that the number of architects in Toronto is considerably greater than the present or prospective demand for their services would warrant, but in view of the commercial and industrial stagnation prevailing in the United States and other countries, there would seem to be great difficulty in the way of their removal to a more promising field.

THE City Engineer of Toronto was recently requested by resolution of the Council to report on the advisability of using native cement for concrete and other works. In his report he says: "Native Portland cement has been used on the works during the past year with very satisfactory results. Frequent tests are being made of this cement, and it is found to be of excellent quality, so that there is no objection to its use on city works, and it is not excluded therefrom. Regarding native natural cements, in my experience they are very much inferior to Portland cement. There may be, however, no special reason why they could not be used in some cases. For roadway work their use would involve considerable delay on account of their slow-setting character. The difference in cost between this cement and Portland cement, when used in concrete, would not be so great as is generally supposed, as a larger quantity of cement is required to be used to make a cubic yard of concrete. I have, however, inserted a clause in the specification for work which is now being advertised, providing that the contractor state in his form of tender the amount he is prepared to deduct from his contract price in case natural cement is ordered." In addition to the manufacture of natural cement which has been carried on extensively in Canada for many years, several companies have lately commenced the manufacture of Portland cement, as a result of which importations of cement are reported to have materially decreased.

A REPORT of the proceedings of the annual convention of the Province of Quebec Association of Architects appears in the in the present issue. Owing probably to the fact of the meeting being held in Quebec, the attendance was small, and the business transacted principally of a routine character. A couple of excellent papers were presented by Messrs. A. T. Taylor and Chas. Baillairgé. We regard it as unfortunate that the visits to points of interest precluded discussion of them. It is gratifying to notice that the importance of proper facilities being provided for the study of architecture has impressed the minds of leading men in the profession in the Province of Quebec. It is to be hoped that the attention bestowed on the subject at this convention will serve to call public notice thereto, and assist in paving the way for the establishment of a Chair of Architecture in connection with one of the great local universities. We regard this as by far the most important work to which the efforts of the Association can be directed. Had Mr. Baillairgé in his otherwise admirable paper kept more closely to this subject, he might have laid before the public a much stronger case on behalf of the proper training of those who will be the architects of the future, and we hope that at some future time he will return to the subject and for the benefit of the profession and the public review it in all its aspects. Mr. Taylor's paper on the Architecture of the World's Fair is a most skilful and interesting portrayal of his observations at the "White City." It is interesting to compare the facts as stated in this paper with the impressions of one of our correspondents in his article in this issue entitled "Notes from the World's Fair." It will be noticed that agreement of opinion exists on one point at least, namely, that the Canadian Building does no credit to Canada.

MESSRS. Dill & O'Hearn were recently given a contract for painting the exterior wood and iron work of one of the Toronto public schools. After the contract was completed, a Mr. Moore, who is alleged to be a rival contractor, charged Messrs. Dill & O'Hearn before the Public School Board with having violated the specifications by giving the building one instead of two coats of paint. A committee of the Board was appointed to investigate, and reported that they were of opinion that two coats of paint were not given to the whole of the work, and that as to any part of the work which might have received two coats it was done in a very hurried manner and not in accord with the intention of the specifications. The contractors admit that the work was hurried, but claim that otherwise it was properly done. When the report came before the Public School Board for consideration, it led to a warm discussion. The chairman created a sensation by stating that it had for a long time been a by-word in Toronto that work in connection with the public schools had been scamped, and that specifications were so drawn that certain favored contractors could secure the work. These remarks, reflecting severely upon the honesty of the Superintendent of School Buildings, were very properly resented by some members of the Board. The Superintendent is, we believe, above such conduct. The report of the Committee was adopted without the Superintendent being asked to report on the case, or explain his position in relation thereto —a course of action which must be deemed to be most unfair to the head of an important public department, more especially in view of the fact that the work had not been finally passed by the Superintendent and there was owing to the contractors on other contracts more than sufficient to cover any defects in the work It is alleged that the man who preferred the complaint had been detected in an attempt to scamp a contract which he had secured from the Board, and that his action in the present case was an attempt to get even with the Superintendent for having compelled compliance with the specifications.

AN ARCHITECT'S OPINION OF THE "CANADIAN ARCHITECT AND BUILDER."

Mr. F. J. Rastrick, the well known architect, of Hamilton, Ont., writes: After an examination of the last year's numbers of the CANADIAN ARCHITECT AND BUILDER, I wish to congratulate you upon the great improvement which has been attained. It has become quite an artistic publication, and one which is not excelled amongst the architectural publications of the United States or Great Britain.

TORONTO ESPLANADE IMPROVEMENT.

MR. Sankey's report to the City Engineer contains his plan for laying out the new water front on the bay, so as to provide public wharves that will give a favorable impression to visitors who enter Toronto first by this way; to arrange for heavy traffic on Lake Street and reserve sites for commercial buildings on the landward side of it; to bring street car accommodation by coverhead lines in connection with the ferries and lake steamers; and lastly, as the wharf accommodation provided is considerably more than double that now in use, to reserve for the public a large waterfront square surrounded on three sides by water.

The works proposed occupy the space from the Yonge Street wharf to the new pier of the Argonaut Rowing Club—practically from Yonge Street to York Street. There will be a new Yonge Street wharf more than three times the size of the present one. The new wharf will more properly speaking be a sold pier cribbed only on the outside and filled in firmly with earth. The front will be long enough to allow the longest lake steamer to lie without obstructing the passage of other vessels to and from the sides, which will be of somewhat greater length than the front. The pier will thus form a square of solid earth with a wharf all round. The space reserved for wharf room is 50 feet —20 feet for a gangway and 30 feet for wharf buildings. Behind the wharf building there will be a 40 feet road all around, leaving a central block, round which the road passes, which will be well adapted for a fruit market and cold storage warehouse. The ferry pier will be at the foot of York street and will have besides landings for the ferries, accommodation for steamers running in connection with the railways. The remaining space, about half the distance between Bay and York streets, will be occupied by what Mr. Sankey calls the "Harbour Square." This will be formed in the same way as the Yonge street wharf by external cribbing filled in with earth and will form an area, planted we may presume with trees, about 400 feet wide and running out for about the same distance or a little further into the bay.

To bring the public into communication with the water front it is proposed to form a loop of the street railway between York and Yonge streets bringing the lines down by inclined bridges from the level of Front street to that of Lake street.

In pointing out that the expense of constructing the wharves and harbour square will be small, Mr. Sankey says:—"It should not be more than the cost of the necessary cribbing; there is always a demand for a dumping ground near the centre of the city, and all the filling necessary can be got for nothing." It is however necessary that in constituting these works dumping grounds for the city, some discrimination should be used as to the nature of the material dumped. It will be of little use to provide the Harbour Square as a breathing ground for the people if its soil reeks pestilence. The filling in that has been going on all summer in front of the Union Station has been composed to a great extent of what it is no exaggeration to call garbage. The collection of tin cans, broken pots, vegetable tops, spoiled fruit, etc., which was carted to this spot showed it to be the sweepings of the city lanes. To cover it with a layer of earth made it little less offensive than before. The animal life that is generated from decay is said to be indifferent to burial, and it is probable that unless steps are taken at the beginning to prevent filling in the new works with anything but clean stuff we may expect the Harbour Square to be a resort more favorable to microbes of disease than to human beings.

ILLUSTRATIONS.

POST OFFICE, HALIFAX, NOVA SCOTIA.

THE building, which is constructed of freestone on a granite base, stands in a square opposite the Provincial Buildings. The exterior appearance is very satisfactory, but the interior effect and accommodation are less so. The architect of the building was Mr. David Sterling, of Halifax.

DETAILS FOR SMALL TOWN HOUSE.

These details are to accompany the design for a small town house published in the CANADIAN ARCHITECT AND BUILDER for September.

SUMMER RESIDENCE FOR MR. A. W. OGILVIE, MONTREAL.—A. C. HUTCHISON, ARCHITECT.

ST. JOSEPH'S CHURCH, OTTAWA.—W. E. DORAN, ARCHITECT.

QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require on lines consistent with the objects of the paper. Every effort will be made to furnish satisfactory answers to all such inquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

G. E. M., Toronto writes: How many pounds would there be in a bushel of white lime just from the kiln.

ANS.—About 70 pounds.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The sentiments expressed in the following extract from a letter recently addressed by Mr. L. J. A. Papineau to the Cure of the parish of Notre Dame de Bousecours, Ottawa County, protesting against a proposal to substitute for a church in camparatively good repair an expensive edifice of more modern design, will no doubt strike a responsive chord in the breasts of many of your readers: "I have seen in Scandinavia many an old wooden church, of several centuries' existence, and which are as venerated as the lead temples of marble and mosaics in Italy. All throughout Europe they preserve all monuments, civil and religious; and the more so in proportion to their antiquity. In America, on the contrary, people's ambition is to destroy. Each generation seems desirous to pull down whatever their fathers have erected. In Canada, since a few years, it has become a mania to demolish churches and make everything new. For our rural churches there had grown a Canadian type; a long building of boulder masonry, bound by a mortar as hard as a cement, a triangular front and steep roof, arcaded doors and windows, plain, without superfluous ornaments, the shining roofs and steeple seen from afar in the sunlight, the long and sharp steeple ascending towards heaven, crowned by the cross and the Gallic cock. All these old monuments of our ancestors people are now hurrying to destruction, to replace them at fabulous prices by monstrous constructions which are neither gothic nor classical, but a mass of incongruities which may be called the Jesuitical order of architecture, such as is exemplified in so many churches of Spanish America and a few modern European. An agglomeration of pinnacles and caps which, grovelling low, are neither steeple nor dome, and in place of a tympanum display immense white flourishes and ribbons of stone which resembles the contortions of serpents in place of the triangle of Jehovah or the Trinity. We have a striking example of this barbaric transformation in the unfortunate chapel of Bonsecours in Montreal—the only temple left in that city of the colonization period—that venerable temple, which has been so shamefully altered both internally and externally. They have destroyed the many golden sculptures that once decorated the original parish church of 1645, and replaced them by horrible grey daubs worthy of penny theatres. I will not mention the elevator to the roof exhibitions. What a caricature they have made of the holy shrine."

Mr. Porteous, who was perhaps the oldest architect in Montreal, died in this city on the 28th August, at the advanced age of 82 years. Deceased was the designer of a large number of churches and factories. He superintended the construction and hanging of the lock gates of the Williamsburg and Cornwall canals, having been the inventor of an improved method of hanging such gates.

In olden times it was not unusual for the building of a cathedral to occupy a period of one or several hundred years. In our times, however, we are accustomed to see great structures rise as if by magic, and but a few years are required for the rearing of mighty cities. In contrast to this haste of modern times has been the building of St. Peter's Cathedral of this city, which is to be opened at Christmas. It has been under construction for a quarter of a century, not because it could not have been erected in a much shorter time, but because its progress was limited to the rate at which the necessary funds could be obtained. The building, as is generally known, is a model of St. Peter's at Rome, and is about one-third the size of the latter. The interior decorations are as yet incomplete.

HAMILTON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The old post office building on St. James street, which I have always regarded as one of the most creditable of the public buildings of the city, is sought to be occupied by the Associated Charities or the Wentworth Historical Society. I trust the latter Society's request may be preferred, as I should dislike exceedingly to see such a building given up to the uses of a soup kitchen.

The statue of the late Sir John A. Macdonald to be erected in this city, and of which an illustration appeared in the CANADIAN ARCHITECT AND BUILDER some months ago, is to be unveiled by the Premier of the Dominion, Sir John Thompson, early in November.

The Board of Works entered early in the year into a contract with Messrs. Robert Thompson & Co. to supply a certain quantity of lumber, at a certain price, for the use of the corporation. The Board having subsequently overdrawn its appropriation, the Mayor instructed the Street Commissioner to receive no further consignments of lumber. In consequence of this order, the contractors threaten to enter suit to compel the acceptance of the balance of material called for by the contract.

The present year has been a fairly active one for architects and builders, and the fact that a considerable increase in the city's population is reported by the assessors may be regarded as a favorable indication for the future.

NOTES FROM THE WORLD'S FAIR.

(By a Correspondent.)

What has been written in the American press about the building of the World's Fair would, if taken without a grain of salt, raise expectations after which the Kingdom of Heaven would be disappointing. But one becomes so accustomed to make light of any utterance of the American newspapers and to make due allowance for the conscientious enthusiasm of articles in the illustrated magazines, that, in spite of all that has been said, the Fair was not disappointing. It is in fact a great piece of designing and a triumph for its designers and the nation.

There is nothing in the natural shore to suggest the result obtained. It is an unbroken beach, sandy and barren. The arrangement of the ground appropriated to the Fair is a piece of pure design, and to whomever it first occurred to dig out a portion of the grounds and let in the water of the lake is due the feature which forms the essential beauty of the Fair and its essential advantage in beauty over other Expositions. The rest is perhaps no invention. Neither the idea of abandoning the old form of Exhibition building in iron and glass nor the material used in making other forms was new. But the completeness with which the scheme has been carried out makes this Exposition a new departure in Exposition building.

The "staff" with which the buildings are covered, a compound, chiefly of plaster of Paris and cement united with fibre, which was invented for the last Paris Exposition, has when set an appearance very like the white stone of which the chateaux of the Loire Valley are built. It is applied to a construction of iron and wood and the result is a building apparently made of stone. As to the buildings themselves, to read some writers on the subject one would think there never were such buildings, that now for the first and only time the world has seen perfect buildings. This is not precisely true; but for total effect the "White City" has been an opportunity in design which the world can seldom offer and of which the associated architects, acting in concert with a great landscape gardener, have taken good advantage. Partly by virtue of size, for the porticos of the Manufacturers' Building are 122 feet high and yet do not appear unduly large; partly by virtue of uniformity of colour and harmony of style; partly by dint of profusion of architectural features, such as domes, towers, pinnacles, colonnades and statuary, but chiefly by skillful disposition of the buildings and by the introduction of the final charm of water with its accompaniments of bridges, balustraded terraces, broad flights of white steps for landing in some parts and the dark contrast of overhanging trees, all planted, in others, the enlivenment of passing boats and of water fowl which swim about and break the water into many colours; the buildings as a whole form a piece of architectural landscape which realize Turner's pictures of Carthage and Ancient Italy. The architects have for once found themselves to some extent in the position of poets who, as Bacon says, may build for beauty only, as they build with small cost. I do not however, think, that any one can argue from these buildings a case for sham; for they cannot be called shams, being so obviously and openly ephemeral. The well regulated mind, which would loathe a sham in permanent work, can derive straightforward pleasure from these buildings and rather prefers in the case of a summer's show to know that the cost is not absurd. Moreover, part of the offensiveness of sham is the facility it affords for representing noble material in a base situation. The soul recoils from a marble front to a corner grocery store. But here no magnificence is out of place, provided it does not cost too much. So far from revolting from an impossible magnificence the imagination claims it as due from the material used, and resents instead a compassable severity which would really simulate stone. It is at any rate true I think that the less satisfactory buildings fail in the direction of the commonplace and matter of fact. The designers who have succeeded best have been those who have used to the greatest extent the freedom given by the material for a lavish use of columns, statuary and plastic decoration.

At one end of the Fair grounds apart from the Exhibition buildings are the States buildings, which represent the States and countries taking part in the Exposition, and contain the official apartments of their commissioners. On the whole it must be said that with the exception of some of the foreign buildings they form a sorry exhibition of designing, and one of the very worst is that representing Canada. Its triviality of design and barren ugliness were more tiring than ten hours in the picture gallery. Many of the States were led astray by their originality, but not so the Canadian designer: his originality was well in hand. Others thought more of displaying native material than of perfection of design. The Canadian designer displayed nothing but native ugliness. Among States' buildings of the United States the best are those which reproduce old examples. Massachusetts excels with a reproduction of the truly refined and beautiful John Hancock house. California has reproduced a Spanish Jesuit mission building, a large building which is used also for an exhibit from the State. New York, it was originally understood, intended to reproduce the Van Rensselaer Mansion on the Hudson opposite Albany. But New York has turned its back on the Dutch and proclaims itself in a present day fashion by a gorgeous Renaissance Club House, extravagantly finished, thickly carpeted and hung as to the walls with tapestry or silk. The stairs are of stone on concrete, with a marble dado, if I recollect rightly, and the economically minded visitor only breathes again on discovering that the handrail is of wood painted to imitate marble. All this for one summer's use is of course sinful. We may congratulate ourselves that the Dominion Government possesses more of the domestic virtue of thrift and that we are spared the pain of regret that the Canadian building must be pulled down. The English Government *more Anglicano*, have built their house solid and presented it to the Park Commissioners to serve some purpose in Jackson Park, after the Fair is over. And this, I believe, will be the only relic on the grounds left of the whole display.

It is hoped that copies of some of the fine groups of statuary will find their way into museums. But some of the best are colossal and others would lack their architectural and landscape setting.

For the buildings there is no further use; and, even if left, they would soon shed their beauty to the ground and stand as bare as trees in the autumn.

One wonders whether there will again be so great an Exposition. It is understood that the promoters of this Exposition will drop nearly half as much again as the entire cost of the Centennial Exposition, and what people can stand such an outlay?

However, there will be Expositions, and if the designers of the next will learn positive lessons from this as well as caution, may I be there to see.

TORONTO ART STUDENTS' LEAGUE.

The Toronto Art Students' League has resumed its regular meetings. Preliminary arrangements are already under way for what promises in January next to be the most interesting exhibit of the work of the members of the League that has ever been submitted to the public view.

RECENT PLUMBING PRACTICE.

Mr. Glenn Brown, F. A. I. A., who read a paper on the above subject at the recent International Congress of Architects, at Chicago, summed up the deductions to be drawn from all the experiments reviewed by him as follows:

1. That unventilated traps are liable to fail from either or both siphonage or back pressure.

2. That small traps should have vents the size of the trap, and the main vertical vent should be three inches in diameter in ordinary dwelling houses, and should be computed for larger houses.

3. Ventilated traps do not fail by either back-pressure or siphonage.

4. That ventilation through pipes of the proper size should be required in all specifications.

In the matter of methods of testing pipe-systems, the smoke and the peppermint test are of little service, as they do not represent any pressure. Filling the pipes with water or testing them with compressed air, the pressure showing on a gauge, are the only reliable methods.

Steam for heating purposes says the *Plumber and Decorator*, possesses an advantage over hot water in the case of its application where great inequalities and frequent alterations of level occur, and particularly when the boiler must be placed higher than the place to be heated. For buildings occupied at intervals steam is more effective than hot water in its rapid generation of heat.

USEFUL HINTS.

One gallon priming colors covers 50 square yards; white zinc, 30; white lead paint, 45; lead color, 50; black paint, 50; stone color, 44; yellow paint, 44; blue color, 45; bright emerald, 25; bronze green, 75.

To remove rust from nickel plate: Grease the rust stains with oil, and after a few days rub them thoroughly with a cloth moistened with ammonia. If any spots still remain, remove them with diluted hydrochloric acid and polish with tripoli.

It is stated that ordinary brick boiled in tar for about twelve hours, or until they are saturated with it, are increased about 30 per cent in weight, are much harder than common ones and unaffected by frosts and acids as well as perfectly waterproof. They form an excellent flooring for work shops or store rooms, particularly in chemical establishments.

Cement for Mosaic Cubes.—Soak isinglass in water till soft; then dissolve in proof spirits by means of a gentle heat. In two ounces of this mixture dissolve ten grains of ammoniacum and while still liquid, add half a drachm of mastic dissolved in three drachms of rectified spirits. Stir well together and put in bottles. Melt by standing the bottles in hot water and use directly.

At the Workmen's Exhibition recently held at the Agricultural Hall, London, some interesting examples of wall decoration by means of sand were shown. A plain coloured surface having been prepared the design is stencilled on with gold size or some other suitable sticky material—varnish allowed to partly dry would answer very well. Sand that has previously been coloured to the desired tints is then applied to the surface marked by the design to which it adheres, giving a very attractive appearance. Sand of several colors may be employed if desired.

Swiss Brick.—In Switzerland there is now being manufactured a glass brick, or a brown building block, formed or molded flask shape, with a short neck at each end, 8 inches in length, 6 inches in width, and 2½ inches in depth, with an air chamber through the center. The edges of the brick are covered, recessed or ribbed and grooved to receive when laid a suitable cement of plastic material of such character that after it has hardened it will constitute a suitable frame or setting to keep the entire mass, roof or wall solidly together. The forms or molds, there being two shapes, are pleasing to the eye, the line or ridges being clear and smooth, and of sufficient thickness or strength to stand a pressure of 150 to 200 pounds to the square foot.

Experiments with glass bricks for building purposes were begun in 1891 by Mr. Falconnier, an architect of Lyons. These bricks are hollow, being blown like ordinary bottles, and are given forms—such as cubes, hexagons, etc.—that permit of ready laying. A bituminous cement, with a base of asphalt, is used; the bricks serve as double windows, giving protection against both cold and heat: they are good insulators of humidity and noise, and they lend themselves readily to the decoration of buildings, either by their form or their colour. Many applications are forseen. The bricks are described as neater than marble for meat markets, and are especially adapted for hospitals, bath halls, hot houses, refrigerating establishments, and buildings in which absence of windows would be an advantage. A hot house of glass bricks, we are informed, costs about the same as an ordinary one, saves fuel and resists hail.

Among the processes for fireproofing to which the attention of the directors of the Berlin Exposition was recently drawn, and for which awards have been declared, are the following: For light tissues, consisting of sixteen pounds of ammonium sulphates, five pounds ammonium carbonate, four pounds of borax, six pounds boric acid, four pounds of starch—or one pound dextrine or one pound gelatine—and twenty-five gallons water, mixed together, heated to eighty-six degrees Fahrenheit, and the material impregnated with the mixture, centrifugated and dried, and then ironed as usual. One quarter of this mixture, costing only a few cents, is sufficient to impregnate fifteen yards of material. For certain materials, theatrical decorations, wood and furniture, thirty pounds of ammonium chloride are mixed with so much floated chalk as to give the mass consistency, and it is then heated to from 125° to 150° Fahrenheit; two coats of it by means of a brush. A pound of this, costing only a mere trifle, is sufficient to cover five square rods.

Steam-Pipe Joints.—The method of constructing steam-pipe joints at one of the Edison Electric Light Stations in Boston where the working pressure carried is 150 pounds per square inch, designed by William H. Gallison, is said to have given excellent results. The pipe is made of wrought iron, and the joints between contiguous sections of pipe are made by the use of cast-iron flanges. The pipe and flange are threaded, and the screw joint is first made in the usual way, care being taken that the thread on the pipe is of sufficient length to extend through the flange its full thickness. After being made up solid inside of the pipe at the extreme end is expanded by the use of a hammer, the metal being driven or riveted into the thread. The pipe is then put in a lathe, and the flange faced off throughout its whole surface; not only that of the cast-iron of the flange proper, but also that of the end of the pipe. The gasket which is used is made of copper, and care is taken that this extends through to the interior edge of the pipe as well as the surface of the flange.

Coatings for Preserving Stone.—The following formulæ for metallic cements are given by Mr. Grimand in *La Revue Practique des Travaux Publics*: Oxide of zinc dissolved in a solution of chloride has for a long time been used as a paint, and it serves as a base for the following cements: 1. Oxide of zinc, twenty kilogrammes; pulverized Lorraine cement stone, twenty kilogrammes; sandstone, ten kilogrammes. This cement must be tempered by a liquid composed of hydrochloric acid, twenty-two degress, B., ten litres; water, five litres; zinc white, three kilogrammes; ammonium chloride, 0·5 kilogrammes. 2. A cheaper cement can be obtained by mixing oxide of zinc, ten kilogrammes; pulverized Lorraine cement stone, twenty kilogrammes; sandstone five kilogrammes; and yellow ochre, 0·4 kilogrammes. This cement is tempered with the solution just given, diluted with five litres of water. For soft stone, a cement is made of oxide of zinc, ten kilogrammes; Lorraine cement stone, thirty kilogrammes; sandstone, ten kilogrammes; and yellow ochre, 0·3 kilogramme. Or the following formula may be used: Zinc white, five kilogrammes; plaster ten kilogrammes; Lorraine cement stone, ten kilogrammes; and yellow ochre, 0·5 kilogramme. If an extremely strong cement is desired, it can be prepared of oxide of zinc, ten kilogrammes; pulverized quartz, fifteen kilogrammes. For the last mentioned three cements, the liquid given above is used, only ten litres of water are added instead of five litres. These cements can be applied with a brush as a paint. Colours give give good results. The coating adheres perfectly to the stone, and gives it the appearance of a newly cut surface, and at the same time forms a protecting covering against the inclemency of the weather. The stone should be well cleaned before applying the paint, and, if necessary, several coats may be given.

Method of Measuring Bridge and Floor Vibrations.—Professor Steiner, of Prague, has perfected a method of accurately measuring bridge and floor vibrations by the aid of photography. His process, says *Le Genie Civil*, is a delicate one and is an application of the chrono-photographic process of M. E. J. Marey, of the Institute of France. He uses little glass balls, and these are strongly illuminated, either by the solar ray or by an electric arc light or a magnesium light. These balls give upon a photographic negative a clear and well defined point. To register vibrations one of these glass balls is fixed at the point to be examined, and the photographic apparatus then so set up that the image of the ball falls on the right edge of the plate. The plate is exposed at the moment the movement commences, and at the same time the camera is turned from right to left on a pivot. The negative then shows an undulating line which is the vibrations of the ball point in amplitude and duration to obtain a scale with which to read this undulating line, a second ball is suspended to a fixed point, to which is given a known rate of oscillation. The position of these two balls is such that their images coincide in a state of rest, and a comparison of the trace of the second ball as printed upon the line of the first on the negative gives the number of vibrations of the latter in a given time. It is possible, then, to place near the first ball a fixed scale, brilliantly illuminated like the ball itself, and as this scale appears on the negative, the amplitude of the oscillations can be measured at a glance. The measurements may be made either directly upon the print or from an enlargement made in the usual manner. To avoid the practical difficulty of making the images of the two balls coincide at the beginning of the operation, Professor Steiner says a pendulum may be made to oscillate before the source of illumination of the ball. The ball of the pendulum will pass before the light at regular and determined intervals, and the undulating line of the negative will be broke at distances corresponding to the duration of the oscillation of the pendulum. It is not important that the camera turns upon its axis with a uniform motion, and the speed of turning is likewise of little importance. The relations of the curves placed by the two balls will always remain the same. It is suggested that an apparatus of this kind would be useful in studying the vibration of the floors of buildings resting for some years on iron beams, especially when these floors are submitted to the rythmic shock of dancing.

THE ARTS AND CRAFTS.

This is what Mr. Crane says, in a recent issue of the *Magazine of Arts*, as to the connection which should exist between Arts and Crafts: "The designer—if designer pure and simple he is forced to remain—must never lose touch with the craftsman. It would be well, indeed, if he practiced some craft himself, as the technical conditions, peculiarities, perhaps difficulties, he would be sure to encounter, would tell him more than any words about it; and the practical experience and suggestions gained would certainly react most favorably upon his power to design. Before the evolution of our industrial epoch of sub-division of labour, machine industry, and centralized markets, the craftsman was his own designer. Handicrafts, in fact, did not exist apart from art, and the workshop training and apprenticeship was common to them all. Thus a painter began as a colour grinder, and went through all the technicalities of the studio or workshop before he became master of them. The system is so obviously sensible and sound that it seems strange it should ever have been departed from, and, in fact, it only was broken up by the pressure of the modern commercial system, and the domination of the money-making idea."

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

PROCEEDINGS OF THE ANNUAL CONVENTION.

The Quebec Association of Architects met in annual convention in the Parliament buildings, Quebec, at 10 a. m. on Sept. 28th ult. There were present :—

Victor Roy, President ; J. Nelson, First Vice President ; H. Staveley, Second Vice President ; J. Z. Resther, Treasurer ; A. C. Hutchison, Secretary ; A. T. Taylor, J. L. Peachy, J. B. Resther, Theo. Daoust, H. Nelson, F. X. Berlinguet, Chas. Baillairgé, George Emile Tanguay, A. Gendron, J. Redmond and J. Bertrand.

In a brief address the President called the convention to order. Reports of the Treasurer and Auditors were received and adopted ; also the report of the Council, which was as follows :—

REPORT OF COUNCIL.

The Council beg to report that since the last annual meeting of the Association held in Montreal, fourteen meetings of Council have been held, the business at which was principally of a routine character.

The attendance at these meetings was as follows :—Alex. C. Hutchison, 14 ; J. Haynes, 12 ; A. T. Taylor, 11 ; J. Nelson, 9 ; A. F. Dunlop, 8 ; J. Z. Resther, 8 ; V. Roy, 8 ; J. P. Ouellet, 1 ; J. J. Browne, 1 ; H. Staveley, 0 ; H. M. Perrault, 0.

The small attendance of Messrs. Staveley and Ouellet, of Quebec, is accounted for by an understanding that to save expense they were only to be summoned when the business was urgent and that the late Mr. Brown, owing to an accident which happened to him early in the year was incapacitated from attending.

At the first meeting of Council held after the annual meeting, Messrs. F. X. Berlinguet and C. Baillairgé, of Quebec, and Messrs. A. T. Taylor, Joseph Haines and Alex. C. Hutchison, of Montreal, were appointed a Board of Examiners. This Board reported that at the semi-annual examinations held in Quebec on the 26th and 27th of January last three candidates, namely, Messrs. J. P. Ouellet and J. P. E. Dussault, of Quebec, and Mr. D. A. Monette, of Montreal, had presented themselves and succeeded in passing the final examinations prescribed by the Act of Incorporation and by-laws. Their names were consequently entered upon the register of the Association.

The Board also reported that at the semi-annual examinations held in Montreal on the 27th and 28th of July six candidates had presented themselves for matriculation examination, and that the following four had succeeded in passing, namely :—M. Helbronner, P. Sicotte, F. Peden and J. A. Deschamps.

Shortly after the last annual meeting, the Council, with a view to bring the members of the Association resident in Montreal together more frequently, arranged that as many of the members as could make it convenient to attend should meet and dine together once a month—these monthly dinners to be followed by a general meeting of the members for the reading of papers, lectures and discussions on subjects of interest to the profession. These monthly dinners and meetings were held from December to May ; at the meetings papers were read and lectures delivered as follows : "Truth in Art," A. T. Taylor ; "Westminster Abbey," A. T. Taylor ; "Archaeology," J. Venne ; two lectures on "French and English Gothic Architecture," illustrated by lime light, by A. C. Hutchison. At one of the meetings a discussion led by Mr. W. E. Doran took place on the Single Tax question. While the attendance at these meetings was not as good as the Council expected, they hope that if they are continued during the next winter season the members will avail themselves of the opportunity thus afforded them for social intercourse and instruction.

An attempt was made in January last to form classes for the instruction of students, but owing to the difficulty of obtaining instructors and the apathy of students, they were not carried out.

During the last session of the Legislature of Quebec, a bill was introduced by Mr. Auge respecting the privileges of labourers, mechanics, contractors and furnishers of materials. As the provisions of this bill if passed were likely to interfere with and hamper the obtaining of loans for the purpose of building, and would foster the growth of an inferior and irresponsible class of contractors, the Premier of the Government was communicated with and he was requested to use his influence in preventing the passing of the bill. The Council were assured that when the bill came up for discussion their objections to it would be presented. The bill, however, was withdrawn before discussion upon it took place.

In the month of January printed lists of the names of members on the Register of the Association at the beginning of the year were issued to all the members.

Shortly after coming into office of the present government of the Province of Quebec their attention was called, to the tariff of professional charges which had been prepared in accordance with the terms of the Act of Incorporation, and submitted to their predecessors for confirmation by the Lieutenant-Governor in Council. As this had not been done when they left office, the present Government shortly after they had assumed office was petitioned to have the tariff confirmed at an early date, and on the 24th of March last a deputation of seventeen members of the Association waited upon the Honorable Mr. Taillon, Premier, and urged the claims of the Association to have the tariff ratified. Though the deputation was well received and promised that the subject would have his early and careful consideration it still remains in abeyance and has not yet been rejected.

As a number of the members of the Association wished to have a copy of the tariff as prepared by the Council and submitted for approval to the Government, it was printed in French and English and distributed to all the members of the Association. At the same time circulars were issued containing suggestions for the conduct of competitions. The Council would respectfully urge upon the members to use their influence with any person or body promoting a competition to have it carried out in the manner suggested by the Council.

Early in the year the formation of a library of reference for members and students was taken into consideration. As a library placed in Montreal could only be of use to the members and students resident there, it was felt that it would be unfair to the members of the Association not resident in Montreal to devote any of the funds of the Association to such an object. Subscriptions in books and money were therefore solicited from members in Montreal, and in response to the appeal the sum of $120.00 was subscribed as follows :—V. Roy, $25.00 ; A. T. Taylor, $25.00 ; Alex. C. Hutchison, $25.00 ; A. Raza, $25.00 ; W. E. Doran, $10.00 ; J. Wright, $10.00.—$120

Donations of books were also received from C. Clift, J. Nelson, A. F. Dunlop, A. T. Taylor, C. St. Jean, J. Haynes, Mrs. J. Redpath.

With the money and books thus subscribed and with those previously donated by Mr. C. Baillairgé, of Quebec, the Council have now 107 volumes upon the shelves of the library, and as they still have an unexpended balance on hand, the number of books will shortly be increased and the nucleus of a good library of reference established.

The preparation of a suitable design for a diploma to be issued to the members who enter the Association by passing the examinations prescribed by the Act of Incorporation and By-laws has received the attention of the Council and they are pleased to report that after considerable delays the diplomas are now ready, and that they are being issued to the members entitled to receive them.

Your Council regret to report in August last the death of one of its members, Mr. John James Browne. The following resolution of condolence was adopted by the Council and a copy of the same transmitted to his widow and family :—

"That the Council put on record their deep regret at the loss by death of their confrere, Mr. John James Browne, whose name has been identified with the growth of the City of Montreal during the last thirty years, and whose vigor and energy gave promise of many years of usefulness to come. His untimely death is mourned by all his professional brethren. The Council would also express their sympathy with the widow and family in their great loss."

In view of the short time between the decease of Mr. Browne and the annual meeting the Council did not consider it necessary to fill his place in the Council by the appointment of another member.

The Secretary's statement of receipts and the Treasurer's report are herewith submitted. The whole of which is respectfully submitted.

The Treasurer's statement shows a balance on hand of $139.16.

ALEX. C. HUTCHISON, Secretary.

The following officers were elected for 1893-4 : J. Nelson, President ; Chas. Baillairgé, First Vice-President ; A. C. Hutchison, Second Vice-President ; J. Z. Resther, Treasurer ; Joseph Haines, Secretary ; Members of the Council—A. T. Taylor, A. Gendron, J. B. Bertrand, Eric Mann, J. Venne, George Emile Tanguay ; Auditors—Theo. Daoust and J. F. Peachy.

A large and richly framed photograph of the original members of Quebec, was presented to the Montreal members, who tendered them a hearty vote of thanks.

A number of the visitors were entertained at luncheon by a few of the Quebec members.

At 2 p. m. a second sitting of the convention took place, when the following paper was read by Mr. A. T. Taylor :

BRIEF NOTES ON THE ARCHITECTURE OF THE WORLD'S FAIR.

If you wish to realize to the fullest extent the power and potency of contrasts, go to Chicago, and from thence to the World's Fair. You will have shade and light personified. To pass from the noisy, dirty, half paved, half-baked chaotic city of Chicago, to the fair white city on the shores of Lake Michigan, with its lagoons and islands, pleasant winding walks, fountains, statuary and architecture, is like a translation from Purgatory to Paradise.

It is not often the happy lot of any members of our profession to be called upon to design an ideal city. The average modern city is not planned—like Topsy, it just grows, and we are only allowed to touch with the finger of beauty a spot here and there. One longs for the days of Pericles or Cæsar, or even those of the First Empire, when cities were laid out with beauty and effect and were an exquisite settings for noble gems of architecture.

When it was decided to grant Chicago her desire to be the host of the nations, it became incumbent upon her to take steps at once to arrange for the same in a worthy and fitting manner. The experiment was not new, for many previous exhibitions formed precedents for her guidance, but Chicago-like she determined to achieve a success which would at once leave all previous efforts hopelessly in the background. How this has been done remains to be seen. The directors of the Fair were fortunate in securing the services of Messrs. Burnham & Root, architects in Chicago, to formulate a general scheme for arranging the necessary buildings on the flat swamp of Jackson's Park ; and Mr. Olmsted, of New York, was also called in to prepare a scheme for laying out the grounds. With great wisdom it was decided to obtain the co-operation of the best architectural talent of the United States in designing the various buildings. Accordingly, Mr. Richard Hunt, Mr. G. B. Post, and Messrs. McKim, Mead and White, of New York, Messrs Peabody and Stearns, of Boston, Messrs. Van Brunt and Howe, of Kansas City, and Messrs. Henry Ives Cobb, S. S. Beman, W. H. B. Jenney, Adler & Sullivan and C. B. Atwood, of Chicago, and one lady, Miss Sophia B. Hayden, were selected for the work.

The general arrangement was mainly drawn up by Mr. Root, whose untimely death has robbed the profession of one of its brightest members. The conception was so grand and dignified that it was accepted with but little alteration, and the various buildings were then all located amongst the above named architects. It was considered advisable to adopt one style for the general exhibition buildings, so as to gain unity and harmoniousness of effect, and yet by bringing to bear upon the problem different minds, a variety and interest was obtained. The style adopted was a liberal phase of classic, ranging from the severe Greek to a florid Renaissance. Two important exceptions, however, were made, viz.: in the Fishery Building, in which a free treatment of Romanesque is adopted, and in the Transportation Building, which is orientally nondescript.

What probably strikes a visitor most of all, is the apparently substantial and permanent look of the buildings, and then follows the inevitable expression of regret that they are so soon to be demolished and fade away like a dream.

In the nature of things buildings for exhibition purposes have been more or less of a light, flimsy and evanescent character. Perhaps we may make an exception in favor of those of the last Paris Exhibition which were about the best hitherto. We may say as a general rule, however, that the exhibits were the attractions in previous exhibitions and not the buildings ; in this case it is the buildings and not the exhibits. It is an undoubted triumph for architecture, and it has opened the eyes of thousands to the possibilities which lie in the work of our profession, to which they were previously blind.

Doubtless many architects who visited the Fair sighed for such an opportunity of distinguishing themselves in design as had been afforded the architects who were chosen, but he that will be faithful in much must be also faithful in little, and genius can be shown in a nut shell as well as in a cathedral. If we are but true to our noble heritage, and to our splendid traditions, and true to our better selves, we will pander to no evil tastes of the age, but will design the smallest buildings we have as well as we know how, making them instinct with truth, beauty, fitness and grace.

Whatever may be the results of the Exhibition on the industrial life of the world, I am convinced of this, that the architecture of the Fair will have a powerful influence on the architecture of this continent for good or evil for some time to come. The style adopted will be the predominant one, and we may expect to see reproductions of the various buildings more or less spoilt, springing up all over the country. One of the gravest results which I fear, will be the bringing again into use of the plastic material called "staff" or a modification of it. It has been found such a pliable adaptive material, lending itself readily to any shape, form or mode of handling, that people will forget it is only justifiable in its use for buildings of a temporary nature, and will endeavor to use it for structures of a more permanent character, the more especially as the gigantic and monumental character of the style adopted for some of the buildings would be enormously expensive if carried out in stone and such like permanent material, and there will be a great temptation, which I am afraid will prove to some people irresistible, to obtain the effect by using this "staff" or composition, to the destruction of truth and genuine progress in architecture. If such be the case, then the World's Fair of 1893 will mark a black period in the annals of architecture. It is not so long ago since we emancipated ourselves from the shams of "compo" fronts and the falsehoods which had well nigh strangled our beloved art, and were endeavoring to work on honest lines with honest material. Let us determine that we will not again be brought into bondage, being well assured that no architecture worthy of the name can live, progress and flourish that is not true and honest in every part.

I have had enlarged the general plan of the disposition of the buildings, so that those of you who have not been able to visit it will be able to form some idea of its arrangement, and I have also brought a few views of some of the buildings ; but no plan or views or description can give you much idea of the charm of the whole—it is to be felt and absorbed gradually and cannot be expressed.

The Court of Honor, as it is called, is the great central feature of the general design extending from the lake up to the terminal station, and so arranged that visitors by rail as well as visitors by boat are at once introduced to the grandest spectacle of the exhibition and are profoundly impressed at the outset.

At the lake is a triumphal arch modelled on the Roman arches and flanked on each side by a well proportioned colonnade or peristyle, terminating in a well designed ornate building at each end.

At the terminal station end is the great Administration Building, intended to be the centre of the whole system and having a gilded dome soaring up into prominence. Down the centre of the Court is a large water basin encircled with elaborate balustrading, terraces and steps, having at one end a statue of the Republic 60 feet high, gilded, and at the other a highly ornate and florid Columbian fountain.

On the one side of the Court is the gigantic Manufactures and Liberal Arts Building, and the buildings for Electricity and Mining, and on the other the palaces for Agriculture and for Machinery, the whole forming a magnificent group. Of course to architectural students whose mission it is to criticize and probe and dissect, there is fair scope for criticism on many points. Exception has been taken to the buildings on the ground that in design externally they have no relation to the objects or exhibits they enclose, and were a few extraneous sculptures and frescos removed, the buildings could be all transposed without affecting them in the least, and could even be labelled Royal Palace, State House, Court of Justice, etc., and sustain the character well. There is truth in this criticism, but at the same time it must be borne in mind that the very buildings are themselves in the nature of exhibits, and that each architect vied with the other in producing a noble and magnificent building *per se*, and quite irrespective of its use.

It is manifestly impossible in this short paper to go into an exhaustive description or criticism of the buildings. Their general appearance and their virtues and faults are no doubt familiar to most of you. I can only touch on them in a cursory way, and by bringing the subject before you refresh your memories on perhaps some points.

It seems to me that the designers acted wisely in leaving the buildings for the most part the natural white color of the material. The most radical departure from this is in the Transportation Building, which cannot be said to be happy either in its design or in its color scheme. It is crude in color, unintelligible in motive, and ungraceful and disproportionate in its parts.

I can only speak in passing of the Women's Building designed by Miss Sophia B. Hayden, and which is most creditable to her. She stands, if I mistake not, in the proud position of being the first woman to design a building of such magnitude which has been executed, and it puts to the blush many of the secondary buildings on the ground, such as the United States Government Building, the Illinois State House, and others. We shall have to look to our laurels when our sisters enter into competition with us, and there seems no reason why women should not engage more largely in architectural designing, and the tendency I think is to do so.

Perhaps the building that is most satisfactory and pleasing is the Art Gallery, designed by Mr. Atwood, whom I had the pleasure of meeting. It is purely academic in its treatment—a severe form of Greek having been rigorously adopted. In its repose and quiet dignity, chasteness of detail, and simplicity of outline, it is very satisfactory and restful.

One cannot but be filled with admiration for those old Greeks who produced a style which reproduction thousands of years after cannot spoil, and whose translation into other purposes cannot quench the light of eternal beauty inherent in it.

Of the State Buildings I can only refer to one or two. Some of them have a strict relation in design to the State they represent, and are therefore fitting and pleasing ; of these the California building, the Idaho building, the Massachussets building, as well as those of Colorado and Washington, are worthy of mention. Dotted about in every variety of style and color and material, they presented a bewildering and picturesque appearance. The Illinois State House has the unenviable notoriety of being perhaps the worst building on the ground.

Amongst the buildings representing foreign countries England has a modest but tasteful building in the English domestic style, well finished and furnished. The German building is most interesting, being finished with the fantastic and floridly grotesque decoration outside and inside characteristic of some of the Mediæval German buildings.

Canada, I regret to say, does not shine in its building. It is inoffensive and sadly commonplace, and conspicuously uninteresting. It is the more to be regretted as the position allotted to it is good, and the opportunity one which ought to have been taken full advantage of. Inside it is sadly lacking ; whilst other buildings had comfortable quarters where any one could get rest in luxuriance and read the papers or write letters amidst inviting surroundings, the aim seems to have been in the Canadian building to make it as uninviting as possible. In justice it should however be said that the money available was quite inadequate for such a purpose.

The little Dutch house of Van Houtens' merits a passing word. The charming interior furnished with Dutch tiles, blue plates, old oak furniture, together with the quaint costumes of the attendants, make as pretty a picture as could be found on the grounds.

On the whole the treatment of the sculpture has been most effective and many of the subjects are of extreme beauty, but these would merit another paper. I would praise, however, the smaller subjects rather than the more gigantic.

The gilded statue of the Republic already referred to is very unsatisfactory—the back view especially being most ungraceful and stiff, and the whole rather coarse and unrefined.

The McMonnies' fountain, as it is called, which has been so much lauded, I must confess I could not like. It seemed to me melodramatic and very disproportionate, many of the figures being lanky and ungraceful and the details evidencing a want of balance and due elevation.

In a few months this white city, or city of white elephants, as it has been called, will have disappeared like a dream—only the Art building will be left as a memorial of the great Exhibition. If it has done nothing else it has proved the indomitable perseverance and skill of those who reared it. It has been a testimony of the ennobling influence of architecture and to the possibility that lies in the art for the magnificent expression of some of the highest emotions of man.

Mr. Chas. Baillairgé then read the following paper :

A PLEA FOR A CANADIAN SCHOOL OF ARCHITECTURE.

I had the satisfaction about this time last year, or during the annual meeting in Montreal of the Quebec Association of Architects, of visiting in your company the splendid new engineering buildings of the McGill University, since opened by His Excellency, the Governor General of Canada, on the occasion of the conversazione given by the Governor of that institution on the 24th of February last, to which I had the honor of being invited.

McGill has now endowed Canada with a school of theoretical and practical technology and engineering second to none on this continent, and equal in every respect to those of the older world, as at Kensington, England, at Aix, Angers, and St. Cyr, in France.

You will remember, gentlemen, and we have it from Professor Bovey's own utterances on the occasion, that he was given *carte blanche* by the promoters to go abroad and spare no expense in bringing together from any part of Europe, the United States and the world at large, machinery and models of the very latest design and excellence.

And yet this School of Engineering was if anything less urgent for Canada to have than a School of Architecture, which we should long ago have been endowed with by the directors of Laval University, had some of our

wealthy French Canadians came to the rescue, as has now been done by the munificent benefactors of McGill. I say it was less needed than a School of Architecture, for at this stage of our country's progress, our engineers do not require to go abroad for help or hints. In this respect we are now self sufficient, as even when the Victoria was run over the St. Lawrence, our Keefers were adequate to the task and there was no need of going to England for men unacquainted with our climate and who merely proved their common sense and prudence by adhering strictly to the Canadian engineers' design.

America has outstripped Europe in very many things: the 800 feet span railway bridge over the Niagara, the more stupendous one of double the span between New York and Brooklyn, The Frith of Forth, of Scotland, to be sure, in its turn outstrips the Brooklyn with its twin arches of 1700 feet, and leaves the Eiffel tower in the shade, but its very boldness of concept on was due to lessons taught on the Columbian continent, lessons from the United States and Canada, by our now nearly half a million miles of railway with their stupendous cantilevers reaching from cliff to cliff over rivers and ravines innumerable and of untold depth, across the Rockies, the Ne adas and the more than marvellous Colorado, and other heretofore so-called impracticable situations, but which our American engineers have mastered in spite of old world fogies pronouncing them impossible.

Nor need we in this respect allude to aught else than our own system of inland navigation which not only equals but surpasses anything of the kind in the old world.

Our engineers have not been slow to mould their minds, their works on the same vast scale as that of our waters, while European engineering has been dwarfed in some respects by having to deal with the narrower streams, the less precipitous rocks of the Eastern Hemisphere. We have the proof of this in our Quebec docks, where when looked down upon from the city ramparts, it makes one's heart sore to think of the millions that have been wasted in the construction of a jetty some 4000 feet in length, to enclose what? not as it should have done, a space commensurate with our increasing Canadian commerce, an extent of ground where a series of piers or wharves could have been built out southward from the jetty and made capable of affording berths for a score or more of ocean steamers, had the jetty been moved northward by 500 or a 1000 feet as it could and should have been; no, nothing of the kind, nothing but a mere strip, a few hundred feet, the veriest fraction of our comparatively immense estuary of the St. Charles at its confluence with the St. Lawrence, a basin where a vessel of any length can not even turn around in, but must back out of by the same route it comes in.

Had a Canadian engineer been entrusted with this work, such an anomaly, such a costly blunder, never could have occurred, and what is of concomitant importance, the engineers over the work, both resident and foreign, unacquainted as it is now evident they were with the severities of our climate, and with the stress against a dock wall exercised by such a semi-fluid material as the sand dredging with which the jetty is made up, and apparently entirely oblivious of the allowance to be made in a retaining wall for the surcharge brought to bear on it by the mountains of coal heaped upon the embankment, have made the walls so thin, so inadequate to stand the thrust, that they are now and have been ever since the filling in has been completed in the rear thereof, gradually and surely bulging outward to their eventual destruction, and tie rods are now being inserted through them and one hundred feet into the heart of the embankment where they are anchored to stay the ruin, while the unresisting nature of the made ground is such that the ties should have been taken through the 300 feet width of jetty and anchored to the opposite or north face or cribwork of the mole.

This subject of the strength of retaining walls is of vital importance, and that they are generally made of insufficient thickness to stand the thrust from behind is evidenced by the giving away of the revetment wall along Commercial street, Montreal, which, if of proper thickness, say not less than ⅓ the height, as if to bear the stress of water, and thicker where a surcharge is to be allowed for, should have lasted 100 years or more instead of 50, to say nothing of the walls of antiquity, many of which still stand solid and unyielding after a life of several thousand years.

Imported English engineering knowledge was again at fault, and where the climate could not be invoked or blamed for it, when from failing to test the nature of the ground by borings, as should have been done, the front wall of the Levis graving dock had to be removed 65 feet further inward or to the southward and the dock curtailed by so much in its length, an error requiring the construction of an otherwise unnecessary dam costing $18,000 and in other ways nearly doubling the cost of the improvement, while rendering the dock so much less frequently available to vessels of the length built now-a-days.

I have said, gentlemen, that we are now well provided for in the way of a professional engineering education, but we can not say as much for architecture. To be sure, a great step has lately been taken by the profession in this country, in forming an architectural association, and obliging would-be architects to submit to a thorough examination as to their technical requirements and fitness for the business.

Our friend Mortimer is also entitled to our suffrages for embarking on the courageous and arduous task, may it prove a paying one, of editing and publishing his now well known, well patronized journal of architecture and construction, styled THE CANADIAN ARCHITECT AND BUILDER. Members of the profession have entered, I am glad to say, on a course of theoretical and practical instruction for the benefit of students, and papers on pertinent subjects are read at meetings of the association in their rooms in Montreal, and re echoed through the length and breadth of the Dominion and abroad by he kindly efforts of the gentleman just alluded to, for the benefit of all. But something more is required to be done for students, aspirants to our ranks; a chair must be established in one of our universities with a paid professor having at his disposal the necessary models, the indispensable appliances for imparting knowledge of a technical and practical nature; just as for a course of physics, chemistry, electricity and the like, instruments and specimens are at hand for imparting a thorough knowledge of the sciences.

If no one can be found amongst us rich enough and patriotic to do the needful, our Government should be appealed to, to help Laval in this long talked of chair of architecture at the University, and what I am now about to add to these preliminary considerations will amply demonstrate the need of instruction in the theory and art of building. And engineers would, like their confrere architects, be amply benefited thereby; for the professions overlap in many instances, and in the same way that an arch tect must know something of engineering, as when building foundations in water, or when called on to design and carry out a viaduct, a light house, etc, so must the engineer trench upon the domain of the architect in the construction of a mill or manufactory, a bridge, an engine or power house for water works, electro motion, a grain or other elevator, a store for dockage purposes, a railway station, and the like.

During a professional career of now over 40 years as land surveyor, engineer and architect, I have had to design, estimate, cost and superintend the construction of very many structures of all kinds, small and large: dwelling houses, churches and presbyteries, the Laval University buildings, colleges, convents, asylums, hospitals, hotels, schools, theatres, mills, manufactories, etc.; and engaged as I have been in hundreds of arbitration cases, relating to defects of construction, as in the settlement of untold accounts for extras arising out of faults of omission and commission on the part of builders, architects and so-called engineers and others; I have had abundant opportunity to notice the great and unpardonable ignorance displayed in scores of instances, of the simplest rules of the constructive art.

There is nothing more usual for instance, with the bulk of our would-be architects and builders than to be totally ignorant of the fact that the strength of a beam or joist is as the square of its depth, and inversely as its length, though they can hardly help seeing without any calculation that the supporting power increases with the breadth.

Do they even know the meaning of the term "square of depth," or if so would they not see that whatever unit they add to the breadth of beam, a fraction of the same added to the height or depth of a joist would produce an equivalent effect. Thus, while to double the strength of a beam its depth remaining the same, its breadth must be double; the same increment of additional resistance is added to it by increasing its depth by four-tenths only, or a little more than one-third of its vertical height, with a saving of nearly two-thirds in the quantity and weight of the additional timber, and the same of course in dealing with iron or steel bearers or supporting bars of any kind. To treble the strength, the advantage is more apparent; it suffices to add not the double of four tenths, but only seven-tenths; while to quadruple the strength, the depth has only to be doubled, or trebled to make it nine times as resistant to any load it may have to support, and sixty-six and two-thirds per cent. of the material saved.

Of course there is a practical limit to thus adding to the height of beam to increase its strength; as, in the case of timber for instance the deeper beam must be cut from a larger and more expensive log, and if very deep, staying or lateral bridging must be introduced to prevent shearing, twisting or giving laterally. And again the depth of floors can not be indefinitely increased, the height between them decreased by so much, or the height of structure added to in a manner to make it more costly or of ungainly aspect. What is more usual in scores of dwelling houses and other buildings than to see the doors out of square, a table so much inclined that you cannot lay a pencil on it without its rolling off,—everything in the house in a word out of the perpendicular or out of level, and all this due to a settling of the centre of the structure attributable to sheer ignorance of the fact that the middle wall of a house should be of just double the strength of the outer walls; while in general not half so strong, or worse than that, no wall at all—a mere stud partition where the superposed head and foot sills and joists and other horizontally placed timbers crush and shrink both by their own weight and in the action of drying. Then there is the incident cracking of the plaster due to the settlement; and the unhorizontal lines of the ceilings and skirtings rendered more strikingly so by the skew to which the vertically hung papering has to be cut at top and bottom to fit the inequalities, and which to a sensitive and appreciative eye cannot but be a source of mental agony, to say nothing of the bodily inconvenience of such a structure and of the expense of cutting doors to suit, displacing locks, latches, etc.

These defects, this saving of the cost of a central wall or other adequate modes of support by cast or wrought iron columns and bearers resting directly the one on the other, or an incompressible stone or brickwork, are often due to the parsimony of the proprietor, or to his ignorance, and in total disregard of the advice of his architect or builder; and the structure remains a crying disgrace and reproach to all concerned in its erection, and a source of discomfort and torment, as everything unaesthetic generally is, to all people of fine and cultivated feelings.

But there is also to be guarded against, the sagging of a floor between the supporting walls; and to this end it often suffices to remember that every joist, as far as possible, or at least every second or alternate one, should stretch right through the structure from front to rear, and so as to rest on all three of the walls, the centre one as well as the two outer, i.e. on three points of support.

The strength of a joist is thus doubled and its tendency to sag at the centre of the vacant space thus reduced by 50%; its stiffness, as already said, being in the inverse ratio of its length. Nor must it be forgotten that when no more than two points of support can be had, or the beam not long enough to reach the full depth, then may its rigidity be increased 25% by thoroughly scaling it at one end in the wall, or by 50% when similarly sealed at both ends; not forgetting either that whatever weight the beam will bear at its centre, it will bear twice the weight when uniformly distributed over its length.

My advice to the profession is to design the work as it should be in every respect, and to so specify it, and let the plans and paper writing there remain to show and prove thereafter, in case of accident or damage to the building, that you proposed what you considered right and essential; leaving it to the proprietor, though under written protest, to cut and curtail as he may please, thin out the walls, shorten the joists or reduce their height, etc., etc., for the sake of false economy.

I have had examples of this more than once in my own practice, as when some 40 years ago I designed the then parish church of Beauport near Quebec. Each of the towers I had planned to have four walls—in fact to make absolute towers of them from the foundations to the base of the spires, the steeples reaching as they did to a height of 200 feet. The church wardens, in their economical wisdom, decided on leaving out the two inner walls of each of the towers and supporting the corresponding corners or sides of the spires on a single angle post or pillar.

The consequence was that each of the spires settled and leaned inwards and towards each other. When called on some years later to remedy the evil and blamed for such a mode of construction, I produced the original plans showing the four walls as at first proposed by me, when the work was finally carried out as intended by adding the omitted walls, and I was of course thereby relieved of all responsibility for the defect or what it cost to rectify the error of the former curate and church wardens.

I have already alluded to retaining walls and to the fact that they should generally be built as if to withstand the pressure of water. Now, this is a case where it is difficult to make most people understand the necessity of so great a thickness. So do not fail, I advise you one and all, to design your wall as it should be, and in case of failure due in after years to any want of breadth of base, your section will be there to bear you evidence that the fault is not to be laid at your door.

I have not always been faultless myself in this respect, wishing to economize the straightened means of such a poverty stricken place as old Quebec; but have long ago found out that it is all false economy, and that for no reason however plausible should anarchitect, or an engineer condescend to any such thing and then be blamed for it, while at the same time subjected to the annoyance of seeing such a wall from year to year, first gradually losing its batter and then slowly inclining over, and in ten to twenty years requiring reconstruction. But the thing becomes criminal when, as in the case of government structures, no consideration of economy need prevail, as when and only as late as last year the wing wall of St. John gate, Quebec, was rebuilt after being put up of inadequate strength, in 1868, of a thickness still inadequate and probably again requiring reconstruction before another twenty years are over.

Retaining walls will of course fail from other causes than mere thrust of the back filling, as where water can get into the filling or between the filling and the wall and freeze there from the omission of weepers to run it off, and the back filling should be rendered impermeable to water and thereby to frost by covering it over with some properly laid bituminous material through which water cannot penetrate.

There are other defects to be guarded against, as the bulging out of walls of certain structures by the stress of vaults and arches where not counteracted either by a proper thickness of the masonry only the strengthening thereof by buttresses, or loading from above by adding to the height and weight, or applying iron ties to counteract the spreading tendency, and bringing the walls together by heating and thus expanding every second tie and tightening up the nuts while the other ties remain undisturbed until in turn they be heated and curtailed in length by screwing up their nuts.

Appearances must also be attended to; the quoin or corner pillar of a building should not be less than that between any two adjoining openings, as when, as in the case of the Langelier block on the Grande Allée, Quebec, the door adjoins the gable wall. This defect should be corrected by widening the passage or even making a recess or a rounded corner in the adjoining room to allow of shifting the door in a way to get an increased width of pier.

Gentlemen, there is in our human nature an element of aestheticism: Certain proportions seem to be innate in us, planted there by the Creator, and irrespective of any tuition of the beautiful, they are so to say, engraved on the retina and thus rendered indissoluble. Likely this is due to the ratios in the human stature. We can all appreciate the true proportions. One is said to be too bulky for his height, too short, too stumpy; another too tall and slight; we do not like, we cannot bear to see a waist half way down the body, of which the normal height is at two-thirds or three-fifths from the ground we stand on. Even an illiterate person or a mere child will say of a building which is top heavy that it is ungainly, as of a person who is short-necked and his head resting on his shoulders. And this want of proportion of head to body is in no way better illustrated than when, in the arched or even square headed into a door or nitch or window, the impost moulding is set too high, as in the new side chapel of the Quebec Basilica where, the arched head of window being but one-fifth or thereabout of the total height, the architect should have kept down his impost by at least 4 to 5 inches below the centre of curvature to render the proportions satisfactory; and this, a fault of very common occurrence amongst architects and builders, should now that they are told of it, be strictly avoided in the future.

No one for instance likes to see a column divided in the centre, or its middle pointed at by an abutting cornice, or a plinth course, or by the head or transom of a door or gateway, or by the impost of an arched opening or by a notch of which either the top or bottom comes opposite the centre. On the contrary, if any such adjoining feature cuts the column, or abuts against it at just two-thirds the height above the base, one feels satisfied that the right proportions are observed.

Why are the reeds in the fluting of a column made just one-third the height of shaft? Try them at one-half and somehow or other you will not feel satisfied. Put two such columns side by side, one of which the fillings reach to half the height, the other to one third, and even the untutored eye will select the latter.

Have you ever seen a spire where if the height of angle minaret differ much from one-third the total attitude, the effect is pleasing to the eye. No, and any attempt to alter it materially is destructive of the effect; while on the other hand minarets and angle turrets reaching a have offat-roofed building are altogether out of place and objectless as introduced in a new house at corner of Daiquillon and St. Augustin streets of this city.

In the same way can we account, I believe for the rule laid down in classic architecture, that the first or main story of an edifice—the "rez de chausee" as they call it in France, must be about two thirds of the combined height of the two stories which surmount it, and an attic story one-third thereof or two thirds the height of the story which it crowns, while the window in the classic attic I allude to must be two-thirds the height of the openings of the regular stories below.

A door must be in some way proportionate to the human form when properly attired, as of a woman with her skirts, say in height from two to two and a half times its width and never its wigth anything like equal to its height.

A room is not satisfactory, it will please no one, not even those who are incapable of knowing why or of giving expression to their dislike, unless its length bears a certain ratio to breadth and height. Our new Parliament buildings, Quebec, are quite a failure in this respect, and to the great detriment of economy of space and comparative cost of building which is only 50 feet in depth from out to out leaving but 15 feet for rooms on either side the corridor, and making mere guts of any room with more than two windows in it, which is the case with most of the committee rooms, as well of those for draughting purposes, and Works and Lands Departments, whereas, had the depth been made 60 feet, the building would have cost but a trifle more for floors and roofs only, with the same walls, the rooms have been 20 feet in depth instead of 15 and the stairs have had a proper tread instead of the break-neck things they are.

Gentlemen, believe me, it is in no spirit of fault finding that I allude to these defects of construction, distribution and architecture; but it behooves us to educate our youth and public sentiment to a true appreciation of what is proper; and in the same way as I am now pointing out defects in buildings due to others than myself, so would I at all times be ready to admit the justice of any like criticism where I have been concerned.

Our new post office is, by general consent deemed top heavy—that is, there is too much masonry, too great a height of wall above the unduly shortened windows of the upper or attic story, and the contrary defect obtains to some extent in our new court house, where there is too little masonry in proportion to the size and number of the openings, which, had they been curtailed in height by just one foot or course of masonry would have restored the desired ratio "*le rapport entre les pleins et les vides*," as they say in France, improved the ratio of width to height of window; and maybe the "mezzanine openings under the roof had better have been omitted, or if essential to light and ventilation, hidden—"dissimulées," as the characteristic French expression has it—behind some ornamental open iron scroll work in imitation of the sculptured frieze of an entablature.

If I allude only to buildings in Quebec and do not reach to Montreal and elsewhere for comparison, it is certainly not that there be not something there to criticize, as is the too scant height above the windows of the sick wards of the new Victoria hospital at the foot of the mountain, the ungainliness of the N. D. Cathedral, the prison like structure at the S. E. corner of the Square and Great St. James street, the space uselessly taken up by the stair well and passages in the new City Hall; but because I have not the buildings in my mind's eye, and I am of opinion, gentlemen, that no better paper could be written by any one of you, none invited or solicited from your city architects of more realistic value to students of architecture, none educative of and conducive to a proper appreciation of the aesthetic on the part of the public at large, than a paper like this, written in a proper spirit, without any desire of fault finding, and which may be discussed to the mutual benefit of all.

What would Mansard say if he could now behold the variety of section given to the roof that bears his name? and in donne construction why do we so far depart from the beautiful proportions of that of the "Invalides" at Paris.

I will not say with the proverb that "there is luck in odd numbers," though I do not pretend to deny the fact; but there seems to be some reason for them even in the Scriptures, as in periods whether of weal or woe, famine or abundance, they are never counted in multitudes of 2, but where the odd unit invariably steps in to destroy the monotony of even numbers, and as well in breadth or horizontal magnitude, must these relations be observed as in the vertical already alluded to.

Try it and vary it as you will, the tower, the steeple must make some approach towards the one-third rule laid down of breadth of church facade, and so must the projecting or recessed central portion of any elevation of a building hold some relationship, some near approach to this same ratio of 1 and 2 to 3.

The old Beauport church already alluded to by me, and of which the facade and spire were over 200 feet in height, is a case in point, its towers like those of Notre Dame, of Paris, Westminster, of London, York, Strasburg, Amiens, Chartres, Tours, Bordeaux, Rheims, Orleans and others bore to the total width of frontage the due proportion and hence more pleasing to the eye; but the effect will now be destroyed in the restored structure by building the new towers, (with a view to not disturbing the interior) in a way to envelope the present ruins, thus increasing the distance between the towers without at the same time adding to their width and thus returning to the hybrid type of our Canadian church fronts with towers or imitation ones only one-quarter, one-fifth or less of the breadth of portal, instead of the majestic strength and beauty of the prototypes of ages.

Proportions must be adhered to or the thing becomes a failure, as in the case of the spire of the new church of St. J. B. of Quebec which, in spite of my forewarning, an old pupil of mine with Strasbourg and La Trinité, of Paris, before his eyes, has made an eyesore of from sheer want of 3 to 5 feet to be added to its diameter.

The odd unit is essential in almost every case. Do we not always have an opening, a door or window, a gateway, or the like, exactly in the central axis of a building, and even in a bridge or viaduct, do we not always seek, if possible to have a central span instead of a pier right in the middle of a river or a thoroughfare.

There are defects of space which may be remedied by optical illusion. If a structure be unavoidably low, avoid the too oft repeated horizontal lines of belting and cornices, and rather do the contrary and throw it into vertical lines, which have the effect of adding to the height. The vertical flutings of a column lengthen the shaft while horizontal lines or spirally wound ornaments curtail the height, bring down the vault or ceiling and dwarf the building, as is the case in the St. Patrick's church, Quebec, where the spirally guilt belt around the shaft brings down the ceiling by about 4 feet, and I wrote and advised the Fathers of this when but one column out of about a score or more had been done; but clerical pride and obstinacy prevailed as usual, and my uninterested warning remained unheeded.

Nor must we forget to observe the natural in all we do; not only must a post, a pillar or a column be stout and strong enough to support a structure, but it must appear to be. So, when the material for instance is iron, it should be known as such, and painted in a way to look like what it is, instead of being made to look like wood or stone, and thus create anxiety and doubt as to the fitness of its size for the burden it has to bear, and how often do we not see this elementary rule of ethics outraged by dissimulating the true material under a coat of imitation stone or marble, where such material, reduced to so narrow a diameter, would not only be obviously inadequate to sustain the superincumbent weight, but not even self supporting when so long or tall in proportion to its breadth. Montreal in this respect I have observed to be often at fault, as when wide openings for shop windows, etc., are surmounted by heavy piers or walls and the supporting beam which must necessarily be of wood or iron is painted in imitation of the stone facade, while a stone of such an inadequate height in ratio to its length, could not even support itself without breaking, thus rendering it absurd in such a position unless supported from below by iron or other columns visible to the eye from the outside.

Again what is evidently strong enough to bear its burden need not, should not, be supported when the supporting member is not required for distributive and decorative purposes. One of our young and talented Quebec architects has been guilty of this by his introduction of a heavy cut stone column right up to and under the very key stone of the attic arched central window of a new store on Dalhousie street, Quebec. This column is not required for support and as a mullion it should only have reached to the springing of the arch and the curved space above have been thrown into two sub arches and a spandrel.

There are defects of crowding too, which should be steadily avoided, as where the bay and other lateral openings of the new Langelier dwelling on Grande Allée are by a foot or more too close upon the central corps and entrance portico, and otherwise objectionably placed in a way to leave too much blank space beyond them.

Gentlemen, we want a School of Arts and Architecture, a school of architectural and constructive technology, or more than one, where our youth may be educated to the necessity and advisability of all these observances, and the thousands of dollars annually spent in making good the defects alluded to would ere this have paid for and maintained many such institutions on a permanent and continuous footing.

Relating to the sanitary element, made up of drainage, light, ventilation, heating, we are now pretty well off for Canadian and Forcign periodicals dealing with the subject, and I would merely remark on one of these heads, suiting the temperature to the requirements of the outer air, that I do not see why, as indicated in my paper "The Free and Liberal Ventilation of Sewers," read before the Royal Society in May, 1892, some means should not be devised and put into practice of adding to our comfort by cooling the inner air in summer in addition to heating it during cold weather. For, in the same way that the colder outer air is heated on its way to the interior of a building by being passed over heated pipes, in a similar manner can this outer air when too warm to suit the human system, be cooled down by passing it over the same pipes then filled with iced water instead of hot, or directly over a bed or stratum of ice; and how efficient this would prove is evidenced by the fact which all of you may have noticed as I have often done myself, that when on a warm day a breeze or current of air reaches one in the open after passing over the surface of the ice in the uninclosed van as we have them in Quebec, the decrease in temperature or coolness of the ambient air is thus most striking and agreeable.

And in other ways less costly can the air be cooled, as it always is in summer during a hot day when a shower of rain occurs, by robbing the air of its heat to become vapor; by following the same process, imitating nature in an artificial sprinkling kept up during the hottest hours of the day, or better still, where it can be afforded, by artificial rain around the house or opposite an open door or window, by conducting a pipe under sufficient pressure to rise to roof level, so that perforated along its length like the sprinkler of a watering can, it may distribute its contents over so much of the eaves as to suit the purposes required.

As to fire proofing, I would merely say that the subject is most pertinent,

and it is satisfactory to see that a very free use is now being made of iron joists and concrete floors; nor can we reasonably hope for much more than this, with brick partitions instead of lath and plaster, as no one will ever consent to dwell or even pass his or her office hours within a building entirely of stone and brick and iron. No one can nor will put up with with any such permanent and continuous discomfort for the sake of an eventuality which may never occur, or so seldom as not to warrant the expense of iron floors and stairs and doors and window sashes and their trimmings, thus surrounding one with ever chilling influences and more dangerous contact in cases of collision or of a slip or fall.

I have already reminded you in my last years' paper on "Escape from Buildings in Case of Fire" that there can be no real or reliable fire proofing unless all joists and beams and columns and other iron work be protected under a covering of terra cotta or some other non-conducting substance, as the mere furniture in any building—the carpets, curtains and upholstery, beds and bedding, clothes and linen and the like, the goods in storage, are always likely to produce such a heat as to cause wrought iron to shear and warp and give way, cast iron to crack and break, especially when reached by a column of water playing upon it from a fire engine.

I now beg to bring this conference to an end by reminding you of the advisability of providing for escape in case of fire as I am glad to see you are doing to some extent, as in the new Victoria Hospital and elsewhere, but having read a paper on the subject at your last meeting as just stated, I need not now further insist on the precautions to be taken.

No provision, I am sorry to say, has, as yet, been made for escape in case of fire from the six story new so-called Fortress Hotel recently erected in Quebec, though the interior of the horseshoe is admirably suited to a series of continuous galleries, one to each story onto which any one could step from his bedroom window and in a moment reach the street level by one or more light iron stairways, the whole in no way disagreeably obtrusive to the eye. It is to be regretted also that this otherwise elaborate building should be disfigured by an ogee roofed turret instead of conical, like all the others, springing from the apex of the roof over the main entrance on des Carriere st. where it is altogether out of place to have one pyramid on top of another. The upper angle of the main building also obtrudes itself offensively to the eye in awkward proximity to the roof just alluded to, and which to hide the defect and ease off the difference in height between the kitchen wing and main building should have been made just one story higher than it is. The angle turrets, one at corner of des Carrieres and St. Lewis streets and the two at the south west end of building, do not produce the good effect they would had they been made like others to stand out from the angle instead of coming flush with it, but the greatest defect and eyesore so far, contrary to all rules of ethics and not to be for a moment tolerated by even the most uneducated eye, is the heavy stone gablet rising from the eastern front towards the St. Lawrence and resting partly on a pier and partly over an opening or window which in common sense should be if required, in some way made to look like the remainder of the supporting piers.

After the reading of the above paper, the delegates visited the new Frontenac Hotel, Garrison Club, etc. Carriages were in waiting to take them to see the ancient Beauport church, after the inspection of which they were royally entertained by Mr. Francois Parant, ex-Mayor of Beauport, in the old home of Montcalm.

THE BANQUET.

After the first toast, that of The Queen, had been duly honored, Mr. Roy, the retiring President, proposed the toast of the Government of Quebec, which was received enthusiastically. Hon. T. Chase Casgrain, Attorney General of the Province, being called upon to respond, said (translated from the French):

Mr. President and gentlemen: I thank you very much for having drank the toast of the Government of Quebec. I must tell you that the health of the Government of Quebec is at present excellent, notwithstanding that my friend Mr. Barthe here says to-night in his paper that it is a moribund government. I thank you for your kindness in inviting the members of the Government to assist at this sumptuous banquet. To Mr. Nantel and myself it is certainly a great pleasure to be among you; and I have been charged particularly by the Premier to say that were it not for his engagement in Montreal in connection with the reception of His Excellency the Governor General he would be here to-night.

I think history, in giving us an account of the building of the Tower of Babel, for the first time speaks of architects. We are told this was an enterprise which had to be abandoned owing to the confusion of tongues. To-night, however, we have no Tower of Bable to construct: there is no confusion of languages, no confusion of ideas, no confusion of any sort; but the large attendance and the look of contentment depicted in every face are indicative of the good will and harmony which exist among the members of your profession.

I know you will follow the example of your ancestors, who, I have heard it said, even in the time of Solomon, charged very moderate fees for their services. I have found out, since I became a member of the Executive, and since I have had to do with architects, that their prices are extremely modest. Another thing that I have had the pleasure of ascertaining is, that "ye olden time" architects had no tariff; and I am glad to see that you of the present day follow in their footsteps in this respect. I speak as a man of experience on tariffs. We impose on the lawyers a tariff, force them to accept a tariff, and what is the consequence? To-day lawyers cannot charge more than the tariff nor less than the tariff: they are bound by it. As a result, if a lawyer go to Ottawa to plead a case he cannot charge more than five dollars, and if we had no tariff, he would probably charge five hundred dollars: so there is no advantage there. Now, if you had a tariff, you would be in the same position: you could not charge more than the tariff, although sometimes you would feel inclined to do so. I am sure it would be so injurious to you that you would not be inclined to offer such a banquet as you have this evening. Gentlemen, don't make a tariff. In making a tariff you make a rope with which to hang yourselves. I would like to be able to convince you that a tariff would not be productive of the good which a great many of you would expect to see flow from it.

I shall not prolong my remarks, but would say, however, that you have shewn us an attention of which we should show our appreciation; and I can assure you that when you come before the Government with demands that are just and reasonable—I see my friend Mr. Berlinguet looking at me as if to remind me that I should not promise too freely—when you do come with demands such as you have made heretofore, you will find in my colleague, Mr. Nantel, a minister ready to give your profession that which all professions have in the Province of Quebec.

Hon. Mr. Nantel, Commissioner of Public Works, being then called upon, said (translated from the French):

Mr. President and Gentlemen: Like my colleague, the Attorney General, I am sensible of your kindness in inviting me as a member of the Government to attend the annual dinner of your Association. Like him also I understand the importance of this Association of Architects; I understand its importance from the point of view of the benefits which it will confer on the profession in general and on the individual member thereof.

I will not say very much to you of the tariff, because my colleague has told you what he thinks of it. His remarks as to the lawyer's tariff was certainly news to me, and at the same time you; and you must have been surprised to hear that these gentlemen were willing to renounce their tariff. I am sure the lawyers feel very much embarrassed about this. In this connection I am reminded of the fable of LaFontaine, in which he tells us of a fox who, having been deprived of his tail, tried to convince all his fellow foxes of the uselessness of this valuable appendage. The lawyers see themselves menaced in the profession of their tariff, because it is quite clear this tariff cannot be maintained; and should they in advance preach the inutility of tariffs for the other professions, they would be even more foxy than they are supposed to be.

Now to be a little serious, my advice to you is: Do not do as he says, but do as he does, and have a tariff. Have a tariff as other professions have, and as your profession has in almost every other country.

The profession of architect is one which, in every country and among every people which has been blest with civilization, has ranked high. Architects have always been the pioneers of good taste, prosperity and progress. Architecture is not only one of the fine arts, but also a science. It is not only useful, but is indispensable; and it has been said—and with good reason—that in judging the architecture of a country, we judge the degree of prosperity which they have attained, and of the civilization which exists among its people.

Gentlemen, you have formed yourselves into an association, and I for one entirely approve of it. In association is strength; for it is the union of all the individual forces in a great whole. The idea of associations is particularly strong in this country, where men in every path of life are united in associations for the better attainment of their ends as individuals; and associations are and will be respected so long as each individual does his own share and is prepared to often sacrifice his own particular interests for the general good. You, gentlemen, have taken the means of making yourselves respected, and will, no doubt, continue in the course you have up to the present been pursuing. Be great, be strong, be powerful: it is your right. On the other hand, you have certain duties to perform, and among the most important is the improvement of the means of studying your profession. It is your duty to elevate the standard of your profession, and have it do here what it has done in the great countries of Europe— in France, in Italy, in Germany, in England—and we may say with candor, in the United States. No doubt we find there specimens of architecture which are somewhat uncouth, but we also find there grandeur, purity and above all, originality. We have there evidence of accurate study of the great architects, who alone possessed the true aesthetic taste. In the United States they make strenuous efforts to approach the Grecian style of architecture as being the standard; and in Europe they find that the nearer they approach the Grecian style the more perfect are the architectural creations.

We have seen with great pleasure in the newspapers that there is question of founding a chair of architecture which will be affiliated to one of the existing universities, either in Montreal or Quebec. This is a grand idea; and I hope you will push it to a successful issue.

We need reform in the mode of building, and particularly in the mode of constructing houses in the cities and in the suburbs of the cities of this province. I might mention specially the suburbs of Montreal. When in Minneapolis some years ago, I could not but admire the style in which the houses in the outlying portions of the city are built. There they begin by making ditches for irrigation purposes, by planting trees, by levelling the ground, and so on, till the house with its surroundings is a thing of beauty to look upon. In Montreal, for instance, what do we see? Buildings put up in a field, without even any provision for drainage being made, and we know to what it gives rise from a sanitary point of view. I think architects should combine with the municipal authorities to do their utmost to protect the community against these abuses. Sufficient attention is not at present paid to the laws of hygiene by a great number of architects. I must say, however, that students of the

profession have not the facilities for studying up the subject which they should have.

With a chair of architecture established in one of our universities you will be in a position to force your pupils to make serious studies, not only in architecture proper, but also in a number of other branches which to-day are very intimately connected with architecture. By means of such a chair there will be uniformity in your studies, and students, on the completion of their course, will be better fitted for the important work which lies before them.

The vocation of architect is a great vocation. Only the full strength and energy of great talents can in this path attain success. Unfortunately, in this country, particularly among French Canadians, resources are very limited. We have not such chairs of teaching as our English speaking compatriots have. They have received noble assistance from some of their wealthy men, and I only hope that some of these days a Stephen, a McIntyre, a Smith or a McDonald among us, will donate $50,000 for the founding of a chair of architecture. This is desirable and, no doubt, will come, and our people will know how to profit by it.

I cannot further prolong my remarks; but before closing, I would say, as my colleague has already said, you may count on the Government when the question of the tariff will come up to consider it with care and to carry it out. I think I can say tath without compromising the Government.

I again thank you, gentlemen, for the kind invitation which you extended to us. Rest assured it shall be warmly remembered by us; and if there is any way in which we can be of assistance in the development of your Association, you may rely upon us to do all we can consistent with the duties of our position.

Mr. Roy (translated): Mr. President and gentlemen, I feel the necessity of answering some of the remarks let fall by the Honorable Attorney-General, particularly when he suggests to us the advisability of abandoning our idea of a tariff. As the retiring president, I feel there rests with me a responsibility, and this responsibility weighs as heavily to-day as it did during the past year, to see this object carried to a successful issue. I have made efforts to have this tariff ratified by the Government of the day, knowing in advance that what we asked was not of a nature to injure the present Government, but, on the contrary, of a nature to render it aid and support; because the question of a tariff for architects is not like the question of a tariff for doctors, lawyers and notaries. The tariff that we ask to have approved by the Government is one that has existed for a great many years. There is no doubt as to the future, there is no fear that there will be any abuse. What we ask is simply a recognition of the value of the services of an architect, and this is the value established by the courts, and by the means save us from some of the difficulties under which we have labored here in the Province, and particularly before the formation of our association. I must say that since that time whenever we have been called upon in court to value the services of an architect, the court has gone with us. The question is always put to the architect who is a witness: Do you beloog to the Architects' Association? Now, what does this mean? It means that the opinions of those who belong to an association recognized by the law is taken in preference to the opinion of one who is not a member. The tariff which we wish to have accepted by the Government is no different from that recognized every day by the courts. It might be said, well, if it is recognized by the courts, what is your reason for desiring so much to have it sanctioned by the Government? Well, the great advantage which the sanction of the Government would give is, that it would obviate the necessity of our going to the trouble and expense of producing a number of witnesses to prove our charges as being fair and just. The ratification which we ask, and which we will have, if not from this Government, from another, would in this manner be of immense benefit to us. The idea of a tariff was mooted and took form under the existence of another government: it has been kept in abeyance for a long while; but I hope and trust this Government will not neglect to advance it.

I thank the members of the Government present here this evening, and particularly Mr. Nantel, who manifested more good will towards us than his colleague, the Attorney-General. The latter gentleman, however, improved somewhat as he went on, and he may finish by being very good. That is, at all events, the hope of the Association. We ask nothing exorbitant. The proposed tariff is one which is recognized as reasonable and just in all the countries of Europe, France, Germany, Italy, England and also by the United States and Canada. In our Province, however, it is not recognized by the law. That is the only difference between our tariff and the tariffs existing everywhere else. As I said before, we must have this tariff sanctioned, and if not from the present government, from another one.

The President then proposed the toast of the Association of Architects of the Province of Ontario, and there being no member of that association present, Mr. Berlinguet was called upon to respond, which he did in a few well chosen remarks.

The Press was proposed by Mr. Baillairgé, who took occasion to say a few words commendatory of the work of the CANADIAN ARCHITECT AND BUILDER, and requested Mr. J. B. Mortimer to respond to the toast, which he did. He was followed by Dr. G. Stuart, editor of the *Morning Chronicle*, Mr. Lavasseur representing *L'Evenement*, Mr. Carrel, of the *Daily Telegraph*, and Mr. Barthe, of *L'Electeur*.

Honorable T. Chase Casgrain, in rising to propose the toast of the Province of Quebec Association of Architects, said:

Mr. Chairman and gentlemen:—It is my privilege it seems and also my pleasure to move the last toast upon the list, the Province of Quebec Association of Architects. I may tell you, gentlemen, that although in my remarks a minute ago I, to certain minds, seemed unfavorable to the Association of Architects, I certainly feel very warmly towards them. And if you knew what good friends I have among the architects of Quebec, I might mention Mr. Baillairgé, Mr. Bertrand and Mr. Berlinguet, you would say that I could not but feel very warmly, not only towards the individual members of your body, but also towards the association itself. I am very happy to see that you have been for a certain number of years formed into an association; and really I see no good reason why, among all the liberal professions, the profession of architecture should not also form an association in the Province of Quebec. The members of every profession seem now to be forming themselves into associations, and certainly, if the notaries, the doctors and the lawyers have the right to form close corporations, there is no reason why the architects should not also become a corporation and an association.

The question which at present seems to be of the greatest import to the architects, I may say this from what I heard fall from the lips of my friend, Mr. Roy, who even threatened the Government, is the question of a tariff. The question: is a tariff required? is the principal question now upon the tapis. This is the great question of the day. I do not know whether or not there is any question of a tariff reform among the architects. It was hinted that I am opposed to the architects' tariff being sanctioned by the Government. Now, this is not at all true, and I am going to make some very plain statements, as politicians always do, upon this most important subject. You need not think I am going to beat around the bush, or that I am going to say things I do not intend to say or do not mean: I am going to be very explicit, as you will see when I am through.

You all know that since we have had the great pleasure and the great honor of administering the affairs of the province of Quebec, we have been kept very busy by our friends on the other side of the House. We have been obliged to fight our battle. We have been in power only eighteen months, and of course we have dealt with very important questions. The question of the architect is an important question; but we have dealt with very important questions; and, to tell the truth, we have not been able yet to consider this plan of tariff. Other tariffs, for instance that of the physicians, have come before the house, but up to the present not on account of any ill-feeling on the part of the Government towards the medical profession, but on account of the opinion which prevails that the country is not yet ready for it, we have not been able to sanction the tariff of the medical profession. Why? I do not know the reason. Why is it that the House will not allow us to do so? I cannot say. You will understand that if we have not yet taken up this question of a tariff for the architects, without wishing in any way to say anything disrespectful to the members of your profession, it is because we have had to deal with matters which were considered of more importance. We have not so far been able to come to it on the list, and therefore the Government has said neither yea or nay on it. We have it under consideration now; and, of course, as you know, governments generally keep questions of this kind under consideration for some time, and especially the good old Conservative party. But when we make a decision, you know that that decision is generally right, although it takes us a long while to come to the point.

Now, why is it, if the lawyers have a tariff, that the architects, who certainly belong to a liberal profession, should not also have a tariff? That is the question which I, as an individual, put to myself. Is there any reason, any moral reason, any political reason, why the architects should not have a tariff? Mind you, gentlemen, I am speaking for myself; I am not speaking as a member of the Government. I am not in any way binding the Government to any policy. Now, I may tell you this, if I am allowed to give you any advice—and this advice is all the better that it is not paid for; it is disinterested advice—when you frame a tariff, do not make it too high. Do you know what happened in the House to-day? We lawyers have a tariff, and we are suffering under the effect of that tariff. Our business is decreasing every day on account of that tariff being too high; and we have the threat that was made last year in the House that if our tariff was not reduced the House would take it into its hands to change the law so as not to allow us to make our own tariff, but to have it made by the Lieutenant Governor in Council or by the House itself. I understand that when an architect presents his bill before a court of law to have judgment rendered upon it that any member of your association can be brought up to swear that the charges made are just and equitable, and are charges which should be made upon certain works. Now, I would ask—speaking, mark you, simply as an individual—what would be the difference if you had a tariff sanctioned by the Lieutenant Governor in Council and forming part of our law? The only difference would be that instead of bringing up ten or fifteen witnesses to prove the charges contained in the bill you would

simply produce the tariff to show that your charges were not too high. This would be of great use to citizens and to the general public. Now, I think my friend, Mr. Roy, will concede that I understand this question, and that I am not against the architects. I have some arguments in favor of the sanctioning of the tariff; and I may say the only argument, if it is an argument at all against it, is that if the tariff is too high, the House will not bear us out in sanctioning it, but perhaps take upon itself to make a tariff or to abolish all tariffs in the Province of Quebec. You understand from what I am saying that this question is one of importance not only to architects but also to the Government and the country at large. It is a matter which deserves to be discussed from every point of view. Looking at it in this way, you will see why it is that up to the present the government has not seen its way to sanctioning this tariff. I know you will believe me when I say it; that this is the reason why the tariff of the architects has not been adopted so far.

Mr. Roy: you have been thinking too long.

Mr. Casgrain: That may be, but, on the other hand, you may rest assured that if we had not reason to fear that we might be checked by the House, it would be carried through. The House of course represents the Province, and until you convince the people of this Province that your tariff is what it should be, you will not be able to get it sanctioned by the Government or any Government which may come after us. It will be practically impossible, because we are subject to the rulings of the House, and I say now unless your tariff is reasonable,—and I think the one laid before us now is reasonable—and that the House is convinced that it is reasonable, it will not carry. I can say that you are greatly mistaken if you think that in the Government as it stands to-day you have any men who are against the tariff. If you will allow us to take our own time, if you will allow us to convince those who are not our supporters, I think you will achieve your end, and in a short time you will be able to applaud us even more enthusiastically than you have done to-night, although, I must say, you have received us with all due honors. But this, perhaps is drawing away from the subject upon which I began to speak.

I will now move that this toast be drank with all honors, and I hope and trust that your Association will always be found in the vanguard of progress, and that within a very short time you will achieve all the ends which you have in view, and as an individual, I hope your tariff will within a brief period of time be sanctioned by the Lieutenant Governor in Council.

Mr. Hutchison, Secretary of the Association, in response to this toast, said:

Mr. Chairman and Gentlemen, our Association is yet a young Association. It is only a few years since we appeared before the Legislature of this Province to ask for an act of incorporation. Now, I take it that in asking for such an act there were two objects in view, one of a professional or personal character, the other of a public character. Let us take the first one. It was in the interest of individual members of the profession scattered in the cities of Montreal and Quebec, scarcely knowing one another and having no interests in common, that they should by means of this association be brought into closer relations with one another. I think that object has certainly been accomplished in a very great degree. Since the formation of this association all the architects of Montreal have become well acquainted with one another as well as with the members from Quebec, who, before the passing of this act, were almost unknown to them. It has also had the effect of bringing closer to us the Association of Ontario, composed of men whom we did not know at all professionally.

Probably the second object under the personal and professional head might be this tariff that we have heard so much about to-night. I know that with a great many members the ratification of the tariff which has been prepared and submitted to the Government seems to be considered of very prime importance. Now, while it is important, I can hardly admit myself that it is of the importance with which some seem to invest it. Practically, a similar tariff has heretofore been in operation, though not legalized. It is the same tariff that applies in every country that I know where a tariff exists. France, England, British Columbia, Ontario have practically the same tariff as the one we have presented to the Government for ratification.

I think our tariff differs somewhat from the other tariffs referred to to-night. Take, for instance, that of the legal profession. If I understand it, the lawyer is bound to charge according to the tariff. Now, in our project it is distinctly provided that the tariff be not binding upon architects. An architect may make any other arrangement he pleases. It is simply a legal protection, so that when a question of charges arises in court we will be in a position to establish that the fees charged are legal. That is about all the good it will be to the profession.

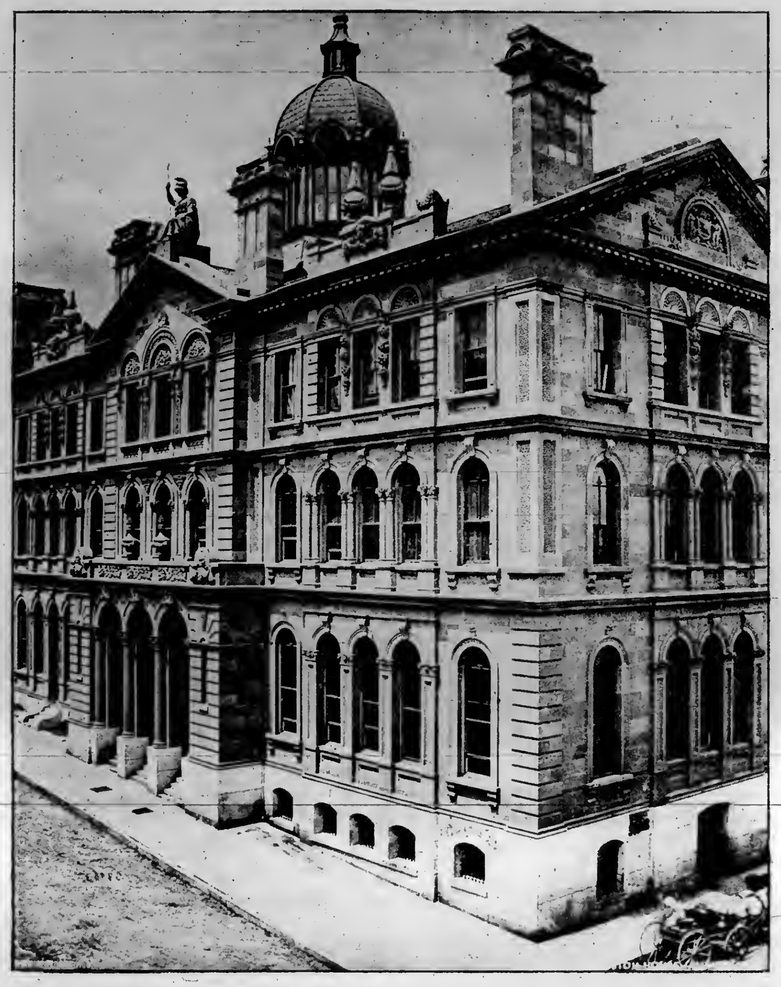
From remarks which I have sometimes heard from some of our members, I judge that some supposed that when the Association of Architects was formed they were to get material benefit or profit from it. That is altogether wide of the mark. It never entered into my head, and I do not think it entered into the minds of any of the promoters of the association that the mere fact of the existence of an association such as we have got should be of any material benefit. I for one should oppose anything like trying to bring every man to the same level. I hope there is no one of our members who imagines that any act is going to bring the low high or the high to the low. Therefore, if the association has not met the expectations of some in this respect, I do not think it is any fault of the association.

Now, Mr. Chairman, in regard to the second object that we had in asking for an act of incorporation, the public interest. The art of building has become such a complicated affair now-a-days, that the structures that are being erected are of such a nature that a person to be a properly qualified architect requires a knowledge covering a very wide field in the sciences and arts. It requires a great deal of skill to be a good architect; and going before the legislature and getting this act was to prevent the public being imposed upon by parties who are not properly qualified. From this point of view it is certainly of much more interest to the public than to us of the profession. Now-a-days an architect requires not only artistic training for his calling, but he also requires a scientific training. The artistic and the scientific should overlap. There is so much steel and iron entering into our buildings that an architect requires a knowledge of the quality, strength and resisting power of these materials, which thirty years ago would not have been thought of. There is also so much to be known about hygiene that an architect requires to be posted on sanitary engineering. Electricity is making such advances, and is coming into such general use, that an architect must be able to wire a building and must know how to put electric plant in. Of course he may call in engineers to assist in all this; but at the same time he will be in a much better position if he be qualified to direct these works himself. The education of thirty years ago is nowhere to-day. But leaving aside all that, architects are called upon to design so many different sorts of buildings, such as mills and that sort of thing, that a familiarity with machinery is of the utmost importance in order to enable them to do their work satisfactorily. I find in the course of my professional work that I am called upon to build mills, and I have to have as much knowledge of the laying out of machinery as a millwright. As a guarantee to the public who have to employ architects we should have men properly qualified. Our act of incorporation provides that all persons who enter the profession after the passing of the act should previously pass an examination to show that they are properly qualified for the profession. Before entering the profession a young man has to show that he has had sufficient preliminary training. This has been faithfully carried out. In fixing the standard for the final examinations a very high standard has been fixed; I hope it will become still higher, and so far only four men have been able to reach it. As I have already said, in the interests of the public it is necessary that we should have properly qualified men; and one deficiency which still remains in our system is the lack of means of training aspirants to the profession. We have so far no school or means of giving men wishing to follow this profession a proper training; and as I have before advocated, I think it is one of the essential things in connection with our association to devise some means by which the necessary education can be obtained. It is true we have already made representations to McGill College; and it has often been talked about that Laval University should establish a chair. McGill University, through the munificence of some gentlemen of Montreal, has one of the best scientifically equipped colleges in America, and it lacks very little to make it most efficient for the special training required for our work. But while Laval and McGill might establish chairs of architecture, the requirements would not altogether be met. There will always be a great number of young men who will enter the profession by entering architects' offices as students; and to give these young men the proper instruction it will be necessary to have lectures given either in connection with the universities or in connection with our association itself. I think most of the gentlemen present know that I have tried hard during the last two winters to establish classes for the instruction of our young men. They have not, however, met with the success that I had hoped for them; but I trust that by sticking at the work we will yet get it established on a good basis. It should be compulsory on every young man entering an office to attend a course of lectures such as I have referred to. He will then follow certain well laid down lines, and when he comes to the end of the course he will be able to pass his final examination to his own satisfaction and to that of the Board of Examiners, and will go forth fully prepared to carry on his professional work. The public, in whose interest, I contend, this act was passed, will feel that they then have a man upon whom they can depend.

There is one thing that I think is more important than the tariff, and I hope the Government will take it into consideration. It is the removal of one word from that act of incorporation. When passing that act of incorporation, the Legislature put the word "registered" in front of the word "architect". We want that word erased, and just have it left simply architect. As it is now any person can practice the profession of an architect The inserting of that word has left the door so wide open that anybody can come in. Now, I may inform the members of the Government here to-night that there is a strong objection to this word "registered," and that the word "architect" is strong enough without being qualified in this way.

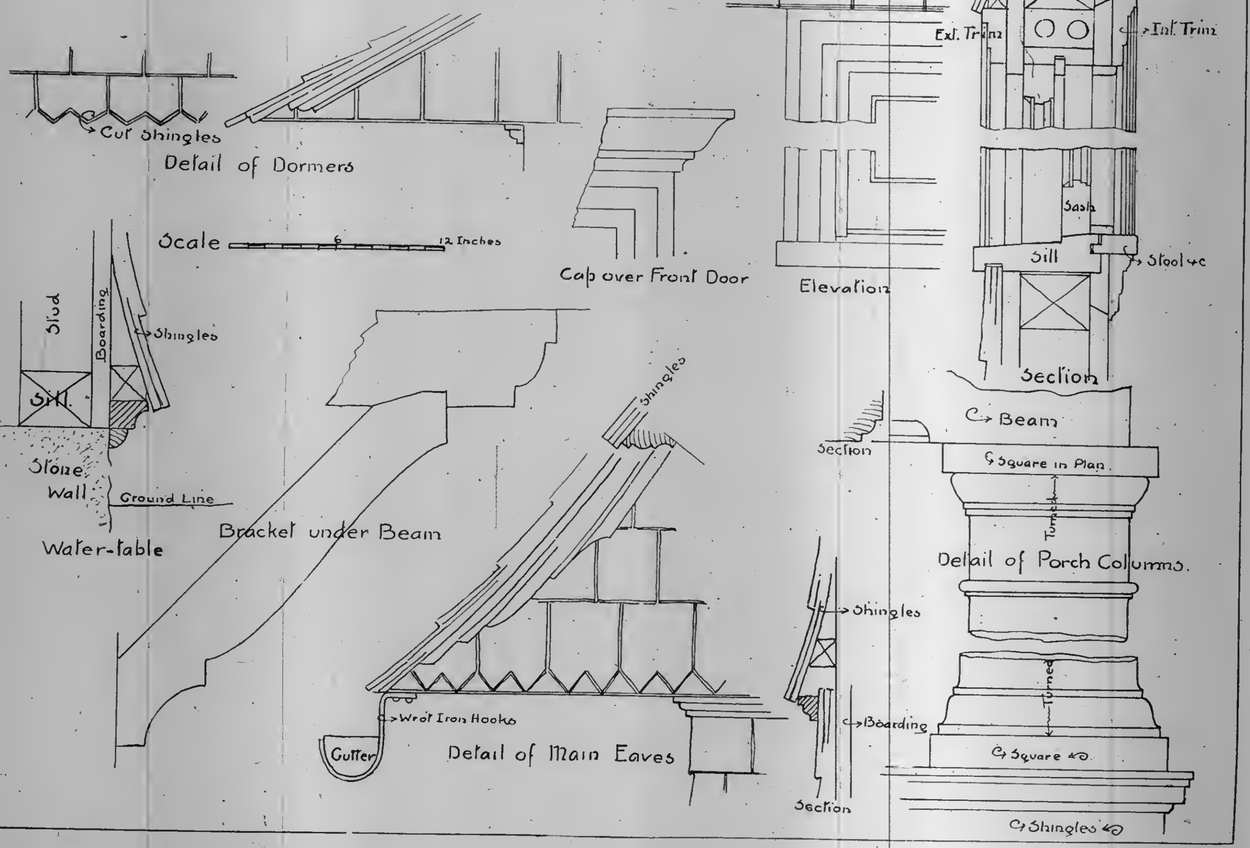
I have to thank you, gentlemen, for your kind attention.

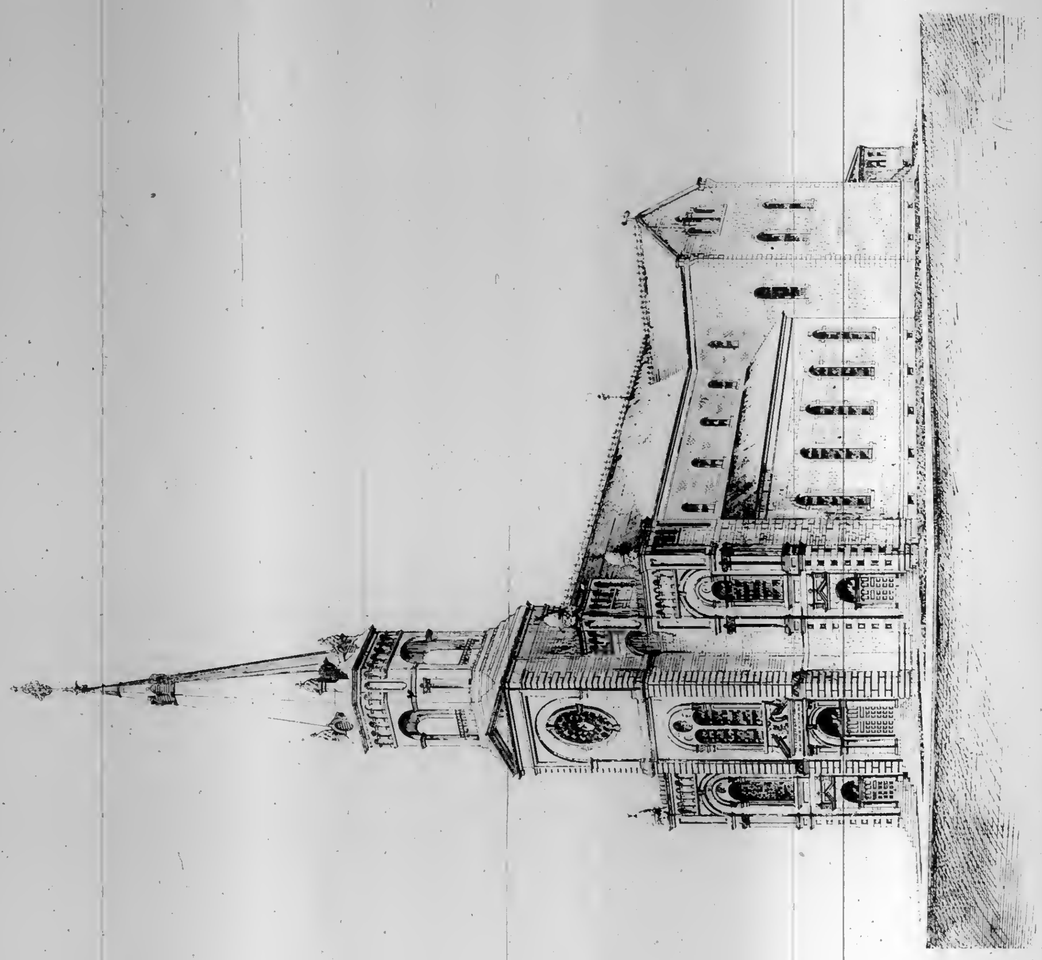
After Mr. Berlinguet and Mr. Roy had made some further remarks on the tariff question, Mr. Lavasseur, of *L'Evenement*



POST OFFICE, HALIFAX, NOVA SCOTIA.
MR. DAVID STERLING, Architect.

EXTERIOR DETAILS FOR "A SMALL TOWN HOUSE"





St. Joseph's Church, Ottawa, Ont.
W. E. Doran, Architect

SUMMER RESIDENCE FOR MR. A. W. OGILVIE, MONTREAL.

ALEX. C. HUTCHISON, ARCHITECT.

CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—NO. XI. NOVEMBER, 1893 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

64 TEMPLE BUILDING, - MONTREAL.

Bell Telephone 2290.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 15th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	D. B. DICK, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	JOHN E. BELCHER, Peterboro'.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

DAVID EWART	Ottawa.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
FRANK DARLING,	Toronto.
W. A. EDWARDS	Hamilton.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	J. NELSON, Montreal.
1ST VICE-PRESIDENT	CHAS. BAILLAIRGE, Quebec.
2ND VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
SECRETARY	JOSEPH HAYNES, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. GENDRON,	Montreal.
J. B. BERTRAND	Quebec.
ERIC MANN	Montreal.
J. VENNE	Montreal.
G. F. TANGUAY	Quebec.

AUDITORS—THEO. DAOUST, J. F. PEACHY.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
GEO. MOIR, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
JOHN BARNARD, Treasurer.
WM. J. HILL.
JOHN ALDRIDGE.
JAS. CRANG.
J. LISTER NICHOLLS.
WM. BOOTH.
JAS. ISAAC.
JOHN LOGAN.
WM. PARK.
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

MONS. H. LE CHATELIER, a French scientist, has recently succeeded in producing marble from pure calcined carbonate, This substance in the form of an impalpable powder, was enclosed in a steel cylinder and compressed between two steel pistons with a pressure of 1,000 kilogrammes per square centimeter. While in this condition, a platinum spiral previously embedded in the powder, was heated by an electric current, with the result that the powder in the neighborhood of the wire was rendered crystalline and translucent. Sections of the resulting substance when examined under the microscope exhibited the characteristics of certain specimens of slightly marled marble. This achievment though it may be useless from an economic point of view is none the less interesting.

THE storm which a few weeks ago passed over Ontario, and was the cause of great destruction of property, may be taken as an illustration of the fact previously adverted to that provision should be made by architects and builders in the erection of their buildings to resist the increased wind pressures to which apparently buildings in this country are likely to be subjected in the future. In the storm to which we have referred, the spire of a Toronto church was carried away, and the vibration of some of the buildings used for business purposes was so great as to cause serious alarm to the persons employed therein. There seems to have come a change in the climatic conditions of this country of which more violent wind storms are a feature, and their influence upon buildings should not be lost sight of by those who design them.

THE subject of the water supply of the city of Toronto has been one of general interest for many years past, more particularly during the last two years, within which a number of accidents have occurred to the waterworks plant, resulting in deterioration of the quality of the supply. The question as to what should be done to improve the supply and perfect the system, has been widely discussed, and numerous have been the theories advanced. The idea that water of much greater purity is obtainable at Lake Simcoe, and that it could be conveyed by gravitation to Toronto more cheaply than the necessary supply could be pumped from Lake Ontario by the existing method, is one which has apparently taken a firm hold on the minds of some of the citizens. The advocates of this idea argue that not only could water for drinking and other domestic purposes be supplied, of better quality and more cheaply, by this method, but also that power could be developed to operate all the manufacturing establishments of the city, as well as light the streets. These views were promulgated by one of the mayoralty candidates at the last municipal election. Whether or not the startling nature of the proposal had anything to do with his defeat, we have no means of knowing; certain it is, however, that the theory is not backed up by any engineering authority. The fact has been demonstrated that the water of Lake Simcoe is in no respect superior in quality to that of Lake Ontario. This is one of the important features in the case. Another is, that in the opinion of the City Engineer of Toronto, a tunnel can be constructed for half a million dollars which will ensure a supply of water sufficient for the needs of half a million people, while the means of bringing water from Lake Simcoe would cost millions. The height of land lying between Lake Simcoe and Toronto, would necessitate about twelve miles of tunnelling, the cost of which in itself would be enormous. As to the advantage of the scheme for power purposes, it is an undisputable fact that power can be produced cheaper by steam engines on the ground.

SIR David Macpherson in presenting his collection of palms and plants to the city of Toronto made, in referring to the Palm Garden of Frankfort on the Main, a suggestion as to the manner of housing them. A prominent merchant of the city, who has spent some months near Frankfort, has written to the *Mail* describing the Palm Garden in terms of enthusiasm and advocating the erection on the same model of a winter garden in Toronto. Sir David Macpherson's collection is evidently the nucleus of what may be made a very good thing. But it is well, in adopting ideas from successful features of European cities, to remember that such features can seldom be transplanted without modification. Continental modes of life are so different from ours that in appropriating ideas we must start from consideration of our own needs as carefully as in originating without a model; and it will usually be found, where the resulting work is good, that what was at first taken as an example has ended by being only a suggestion.

LORD ABERDEEN'S request for an addition to Rideau Hall has excited comments from the daily press varying according to the political bias of the paper. One paper is for leaving Rideau Hall as it is and forcing our Governor-Generals to conform their manner of living to the ideas of our farmers who, the leader writer asserts, are coming to the front in public affairs and will be found on the side of a policy of "democratic simplicity." Another paper is for pulling down Rideau Hall and replacing it by a "respectable looking mansion." It is, as it has turned out, a pity that this course was not adopted at first, for, according to the figures quoted, Rideau Hall, which cost $82,000 to purchase, has cost $53,000 for repairs and alterations. Whether the need of fifteen thousand dollars worth of more room is sufficient provocation to pull down what has been done and build the respectable looking mansion now, is a question. It would not be an exact response to the request of the Earl, who has not asked for a new mansion bye and bye, but for a few more rooms now. It hardly seems likely that the old Hall with its additions will be pulled down before it has had a life reasonably proportioned to the money which has been spent upon it. When the time does come for it to be replaced it is to be hoped that some steps will be taken to have the work well designed. It is not the class of building that is likely to be well handled by the Public Works Department. The forte of the Chief Architect's office is in its organization for the multiplication of buildings of a similar class An order for such an unprecedented and (unless the farmer forbids) elaborate piece of work as a new residence for the Governor-General would sweep the office like a cyclone. The pavilion representing Canada at the World's Fair has already proved too much for the elasticity of the departmental designer. If a new residence for the Governor-General should get into the hands which produced that work, it is impossible to avoid the conviction that however capacious the mansion might be it would not be "respectable looking."

THE by-law appointed by the City Council of Toronto some four years ago, making compulsory the inspection by the city officials of all plumbing and drainage work, as well as alterations in existing work done in the municipality, is unquestionably one of the most valuable pieces of civic legislation that has marked the history of the city. Previous to the passing of this by-law, the plumbing and drainage work throughout the city, even in the most expensive residences, was often done in a disgraceful manner, and in such a way as to prove injurious to the health of the occupants of the house. It was not unusual for drains to be laid without joints of any kind being made and in this condition covered up with earth and concrete, the character of the work being subsequently revealed when sickness entered the house. Under the present system, work of this kind is no longer possible; the owner or his architect can demand from those who are to do the work a certificate from the plumbing inspection department that everything has been done in accordance with the provisions of the plumbing by-law, and unless the work has been done in this manner, the department will not issue a certificate, and the owner may refuse payment. Another valuable feature of the by-law is, that plans for the plumbing and drainage work must be filed with the plumbing department, so that in the event of defects developing in the work in the future, the exact location the of pipes is ascertainable. A great deal of difficulty is often experienced in cases where alterations are required to work done previous to the passing of the by-law, as in such cases much trouble and expense is often necessary to discover the location of the drains. In this connection we wish to point out that greater care should be exercised in the plumbing department for the protection of the plans which are there filed, and the value of which we have already referred to. These plans are at present kept in pigeon holes in an ordinary wooden desk, where, should a fire occur, they would be certain to be destroyed. The plumbing department should lose no time in providing a fire proof receptacle for these plans, otherwise we may expect to hear that the valuable record of plumbing work done in the city for several years past has been irretrievably lost.

IN view of the hundreds of thousands of dollars that have been bequeathed to the engineering department of McGill University, it is a matter of wonder that not a dollar has been given for architectural education. Mr. Baillargé, in his paper read before the Province of Quebec Association of Architects, very truly says that there is a greater need in Canada to-day for instruction in architecture than in engineering. In engineering knowledge and ability Canada already takes front rank, and it is no doubt, partly due to the facilities which have been afforded for obtaining engineering knowledge. This knowledge is undoubedtly important, but cannot be said to be more so than a knowledge of architecture. Architecture, especially in the odern days in which we live, affects so closely the life andm happiness of the individual, that its importance cannot easily be overestimated, and in view of this, it is surprising that greater interest has not been manifested by the public in the proper education of architects. The range of knowledge required by the architect of to-day, is greater than that required by the engineer. He should to a large extent have the knowledge of the engineer, and in addition be conversant with the principles of sanitation, design, decoration, etc., of which the engineer needs to know nothing. On the knowledge of our architects depends the appearance of our towns and cities, as well as the comfort and health of the citizens, and a sense of pride, if nothing more should cause our people to assist in every way possible the cause of architectural education. While possibly little can be done for the architects of the present, steps should be taken to place within the reach of Canadian students of architecture in the future the means of acquiring the needed instruction pertaining to the successful practice of the profession. We trust that the Architectural Associations of Ontario and Quebec will continue to keep this subject before public notice, and that in the near future some of our wealthy citizens will feel it a privilege to give liberally for this worthy object. Unfortunately, architects themselves as a rule are not possessed of sufficient wealth to give much assistance to this object; were it otherwise, we have no doubt that facilities for the study of architecture would long ago have been provided.

OLD UPPER CANADA COLLEGE GROUNDS.

THE Parks and Gardens Committee of the Toronto City Council is considering a message from the Mayor proposing that the city should acquire the old Upper Canada College grounds "for park and other purposes." The price is the present assessed value of the land. The terms are so easy as to suggest the possibility of securing an open space and ornamental feature for the city with but little burden to ratepayers. It is possible so to lay out the land as to make building sites aggregating in value about the purchase price of the block, and still leave vacant enough land for ornamental open space. To do this will be a benefit to the city greater than the acquisition of the land for park purposes only. A park is after all an interruption in a city, while a square is a higher development of the city itself; and what is needed just now in that part of the city is development. Moreover, the removal of Government House, after some time, is probable; and its grounds are better fitted for park purposes than the grounds of Upper Canada College. They are better adapted to the purpose in form, but particularly by their southerly position. It is the southerly aspect that buildings require, and the Upper Canada College grounds with Government House to the south are a more eligible site for building upon than are the Government House grounds with a park on the Upper Canada College grounds to the north

Although it is possible to balance the cost of the whole block by the price of a portion only, laid out for building upon, it is of course impossible in the present state of affairs to do this at once, and so give the city an open space for nothing. Whether or not this may be the ultimate result is a question chiefly of population. But it is also a question of management. The value of the ground to the city, both as an attractive feature and also as a financial investment, depends to an extent that it would be hard to overestimate upon the skill and judgment with which it is laid out. It is a case for an expert adviser whose fee would be returned many times in increased availability of the land and its enhanced value. The better the opportunity given for profitable investment of capital, the greater is likely to be the response and—which is important—the quicker. There have been for some time rumors in the air of a big hotel, connected with the names not of one set of promoters only but of several. That the lack of such a hotel is a loss to the city is now common opinion. The Upper Canada College grounds have been often talked of as a suitable site. They are near—and yet not too near—the water, the Union Station, and the business part of the city. A site inside the grounds would give the hotel retirement from the streets combined with a southerly aspect and an outlook over the Government House grounds, which may some day form an even more pleasing prospect. If, by municipal intervention to treat the whole square, immediate surroundings which are agreeable can be secured for the hotel without involving an extensive purchase of land by its stockholders, it is likely that the scheme would at last hatch out and the big hotel form not only a speedy and large contributor to the cost of purchasing the block, but an attraction to other purchasers and a standard of character for the buildings, which would increase the revenue to be derived from the land and also raise the value of neighboring property.

TORONTO TECHNICAL SCHOOL.

LATE in the fall of 1891 the City Council passed a by-law establishing the Toronto Technical School, providing the means and appointing a Board, giving them full powers to obtain a building and equipment, to select a staff of teachers and to draw up a scheme whereby might be placed within the reach of mechanics and artisans and the employed of the city generally, the means of acquiring those elements of an education which would be of most value to them in the pursuit of their various avocations.

The preliminaries were attended to by the Board, but it was well on in January before the school could be opened. They had succeeded in securing for temporary use the building formerly occupied as Wycliffe College, on the north side of College street at the head of McCaul. It needed some refitting. From the start the school was well attended. The work of the first term was naturally to a great extent experimental, though by considering the special needs of the students and comparing the work done at various similar schools abroad, a programme was followed out which has not had to be materially altered excepting in the way of enlarging upon it and co-ordinating more thoroughly the different parts. This term extended to the first of May. Classes met five nights a week between eight and ten o'clock each night.

In October, 1892, the school re-opened, and again with a good attendance. This was expected to be the trying year. It was thought that the novelty of the appearance of this institution in Toronto might account for the good attendance during the opening term. If it tided over this year it would indicate that such a school could be of use. The register went up during the year to over three hundred and thirty, more than realizing the hopes of its most sanguine supporters. The school continued to thrive, though in cramped quarters, and with temporarily equipped class rooms. The students meant business, they came to learn; and the teaching staff worked with a will. The results were most satisfactory.

Again at the beginning of last month the school re-opened. The classes were crowded from the very start. As compared with a similar period last year the attendance this year has been multiplied by four. In the first week last year somewhat over 100 were registered; in the first week this year four hundred and fifty, and at the end of the second week five hundred and fifty were registered.

It is no longer a question whether there is room for such a school in Toronto. The experimental stage is past. It has come to stay. It is now for the city to show its appreciation of the value of such a school for the education of its mechanics and artisans by assisting it in its development, by providing it with more commodious quarters, and when necessary, by increase of staff or equipment. The sooner it is provided with better accommodations the better will be the results accomplished. It is now in a building greatly inadequate for the purpose. Why should not steps be taken at once to acquire for it better and permanent quarters? As long as it is cramped for room, and unable to separate the different grades and classes of work in the draughting room, as long as some of the elementary classes are three or four times their proper size, as long as chemistry, hydrostatics, light, heat, sound, electricity and electrical testing and laboratory work wait their turn in one small room, so long will the school be unable to accomplish the work that is evidently cut out for it in this city.

The ground at present covered by the course is comprised under the following heads: Mathematics (including arithmeti algebra, Euclid and trigonometry); Draughting (including practical, mechanical, architectural and geometrical drawing and copying, as well as classes in practical geometry, orthographic and oblique projection, perspective, etc.); Mechanics (including statics, kinematics and dynamics), Physics (including hydrostatics, heat, sound, light and electricity and magnetism); and chemistry (inorganic). There are two classes, a junior and a senior, in algebra, Euclid, mechanics, draughting and descriptive geometry, electricity and chemistry.

The students in chemistry also have the opportunity of doing practical work in a chemical laboratory which has lately been fitted up for the purpose.

While the course as outlined is as extensive as can be expected under the present conditions, there are still channels along which it might be still further developed—even while keeping along the same general lines—which would be of great benefit to a considerable number of students. Some of these extensions have already been proposed, but cannot be carried out for lack of accommodations. Classes in decorative design, freehand drawing, etc., have often been asked for. There are a number of subjects that would be of value to engineers and mechanics, such as the working principles of the steam engine, the testing of materials for strength, etc., foundry and machine shop principles, etc., etc. Other extensions would suggest themselves if the school were allowed to develop freely.

The Toronto Technical School has started well, and we hope to see it continue to prosper. We are satisfied that the city which has generously supplied it during its earlier days when its existence was an experiment, will not now allow it to stop short of its full possibilities.

ILLUSTRATIONS.

RESIDENCE FOR C. W. LEONARD, QUEEN'S AVENUE, LONDON, ONT.—MOORE & HENRY, ARCHITECTS.

This building consists of basement, two main floors, and finished attic, and is built facing the south. The foundation is of Credit Valley brown stone, and the upper walls of red pressed bricks and red sandstone.

The interior is finished in various hardwoods, heated by hot water and lighted by gas and electricity; cost $12,000.

ENTRANCE TO FREEHOLD LOAN BUILDING, TORONTO.—E. J. LENNOX, ARCHITECT.—HOLBROOK & MOLLINGTON, SCULPTORS.

WESTMINSTER PRESBYTERIAN CHURCH, TORONTO.—GREGG & GREGG, ARCHITECTS.

QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require connected with the objects of the paper. Every effort will be made to furnish satisfactory answers to all such inquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

E. A., Toronto, writes: Through the columns of your valuable paper would you please tell me what extra training would a person holding a School of Practical Science Diploma of Architecture require to become an architect?

ANSWER.—We presume that by "an architect" E. A. means a member of the Ontario Association of Architects. A graduate of the School of Practical Science can become a member of the Association by serving under articles of apprenticeship, in the office of a member of the Association for three years (of which one year may have been served during the vacation of the School) and by passing the examinations of the Associations.

SPURIOUS HARDWARE.

SOME of the leading hardware merchants of Toronto complain that duplicates of some of the more favored and expensive patterns in American hardware are being manufactured in cast iron in Toronto, and after being plated are placed on the Canadian market, represented to be the genuine article. At first appearance the spurious goods are a good copy of the genuine and can be detected only by very careful examination. To make detection still more difficult, a genuine lock is often used with a counterfeit escutcheon. A close inspection will usually reveal that the counterfeit article, while perhaps identical in color, is slightly smaller in size than the genuine. This is due to shrinkage in casting, in the process of which one of the genuine articles is used as a pattern. The genuine article is made of bronze metal, which to a considerable extent is impervious to the action of the atmosphere. The imitation is as we have said made of cast iron, and will retain its appearance at the longest only a few months. The importers of expensive American hardware claim that they should not be placed in competition with a spurious article which can be produced at a tithe of the cost of the genuine. If architects are satisfied with cheap goods they are quite willing to compete on that line, but they should not be excepted to place a genuine article in competition with one to which the same name and appearance have been given, but which is counterfeit. Architects would do well te enquire into this matter.

THE RE-INFORCEMENT OF CONCRETE BEAMS BY TWISTED IRON FOR FIRE-PROOF FLOORS.

The reference made in the May number of the *California Architect* to the use of twisted iron incorporated in concrete, has called out some inquiries, says that journal, as to the nature and extent of the tests so far applied to this mode of construction. Though first introduced upon this coast but little has been published here respecting this new departure in fire-proof building.

The Museum at the Standard University was not the first structure where this method was employed, but the concrete beams supporting the heavy dome, have the longest span yet produced, forty-five feet. Another notable example is the California Academy of Sciences on Market street, where five floors covering an area of 50,000 square feet are so constructed. The span ranges as high as thirty feet, and there is also a projection of three feet of concrete over the central area, supporting an iron railing at the outer edge, and walk for visitors. The floors were estimated to carry with safety 250 pounds per square foot. One section, 15x22, was tested with a uniform load of 415 pounds per square feet, and the load was left on one month. The architects reported the extreme deflection at the center as only one-eighth of an inch. Contractors and workmen were distrustful at first, but their confidence became unbounded before the completion of the work. The saving over the usual mode is estimated at fifty cents per square foot.

Touching the weight of these floors, as compared with iron girders and hollow tiles, the first impression that the concrete must necessarily be much heavier, is found incorrect. For when the span is of usual length, and the required strength of moderate limit, the weight per square foot is less with the new construction. For example: with spans of fifteen to twenty feet, and a safe load of seventy-five pounds per square foot, the saving in weight is about forty per cent over iron girders and hollow tiles. With a load of 129 pounds it is some twenty per cent.

This economy is doubtless due to the fact that the bond between the twisting iron and the enveloping concrete is so perfect and continuous as to give the effect of a homeogenous beam, and that the tensile strength of the iron bar is utilized.

Ordinarily in the use of iron with concrete, the strain has been concentrated at a single point by the employment of nuts and washers. By twisting the iron before it is imbedded in the concrete the strain is diffused equally through the length of the bar while it is firmly held at all points by the enveloping mass.

An incidental advantage of the twisting is that thereby all imperfectly laminated iron is at once detected, and the defect exposed, ensuring the employment in practical use of only a high quality of iron.

In the more common forms of construction the major element has been the iron beam, whose lower cord was exposed, necessitating additional protection below against the action of heat. By substituting the concrete beam as the chief factor, the iron used is so incorporated within the body of the stone as to be amply protected without extra cost. Moreover the iron girder is an expensive form, while the very simplest or cheapest is the flat or square bar.

The claim that cold twisting actually adds to the strength of the bar, rests upon somewhat exhaustive experiments conducted by Lieutenant F. P. Gilmore, U. S. N. (Government Inspector of Iron and Steel for war vessels under construction at San Francisco) and by the College of Mechanics of the University of California at Berkely, also at the celebrated Low Moor Iron Works, England.

Lieutenant Gilmore found that common commercial iron ¼ inch square, being given 1½ twists per lineal foot gained seventeen per cent. in tensile strength; given 3¾ twists, twenty per cent., and six twists gained twenty-four per cent.

The best Norway Iron given six twists per foot, gained from fifty to fifty-three per cent in tensile strength.

Similar experiments at the Low Moor Iron Works ¾ inch round iron, showed twenty-two per cent gain for 1½ twists per foot; thirty-six per cent. with 2½, and forty-one with three twists, which were as far as the experiments noted were carried.

The latter experiments conducted by the University of California gave similar results, with one important fact ascertained, namely: that a suitable interval between the twisting and the testing gave a much greater gain. Three-quarter inch iron turned down to ⅝ was given six twists per lineal foot. Twisted while hot there was a small loss in tensile strength. Twisted cold and tested immediately, the gain ranged from twenty-three to forty-three per cent. Twisted cold and allowed to remain five days and then tested, the increase in tensile strength of the same quality of iron was from forty-seven to fifty-nine per cent. or an average of fifty-three per cent.

It would seem that advantage might be taken of this important augmentation of tensile strength in many places. Bridge builders, as well as workers in concrete, would do well to inform themselves fully upon this claim.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION.

The publisher of the CANADIAN ARCHITECT AND BUILDER invites competitive designs for a town house and stable to cost not more than $4,500.

The house is to be placed on the east side of the street. The lot is 35 feet wide and 125 feet deep. The houses on either side are built up to within three feet of the dividing line, and are fifteen feet from the street line.

The stable should provide accommodation for one horse and accoutrements, and vehicles for summer and winter use. Access to the stable can only be had from the front of the lot.

The house is to be heated with hot water. Arrangement of piping, location of radiators, etc., should be indicated.

Good planning from the standpoint of health, convenience and comfort, will be given first consideration in judging the designs.

Each competitor must give a concise description of his design, stating the materials proposed to be used in its construction.

Drawings must include two principal elevations, floor plans and detail of hall and stair. A perspective may be submitted at the option of the competitor.

The first premium will be $15.00; the second $5.00; the third, one year's subscription to the CANADIAN ARCHITECT AND BUILDER.

Drawings must be made on sheets of heavy white paper or bristol board 14×20 inches in size, and must be drawn sufficiently coarse to allow of their being reduced to one-half the above size. Drawings must be made in *firm strong lines*, with *pen* and *black ink*. *No color or brush work will be allowed.* Each drawing must be marked with the *nom de plume* of its author, and the author's name, *nom de plume* and full address, enclosed in a sealed envelope, must accompany each drawing sent in.

Drawings must reach the office of the CANADIAN ARCHITECT AND BUILDER, 107 Confederation Life Building, Toronto, not later than the 2nd day of January, 1894.

The right is reserved of publishing any design sent in. All designs will be returned to their authors within a reasonable time after the competition is decided.

The decision as to the respective merits of the designs submitted will be made by a committee appointed by the Architectural Guild of Toronto.

All architects practising in cities are debarred from this competition.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.

Last month I quoted from a letter of Mr. L. J. A. Papineau, in which he expressed his regret that so little veneration is shown in this country for ancient buildings. That this disregard for ancient historic landmarks is not universal is however very clearly snown by the interest lately exhibited by all classes of our citizens in the preservation of the old Chateau de Ramezay on Notre Dame street opposite the City Hall. When it became known that it was the intention of the Quebec Government who were the owners of the property to offer it for sale at auction, the Numismatic and Antiquarian Society immediately set about means to prevent the sacrifice of the old building which is one of the few surviving links binding the early history of the city with the present. Meetings were held and resolutions passed asking the City Council to purchase the property with a view to the restoration of the building as a public library and historical museum. Several valuable gifts of books, historical pictures and other relics were promised in case the property was preserved. Petitions were also placed in circulation and signed by upwards of one thousand leading citizens praying the Council to purchase the property. As a result of the general interest thus manifested, the Council at a special meeting called to consider the subject, consented to the petition, and at the sale which took place on the 23rd of Oct., the Mayor on behalf of the city purchased the historical Chateau for $27,000 and some of the adjoining lots for $18,506, while several members of the Antiquarian Society, with the object of preserving to the city the whole square, and preventing the appearance of the old Chateau from being spoiled by objectionable architecture, bought the corner with the three adjoining lots. The property thus purchased at a cost of $32,396 is now offered to the city at cost price.

A movement is on foot with the object of providing a residence in this city for the Governor-General, and the Council are to be asked to consider an offer of Mr. Duncan McIntyre's mansion on Drummond street at the price of $300,000 for this purpose. In view of the enormous expenditures for public improvements in this city of late, and the heavy interest charges which in consequence must be borne, the wisdom of a large outlay for this purpose may very properly be questioned. In connection with Mr. McIntyre's house an interesting suit is now pending in the courts. The widow of the late W. T. Thomas, who was the architect of the building, has brought action against Mr. McIntyre to recover some $35,000, alleged to have been earned by her husband in connection with the erection of the building. The larger portion of the sum mentioned represented 10 per cent. commission on the alleged cost of the house. The owner of the house denies that he agreed to pay a commission on the cost. The court upholds him in his refusal to state what the cost was. The matter has not yet reached decision.

J. NELSON, A.R.C.A.,
President Province of Quebec Association of Architects.

The right of the proprietor of a building which is under lease to make changes therein is involved in a suit brought against the Royal Insurance Co. of this city by a firm of advocates occupying offices in their building. Plaintiffs claim that damage was caused to their practice by the changing of the motor power of an elevator, which was hydraulic, to electric power. Defendants contended that a proprietor has a right to make changes in the premises occupied by the tenant, provident due diligence be exercised. Plaintiffs argued that due diligence was not used, and that in any case the proprietor cannot make alterations or changes in the premises. The case is yet undecided.

The Royal Victoria hospital is shortly to be opened by Lord and Lady Aberdeen. A description of the building has already appeared in the CANADIAN ARCHITECT AND BUILDER.

I have much pleasure in forwarding to you for reproduction in the ARCHITECT AND BUILDER a portrait of Mr. J. Nelson, AR.C.A., the newly elected President of the Quebec Association of Architects. Mr. Nelson has been a modest, though valued worker in the interest of the Association since its inception, and the honor which has been conferred upon him could certainly not have been more worthily bestowed.

The Victoria railway bridge over the St. Lawrence at Montreal contains 3,000,000 cubic feet of masonry work and 10,500 tons of iron.

LONDON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The building season of 1893, owing to the exceptionally fine weather with which we have been favored, will be longer than usual. In this city at least the season which is about to close has been the most active in building enterprise experienced for a number of years. So far as I can learn none of the local architects have had occasion to complain of lack of work, while some have found it necessary to trespass on the hours which ordinarily are devoted to other purposes.

In many of the new buildings erected of late there is pleasingly manifest a striving on the part of our architects after the artistic and aesthetic in the treatment of their designs, a disposition to depart from old time sterotyped ideas, which is deserving of commendation. In most instances the efforts made in this direction have had a beneficial effect upon the architecture of the city.

HAMILTON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The past season is declared by local architects to have been one of the most active in building enterprises experienced here for several years, and there are a number of new buildings projected, which it is believed will make the season of 1894 a busy one also.

Some expensive residences are at present in course of erection. Among these are the residences of Mr. George T. Tuckett and Mr. C. M. Counsell, both designed by Mr. James Balfour, architect, of this city. Mr. Tuckett's residence is nearing completion, and will be occupied by the owner in a few weeks. It ranks among the most expensive residences of the city, and is certainly one of the most modern in its interior arrangements. It occupies a site on rising ground, and affords a pleasing view of the Bay and Burlington Beach in the distance. The building throughout is constructed in the best possible manner, and with the best materials. There is no attempt at elaborate ornamentation, but utility, comfort and good taste, are everywhere apparent. The joinery work, which is being done by Messrs. Jos. Hoodless & Son, is deserving of all praise. For interior finishing, oak, bird's eye maple and mahogany, are principally employed. The brick and stone work was done by Mr. Geo. Webb; the plumbing by Messrs. Fairley & Stewart. The heating will be done by two Daisy boilers of the largest size, arranged so that one or both may be in operation as may be required. The drawing room will be decorated in white enamel with white silk panels, the mantel of white onyx. The ceiling will be decorated in keeping with the rest of the room by Messrs. Elliott & Son, of Toronto.

Mr. Counsell's house, although much less expensive, occupies a pleasing location at the corner of James and Markland streets, and exhibits many original and pleasing features of design. The lower story is constructed of stone and the upper stories of brick and wood. The stone was obtained from a local quarry, and is of good quality but very hard, and so brittle that it is apt to split under the workman's chisel. Often a block will give way just when the work upon it is about finished, thus proving an expensive loss. To such an extent has this occurred that the contractors' profits are not likely to be very substantial. The house is roomy, carefully planned, and excellently lighted, and will no doubt afford every comfort to its owner.

On October 23rd, at the Church of Our Lady of the Holy Rosary, Thorold, Mr. James Battle, cement manufacturer, was united in marriage to Miss Mary Conlon.

At Ingersoll, Ont., a company has been formed and acquired the Canadian business of the Guelick Silica Barytic Co. of Detroit. Mr. Walter Mills, who was manager of the Canadian business of the Detroit Co., will continue with the concern.

An anonymous correspondent of the Orillia *Times* recently declared that "local contractors hesitate to submit tenders for work designed by Mr. W. H. Crocker, architect, of that town; being doubtful whether honest competition would prevail." Mr. Crocker, through his solicitor, has demanded a retraction over the signature of the writer. It is to be hoped that the person who would make such a serious imputation under cover of an assumed name, may be compelled to disclose his identity.

AMERICAN SCHOOL BUILDINGS.*

As to the requirements of a sanitary school building and one best suited to the needs of children, say a common school of twenty rooms: First, it should be as nearly fire-proof as practicable. Children do not have the strength and experience of adults and cannot look out for themselves. If it cannot be fire-proof reduce the fire risk as much as possible. Wooden partitions, though often used, should be avoided. If outer walls are furred, it should be done with fireproof furring. Stairs should be enclosed in brick shafts, and the stairs themselves made of solid material, preferably of hard wood for both risers and treads, with fireproof or slow-burning construction underneath them. If floors are of wood on wooden joists, as they generally must be, the spaces between the joists should be cut off with solid plank in addition to the usual bridging. On no account should the floors be raised from the joists for the purpose of circulating air underneath unless all parts are fire proof. Floors should be of good smooth hard wood, closely laid on an under floor, and deadened with mineral wool or something as good. Joists should not run through from wall to wall, and should be so placed as to drop out without tearing the wall in case of fire. The danger from fire can be considerably lessened by judicious planning, so that all rooms are easily accessible to the halls and the stairs. All exits should be so plainly indicated that a stranger would have no trouble in choosing them at once.

The sanitary school building should be well lighted. This matter has received considerable attention from scientific men. It is claimed that an ideal system would bring in the light from the top of the room and distribute it equally throughout. Many object to this because it appears prison-like; besides in a building with one room over another it is impracticable. School-rooms being generally lighted from side windows it becomes a question as to number and location. It is conceded that the light should enter as near the ceiling as possible, therefore windows reach to the ceiling or nearly so.

It has been customary to follow the rule that light should come over the left shoulder, so as to avoid a shadow on the desk from the right hand; but while this is a good rule it is found hard to apply it where several pupils are together, as in a school-room, since that which will be left-shoulder light for one pupil will not be for some other. In practice an average is struck, and the windows so placed as to properly accommodate the greatest number. With windows on one side only about one-half the pupils get the left-shoulder light in some degree when they sit with the left side to the windows. The other half get the light chiefly in the left eye, or more in the left than in the right. That is a bad arrangement and prolific of unequal vision. This can in some degree be lessened by placing the side windows well towards the rear, and placing some on the rear as well. There is then, however, the objection that the pupils in the diagonal corner furthest from the light are too much in the dark.

In a room lighted wholly from one side and the pupils placed with back to the light some curious facts are noticeable. First, the same number of pupils receive left-shoulder light, as in the former case—that is, one-half; the other half receives the light over the right shoulder, not a desirable thing and not to be tolerated unless there is enough reflected light to dissipate the shadow cast by the right hand on the desk. If there can be such reflected light, and there is no doubt about that, it gives the best light I know of for so many pupils, since as many get left-shoulder light as in the other way, and none of them get it partly in front. That this is the best arrangement for pupils I think there can be no question, though upon the teacher it is especially hard, though it may be said that the teacher can always move about, while the pupils must stay where they are.

I think it is common to put some windows on the side and some on the end of each room, where it can be done, though I am inclined to think the side light the better, if it could be properly curtained and managed by the teacher. Whatever the position of windows there should be plenty of them.

The sanitary school building must be well heated and ventilated. These two things can be considered together, though heating alone used to be the first and only consideration. The requirements call for the right amount of fresh air and heat, properly introduced to the rooms and circulated therein. Economy seems to call for a central plant for the supply. One of the main difficulties to overcome after a good heating device has been provided is the proper inlet, exit and circulation of the ventilating air in the schoolroom. Unless this work is properly done the whole plant is a failure, and it is a fact that much confusion exists as to the method to be employed. The problem is made more difficult of solution because the atmospheric changes are so rapid and radical that no single arrangement of the working parts will answer for any certain time. Obviously the best way to have the air enter a schoolroom would be at openings all over the floor, and it should leave at a like number of openings in the ceiling. That way is not practicable where rooms are over one another, and therefore the common way of introducing air into the room is by single and ample opening. It is let out by another. Where these inlets and outlets shall be placed with reference to each other and the room itself is a question in dispute. Much confusion obtains on this point—perhaps because people believe it is possible to adjust the openings to suit all occasions. The question will be much nearer solution when this belief is eradicated. In some rooms the inlet will be found at the top and the outlet at the bottom; in others it will be the reverse. In some there will be inlets and outlets at both top and bottom; in others the inlet and outlet on the same side of the room. In others the inlet will be on one side and the outlet on the other.

Probably there will be confusion on this point so long as the single inlets and outlets are used.

We must have circulation through the room and we get it in one of two ways. Either the air may enter cooler than the room, in which case, if the inlet is at the bottom and the outlet at the top, a fair circulation will be given; or the air may enter warmer than the room, when, if the inlet is at the top and the outlet at the bottom a good circulation will be got.

Since it is a fact that air must sometimes enter warm and sometimes cool, so as to maintain the standard of heat, it will be seen that neither arrangement of openings will answer for both cases, and the working parts cannot be so fixed as to give perfect satisfaction. If both inlets and outlets are provided at top and bottom when cool air is wanted, the floor inlet and the ceiling outlet can be used. When warm air is wanted the ceiling inlet and floor outlet can be used. But aside from the difficulty of getting any one to understand it, it would take one person's time to watch the thermometers and manage the dampers. Present practice largely adopts the ceiling inlet and floor outlet, ignoring the fact that incoming cool air falls to the floor, and poor circulation is the result.

This intermittent lack of circulation is a grave difficulty and hard or impossible to be avoided when the inlet is high and the outlet low, more especially when a room is heated by air alone.

Some engineers try to prevent notice being taken of the difficulty by putting the inlet at or near the floor. When the air comes in warm it rises to the ceiling, distributes, cools and falls to the floor, leaving at the foul-air opening. Under these conditions the air appears to circulate properly, the only objection being a current of hot air striking the pupils. The current of air is made less noticeable by a screen; that is, of course, unnecessary when the inlet is above. On the other hand, with inlet at the floor and the air coming in cool, there is and can be little or no circulation through the room, the air simply entering, flowing along the floor, and leaving at the outlet. This seems to be a case of out of sight and notice, out of mind. The lack of ventilation is not easily discovered, and thus gives a fine chance for the professional quack to show off his system of ventilation, for with his air meter at the inlet and outlet he finds the full volume of air passing that he guaranteed to furnish, and no one stops to inquire whether that air gets to the proper parts of the room by circulation.

I believe it would be a good system to heat the floors evenly and always bring the air in cool, provided that the floor heat could be controlled and unpleasant draughts prevented.

It is hard to say where the inlets and outlets should be placed to satisfy all conditions, but I have advocated putting the inlet high and the outlet low, though I am quite ready to change should a better way be found.

The general plant that is to furnish the heat and ventilation in a sanitary school building must be ample to do its work. It must be durable, cheap to put in, and cheap to maintain. Furnaces furnishing hot air, steam plants and hot water plants, with numerous modifications and partial unions, are the principal kinds used in school buildings. For years the furnace did good duty, and it still holds its place, at least in the smaller class of buildings. Its first office was probably that of heating, though it was made so that it had to furnish ventilation in order to heat. When steam first came into use its work was entirely that of heating, and for a time schools heated by steam were a long way behind those heated by furnaces. Necessity soon compelled the use of indirect radiators to heat air for ventilation. This system had quite a run, and is still used, though it gradually loses favor as better methods come up.

The marked advance in ventilation during the last few years has been the adoption of a fan or fans run by power for sending the air to the rooms. In furnace-heated buildings the only methods of creating suitable currents was by heat and in order to induce currents in the foul air shaft it was connected with the smoke stack the heat of which caused the current. In steam-buildings coils were used in addition to the smoke stack. It has recently been discovered, however, that the heat used to create currents, in the foul-air shaft would be of more service in running a fan to do the same work. Hence fans are in common use. There is a difference of opinion whether one fan or two shall be used. I am of the opinion that with our ordinary leaky rooms two do the work better than one, though there is room for argument on that point.

From the old form of steam plant have sprung many modifications. There is one that heats entirely by steam coils placed in a fresh-air room in the basement, the air being blown to the rooms by a fan. At present I favour the adoption of a central steam plant, running direct radiators to the rooms, an indirect set of radiators to heat the fresh air, a fan to blow it into the rooms and an exhaust fan to take it out. In a cold climate it works well; in fact, I do not see how it would be possible to get so good results from any other method. In warmer places than Minnesota I suppose the hot air system would be sufficient.

This steam system has its faults and can be much improved, especially as regards details of arrangement. While being somewhat more costly to put in than the indirect method, it makes a very low record for fuel, a good point in any plant. Contrary to expectation, it has been found cheaper to run and fully ventilate than to run the old steam plant without ventilation. It was said when fans came into use and talk of 1,200 cubic feet of fresh air per hour per pupil was made, that it might be very well and quite necessary that we have this fan ventilation, no matter what it cost for fuel. That the fuel bill would be increased no one doubted; nevertheless, it has decreased, and this fact should be a strong argument for its adoption over the country.

The sanitary school building should properly dispose of its waste. I declare for first-class plumbing, without hesitation, where sewerage connection can be had. Where it cannot be had and cesspools are impracticable, I am not so certain what to say. There is a choice between dry closets, crematories and out-of-door privies. As to plumbing, it has been often and justly condemned. It has been the cause of much sickness and death. Whatever it has been, the day has come when a plumbing job can be made practically perfect so that it can be fully recommended for any kind of building. In our modern school building nothing can be better than our best known water-closets, with slate or glass urinals.

However, there are schools where plumbing cannot well be had. There seems to be demand that all toilet rooms shall be inside the building. This demand I believe to be just, provided the inside toilet room can be made quite sanitary; the demand ought to be complied with. But here is the difficulty. The problem seems nearer solution than it did years ago, but there has been great injustice done in the attempt to get a safe device. The principle of the dry closet and crematory is either to dry or burn the sewage. There has been a dry closet in use more or less where the privy vaults were in the basement but wholly unconnected with any other part of the building. This seems to have met with fair success, at least in that it does not admit odors to the schoolrooms, but it costs a large amount for fuel and has no great run.

There is another dry closet in which the privy vaults are connected with the schoolrooms by means of hollow wooden floors and partitions, though sometimes this connection is made through direct ducts. This bold step was evidently taken to save fuel, and though the whole device was carefully arranged and it possesses many taking points, I believe it is inevitably doomed to condemnation as an unsanitary device. No privy vaults connected directly or indirectly with the schoolrooms ought to be upheld for a moment, for although the draught may be made to go the right way some of the time, it will occasionally back up from the privies into the rooms, and no such thing should be tolerated. If outside privies could not be used it would be better for a scavenger to stand at the basement door with a cart and remove the contents of vaults daily or hourly, than for the public to tolerate such a thing. Happily there is a strong sentiment against this device, and attention is being wisely turned to more sanitary contrivances.

Along this line it may be well to say that the recent crematory closet seems to be somewhat in advance of the old dry closet. It has at least the merit of not being connected with the rooms, so what odor there is, not going up the stack provided for it, is not likely to get into the rooms. I have not seen the crematory closet tried, but it seems to promise well. The only difficulty I can foresee is the disposal of the urine, which will accumulate in unpleasant quantities unless the greatest care is taken.

COMBINATION LEAD AND FELT ROOFS.

A novel style of roof combination which is likely to prove more or less interesting to American readers, has been brought to the attention of the foreign world by an invention of Herr Siebel of Dusseldorf, the history of which is decidedly entertaining. The inventor was well aware no doubt that the best protection against dampness arising from the ground into walls is a sheet of lead, and that on account of the great expense of a protection of this kind of sufficient thickness to support the weight of superstructure without tearing, it is common in these days to substitute a sheet of tarred felt. Bearing these things in mind he conceived the idea that both materials might be employed to advantage by inclosing a thin sheet of lead between two thicknesses of tarred leather.

In this way the metal, although thin, acts as an impenetrable barrier to dampness and is not liable, as is the case with felt when used alone, to gradual decay. While engaged in perfecting his invention it occurred to Herr Siebel that the felted lead would make an impervious roof covering, and perhaps a durable one, and thorough tests seem to confirm this idea. The felted lead is solid in the same form as ordinary roofing felt, and applied in the same manner, receiving the usual protecting coating of tar and gravel on top; but the metal protects the felt under it so completely from the evaporation of the volatile portions of the tar, which is the principal cause of the deterioration of composition roofs, that it is said to remain tight for an indefinite period. Even when the lead is exposed, from the decay of the felt over it, nothing is necessary but to lay over it new felt, with tar and gravel finish, to make the roof as good as ever, while an ordinary felt roof which has once begun to rot is not usually worth repairing. The practical man will think of other details, such as the facility with which flashings, gutters and zinc or copper edgings can be soldered to the lead of the roofing, which seems very much in favor of the new material. It is, however, difficult to rool very thin lead, and it is hard to understand how sheets enclosed in felt could be sold for roofing at a price to compete with a tin roof, which would be better in most respects.

PERSONAL.

We regret to learn that on the 21st of October the residence and office of Mr. James A. Macdonald, architect, Regina, N. W. T., with their entire contents, were destroyed by fire. Mr. Macdonald's instruments, papers, and library were among the articles destroyed.

TRADE NOTES.

Sheathing "Quilt" is the name of an article recently patented by Samuel Cabot, of Boston. It is intended to take the place of back plastering and other expensive methods now in use for deadening sound and making dwellings and other buildings temperature proof. It owes its name to the fact that it is made of a tough saline grass held in place between two layers of manilla paper by quilting. Its great elasticity makes it a remarkable sound deadener, and its use in this way is quite as great an economy as in any other.

* Abstract of paper read by Walter S. Pardee at the annual convention of Building Inspectors and Commissioners at St. Louis.

A TABLE FOR TREADS AND RISERS.

FROM *The California Architect* we republish the following table, which will be found very useful to many of our readers. The spacing of the lines of figures into groups aids the eye in following the direction to the final point.

DIRECTIONS.—In the column beginning with the rise of step desired, find the height of story from top of floor to top of floor, then follow this line to the column under "Risers," which gives the number of risers. In the column under "Treads" find the number of risers *less one*, and on this line under the column of width of tread will be the length of run.

Risers	inches	Treads	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches
No. 1	0.6	1	0. 6½	0. 7½	0. 8¾	0. 10	0. 11¼	0. 12½	0. 13¾	0. 15	0. 16¼	0. 17½	0. 18¾	0. 20	0. 21¼
2	1.0	2	1. 0½	1. 1½	1. 2½	1. 3½	1. 4½	1. 5½	1. 6½	1. 7½	1. 8½	1. 9½	1. 10½	1. 11½	2. 0½
3	1.6	3	1. 6½	1. 7½	1. 8½	1. 9½	1. 10½	2. 1½	2. 2½	2. 3½	2. 4½	2. 5½	2. 6½	2. 7½	2. 8½
4	2.0	4	2. 1	2. 2	2. 3	2. 4½	2. 5½	2. 6½	2. 7½	2. 8½	2. 9½	2. 10½	3. 0½	3. 1½	3. 2½
5	2.6	5	2. 7½	2. 8½	2. 9½	2. 10½	3. 0½	3. 1½	3. 2½	3. 3½	3. 4½	3. 5½	3. 6½	3. 7½	3. 8½
6	3.0	6	3. 1½	3. 2½	3. 3½	3. 4½	3. 5½	3. 6½	3. 7½	3. 8½	3. 9½	3. 10½	3. 11½	4. 0½	4. 1½
7	3.6	7	3. 7½	3. 8½	3. 9½	3. 10½	4. 0½	4. 1½	4. 2½	4. 3½	4. 4½	4. 5½	4. 6½	4. 7½	4. 8½
8	4.0	8	4. 2	4. 3	4. 4	4. 5½	4. 6½	4. 7½	4. 8½	4. 9½	4. 10½	4. 11½	5. 0½	5. 1½	5. 2½
9	4.6	9	4. 8½	4. 9½	4. 10½	5. 0½	5. 1½	5. 2½	5. 3½	5. 4½	5. 5½	5. 6½	5. 7½	5. 8½	5. 9½
10	5.0	10	5. 2½	5. 3½	5. 4½	5. 5½	5. 6½	5. 7½	5. 8½	5. 9½	5. 10½	5. 11½	6. 0½	6. 1½	6. 2½
11	5.6	11	5. 8½	5. 9½	5. 10½	6. 0	6. 1½	6. 2½	6. 3½	6. 4½	6. 5½	6. 6½	6. 7½	6. 8½	6. 9½
12	6.0	12	6. 3	6. 4½	6. 5½	6. 6½	6. 7½	6. 8½	6. 9½	6. 10½	7. 0	7. 1½	7. 2½	7. 3½	7. 4½
13	6.6	13	6. 9½	7. 0½	7. 1½	7. 2½	7. 3½	7. 4½	7. 5½	7. 6½	7. 7½	7. 8½	7. 9½	7. 10½	7. 11½
14	7.0	14	7. 3½	7. 4½	7. 5½	7. 6½	7. 7½	7. 8½	7. 9½	7. 10½	8. 0	8. 1½	8. 2½	8. 3½	8. 4½
15	7.6	15	7. 9½	7. 10½	8. 0	8. 1½	8. 2½	8. 3½	8. 4½	8. 5½	8. 6½	8. 7½	8. 8½	8. 9½	8. 10½
16	8.0	16	8. 4	8. 5½	8. 6½	8. 7½	8. 8½	8. 9½	8. 10½	9. 0	9. 1½	9. 2½	9. 3½	9. 4½	9. 5½
17	8.6	17	8. 10½	9. 0	9. 1½	9. 2½	9. 3½	9. 4½	9. 5½	9. 6½	9. 7½	9. 8½	9. 9½	9. 10½	9. 11½
18	9.0	18	9. 4½	9. 5½	9. 6½	9. 7½	9. 8½	9. 9½	9. 10½	9. 11½	10. 0½	10. 1½	10. 2½	10. 3½	10. 4½
19	9.5	19	9. 10½	10. 0	10. 1½	10. 2½	10. 3½	10. 4½	10. 5½	10. 6½	10. 7½	10. 8½	10. 9½	10. 10½	10. 11½
20	10.0	20	10. 5	10. 6½	10. 7½	10. 8½	10. 9½	10. 10½	10. 11½	11. 0½	11. 1½	11. 2½	11. 3½	11. 4½	11. 5½
21	10.6	21	10. 11½	11. 0½	11. 1½	11. 2½	11. 3½	11. 4½	11. 5½	11. 6½	11. 7½	11. 8½	11. 9½	11. 10½	12. 0½
22	11.0	22	11. 5½	11. 6½	11. 7½	11. 8½	11. 9½	11. 10½	12. 0½	12. 1½	12. 2½	12. 3½	12. 4½	12. 5½	12. 6½
23	11.6	23	11. 11½	12. 0½	12. 1½	12. 2½	12. 3½	12. 4½	12. 5½	12. 6½	12. 7½	12. 8½	12. 9½	12. 10½	13. 0½
24	12.0	24	12. 6	12. 7½	12. 8½	12. 9½	12. 10½	13. 0½	13. 1½	13. 2½	13. 3½	13. 4½	13. 5½	13. 6½	13. 7½
25	12.6	25	13. 0½	13. 1½	13. 2½	13. 3½	13. 4½	13. 5½	13. 6½	13. 7½	13. 8½	13. 9½	13. 10½	13. 11½	14. 0½
26	13.0	26	13. 6½	13. 7½	13. 8½	13. 9½	13. 10½	14. 0½	14. 1½	14. 2½	14. 3½	14. 4½	14. 5½	14. 6½	14. 7½
27	13.6	27	14. 0½	14. 1½	14. 2½	14. 3½	14. 4½	14. 5½	14. 6½	14. 7½	14. 8½	14. 9½	14. 10½	14. 11½	15. 0½
28	14.0	28	14. 7	14. 8½	14. 9½	14. 10½	15. 0½	15. 1½	15. 2½	15. 3½	15. 4½	15. 5½	15. 6½	15. 7½	15. 8½

METHOD OF STORING MOULDINGS.

Mr. Owen B. Maginnis writes as follows on this subject in *The Woodworker*:—

Concerning the proper storing and safe keeping of strips and moldings, I think the most convenient way to place them for convenient use is that shown in Fig. 1. A rack or series of holes or spaces is made, by framing together a front out of 1¼-inch or 1½-inch stuff (pine is good enough) after the manner of Fig 1, which is shown to be 10 feet 6 inches high. The

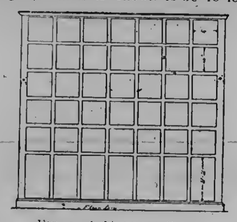


FIG. 1—A MOLDING RACK.

SECTION.

bottom space is 2 feet two inches high and 14 inches wide. The case is ten feet wide, so that 7 spaces are obtained. The bottom spaces are made thus for the larger sizes of moldings or strips, so that they may contain more, and rest solidly and safely on the floor.

In every molding rack the heavy stuff should be stored below, and in order to get a larger quantity into a given space it will be necessary to make the space large.

The rack illustrated here contains 42 spaces for moldings of different sizes, and for convenience and readiness of handling the smallest moldings, as ⅝ and ¾, beads, quarter-rounds, cones, and such like, are placed in the upper spaces. The section drawn to the right will give the reader a fair idea of its construction. The sides can either be left bare or covered over with ⅞-inch matched stuff, and a crown mold broken round the top to give it a finish, as shown.

The practical mill man and wood worker will at once perceive the convenience of a storage rack like this, for the reason that 42 different sizes and designs of mouldings are a good many, but if more be carried in stock a larger rack with more spaces can be made, or another section added to the one already made. In addition to this, the quantities in stock can be quickly computed, especially if the rack be made a fixed length—say 11 or 15 feet; then 12 and 16 feet lengths can be stored in it and the accurate number of lineal feet arrived at by counting the ends in each space. I am a great stickler for order in a mill, and would

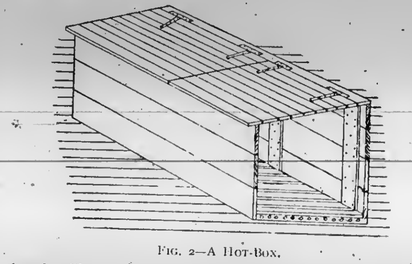


FIG. 2—A HOT-BOX.

therefore like to see one of these conveniences in every well-regulated one. Numbers can be affixed to the face of the frames for catalogueing and ordering. The dimensions of the various pieces I have marked on the sketch, so that anyone who wants to make a rack after this pattern can easily do so.

At Fig. 2 will be seen an isometrical drawing of a hot box for heating stuff preparatory to glueing. The pieces can be handily placed in it, being laid on the strips on the bottom, which lie on the steam pipes underneath. The box can be constructed of ⅞ or one-inch matched or tongued and grooved boards, not wider than six inches, being held together by battens screwed on in the way shown in the interior. The lid is hinged by strong common T-hinges and may, for extra convenience, be in two halves or flaps, in order not to let the heat escape by exposing the entire inside of the box.

DECORATION AND FURNITURE

MANUFACTURED AND REAL ART.

We have heard a good deal about artistic craftmanship, as if it was our duty to invent certain trades for the benefit and pleasure of artists; without for one moment believing that art may be found in every trade, if it be only honestly exercised, and the materials honestly used. For at least 40 years we have been encouraging what we may term "manufactured art," or importing some foreign style; trying to make our furniture, our fabrics and textiles, our metal work, and other things "artistic," to impart to them certain plastic qualities of form and grace and of harmonious colour without seeing or even suspecting that all this effort is thrown away; that, in fact, we cannot force our "art" notions on things or on materials, but that whatever good or beauty and grace an article possesses must be a spontaneous growth out of the material and condition of workmanship. Cultivated people are beginning to turn with well merited disgust from so-called "revivals" and "art" furniture, "æsthetic" carpets and fabrics, "mediæval" brasswork "Queen Anne" or "Jacobean" sideboards and cabinets, chairs and tables, "Japanese" ware, "Empire" decorations, and a variety of other prefixed adjectives of this sort; they begin to see that there is nothing honest about a kind of manufacture which has no claims to be called either Queen Anne or Empire, or by any other title except that it has been made to imitate work of those periods—descriptive titles that have only a meaning in the catalogues of Wardour street or Tottenham Court road.

When will the people learn that we must clothe modern ideas in modern dress? When will they see the absurdity of slavishly imitating old furniture, woodwork, or copying old Persian tiles or the "Book of Kells" for needlework and embroidery? The same desire to make our new work like the old is observed in the copying of old plaster or stone relief in modern compositions for wall and ceilings, or oak carvings in materials which they have no affinity for, to sympathy with, whatever. We have nature open to us as well as the ancients had; we have our own materials to work with, our own requirements, as well as they had. Why do we not make the same use of them as our ancestors? The question awaits an answer. Contrast for a moment the woodwork or furniture on the 16th or 17th centuries with a piece of vulgarised shop work. In the former we observe conversion of the material which was used with meaning and intention; the ornament was an interpretation of nature in sympathy with the material, whether wood or plaster. The workman *started* with an *idea*, instead of borrowing one from some ancient source; his *motif* was derived from his own conception. For practical examples of the contrast, let us compare the woodwork of some old hall in Cheshire or Warwickshire, or a 17th century cabinet at the South Kensington Museum, with a piece of modern workmanship of the Tottenham Court road class, and we at once perceive the differences. In the former there is no meaningless repetition in the modes of framing or ornamentation.

We must look to the practical working of the trades for improvement. If a material or a piece of workmanship is susceptible of art, it can only exhibit it by a close observance of its peculiarities, or by the method employed in converting it. Practical design as it is taught in our art schools consists merely in making designs on paper according to certain conditions, whereas it can only be developed by a close study of the material. Take, for instance, carpet design. The success of the pattern depends on the designer's knowledge of the fabric. How many tints must be used to produce a gradation of colour?—as every patch of colour pattern must be defined in the and be thought of like the tessere of a mosaic. It also depends on the number of colours, the "planting" or dividing the bands of colour or frames, to produce a given design, and the repeats. The designer may make a beautiful arrangement of pattern and colour; but if it does not fulfil the technical conditions it is useless. For these reasons it is better to encourage the working out of those designs which can be most naturally effected, to avoid any complicated and strained efforts, and mainly that the limitations or restrictions imposed by the fabric should be observed. These rules cannot be followed when an endeavor is made to produce anything novel or some new style for the market. There is a ceaseless demand made by some manufacturers for a new style or pattern, knowing the public craving for novelties. It goes on year by year. New carpet and wall-hangings designs; some new furniture or decoration "craze," like Japanese or bamboo; new fenders or fire-irons, stoves and overmantels are among the objects that have to be invented or designed to meet a fashion, and however exotic the taste or unappropriate the style, the order is obeyed. Of course, it goes by that elastic word of the manufacturer, "artistic," though its very nature is extremely inartistic—there is not the faintest indication that the so-called artistic qualities are an outcome of the workmanship or the material; rather they have been concealed or smothered with ornament or what passes for style. To take as an example the Louis XIV decorative furniture, known as Boule decoration. This kind of workmanship was carried to perfection by a few artists and craftsmen, of whom the leading one was André Charles Boule. It is a veneer or tortoiseshell and brass, with angle mounts, lines of mouldings, claws, feet, and other ornamentation; but the beauty of this kind of incrustation arose from the skill and taste of the art workmen engaged, and cannot be manufactured to order as many sorts of modern decoration are. Then there is no effort—no attempt to do something fresh for novelty's sake. The artistic furniture of France a hundred years ago, or the earlier schools of Italy and Flanders, was a branch of workmanship perfected by degrees; studios and workshops were formed of craftsmen who gave themselves up to the work. The art in the old cabinet and bureau was slowly and spontaneously developed. In point of time we had first the chest as a receptable for documents and articles; the fronts of these were panelled and carved; next the chest was placed on legs forming two stages, and we had the cabinet or sideboard. Besides being carved, the fronts have hinged flaps, and the interior is divided into drawers or recesses. The decoration grew as slowly; first carving, then ornamental hinges of metal next incrustation of precious woods, ivory, or metal, the supports ornamented with brass mounts. In this way the chest grew into the ornamental cabinet; each step suggested itself to the craftsmen in a natural way.

The art was then hereditary; the crafts or guilds were the guardians of traditional skill in their particular trades, thus insuring that truly honest, national character which distinguished all workmanship during the 16th and 17th centuries. This traditional skill is seen in the delicate mouldings and turnings, the quiet inlays of wood and ivory. The craftsman, who was a master of woodwork, went patiently but boldly to work, and was content with plainness until he could see a way to develop or ornament a feature. An authority on woodwork has said that the "best present day example of furniture is the deal table of the farmhouse or cottage," where modern vulgarisation has not entered. He is right, because it is a plain, straight-forward piece of framing, solid and well put together; to make it artistic is to give it pleasing proportions. If it is a parlour or sitting room table, the legs may be partly turned, with rails tenoned into them, and the edge of the table moulded. But to make it "artistic" according to the modern sense would be to make it as light in its framing as possible; to make the legs like turned brush-handles, or to stick on a few carved trusses under the top. In the framed carpenter's work of the 16th century we see means the most simple adopted—the construction and form and ornament, if any, appear to be the traditional method of the craft; but its very construction was pleasing, and at one with the ornament, which may be a simple incised ornament or geometrical device on the panel, and delicate members moulded and stopped on the rails and stiles.

What we have said about certain manufactured goods and furniture is equally true of the architectural crafts. There has been a great deal too much forcing, trying to produce ornament by extraneous means. All kinds of American and other inventions have been introduced to turn out ornamental woodwork; but it is not artistic, because it did not spring naturally from those simple conditions which lie at the foundation of all good architecture. For instance, the processes of producing ornament by embossing wood or of burning away certain portions are not those which now commend themselves to us. The chisel, moulding machine, and carver's tool, like the operation of framing, appeal to our reason as the natural processes of conversion. These processes admit only a certain kind of decoration, moulding the stiles and rails, and carving or incising the panels. Stone and brick and metal and plaster have each its own methods of conversion, its own modes of decoration, and if we try to invent any other the work at once loses the characteristic of being artistic. Between modern and ancient art, then, there is this difference—one is a meretricious, superadded quality, the manufacture of art; the latter a spontaneous development from material and skill.—*Building News.*

SANITATION AND HEALTH

DISCONNECTING PLUMBING FIXTURES.

Disconnecting house fixtures from the soil pipe is sometimes practiced with us with good effect, says the *National Builder*, and the principle may, we think, be extended with good results inside our houses. A recent adaption in the bathrooms of a block of flats consists in placing a small sink in the tiled floor, which in turn is laid on a span of plank like the "mill floors." Beneath the floor a "puro" tap is placed on the waste pipe of the little sink towards which the tile floor is slightly graded. The sink is so placed that the wastes of a porcelain lined iron bath and oval basin drip into it with the least possible length. These short wastes are of three-fourths inch nickeled pipes connected to the fixtures by simple means and simply movable. By this means only two holes are made in the floor for waste pipes, one for the closet and one for the sink. This little sink takes care of any overflow that may take place, and the wash of the floor as well. The basin, so apt to lose its seal by self-siphonage, is disconnected, and the usual cumbersome and expensive wastes of the bathtub are done away with. The small open waste pipes of the bath and basin have only small fouling surfaces, and these are easily scoured out by the rapid flow of the hot waste liquids. The number of soil pipe connections is lessened and the work generally simplified by the means taken to disconnect them. Practically the plea is that it is only a little evil, and by tolerating it things will look as much better. The sanitary engineer everywhere finds people objecting to good work because "it looks so." Show the architect or owner how some favorite trick of construction is dangerous to life and health and suggest that the work should not be concealed. The reply is "but it will look so to have it exposed." With a properly arranged bath and basin there is no difficulty in going through a tiled floor with a single opening in addition to that for the water closet.

"The number of soil pipe connections is lessened and the work generally simplified by the means taken to disconnect them." There is no possible excuse for having small fouling surfaces of this character. In the ordinary well constructed bathtub the trap is within the length of a union from the tub, and the distance inside of the bathtub from the surface of the seal scarcely exceeds three inches, and is sometimes less. In many of our best forms of basin the whole length of pipe from the seal up to the basin can be reached for cleaning. The idea that "hot waste liquids will clean out a pipe three-quarters of an inch in diameter" is a matter of faith rather than of works. Every architect should be firmly imbeud with the idea that the plumbing work is the most honorable of all that goes inside the house; there is no excuse for sacrificing it to any other requirement of construction or convenience. Its perfection is of a paramount importance.

It has been found by careful experiments that one square foot of wall space will transmit from 70 to 1.25 units of heat per hour for every degree difference in temperature between the inside and the outside, the difference being caused by the action of the wind; In order to ascertain the amount of heat that will be transmitted through one square foot of wall space it will be well to take the lowest probable outside temperature and the highest transmitting capacity of the wall. Then from the desired temperature of the room subtract the lowest probable outside temperature and multiply the remainder by 1.25. This will give the number of heat units transmitted by each square foot of wall space for the space of one hour, multiply that amount by the area of the wall exposed in square feet, and the result will be the total heat units for one hour.

To find the heating surface we proceed as follows:—From the temperature of the steam subtract the temperature of the room; square the difference and divide by 100, which will give the number of heat units for each square foot of heating surface. Divide that into the total heat units required, and the quotient will be the number of square feet of heating surface for that pressure of steam. A three foot length of one inch pipe equals one square foot of heating surface. When a whole building is to be calculated the roof must also be included. All steam pipes act as heating surface. The diameter of the main in inches should be one-tenth the square root of the heating surface in square feet. It is as well to use one inch pipes for heating with live steam. For heating with exhaust steam two inch pipes are preferable. Return pipes should never be less than three-fourths the size of the mains.

METHODS OF MAKING HARD BRICKS.

In the western parts of Monogolia there are such rapid alterations of temperature that ordinary bricks and even the usual building stones disintegrate very rapidly. The inhabitants of that country have a process for making extremely hard bricks, sonorous, and having the appearance of trachyte. The article by E. Blanc in *Dingler's Polytechnisches Journal*, describing the process, does not inform us as to the exact constitution of the clay. The brick kiln is in the shape of a vertical cylinder, surmounted by a dome. There is a rather wide dome, and during the first part of the process the hole is left open. Three draught chimneys built inside the furnace open outwards at the height of the dome and are kept closed with clay at the begining of the operation. The kiln is heated for three days during the first part of the process, and then the hole at the center of the dome is gradually reduced in size, by means of blocks of moistened clay. The flame is allowed to die down and the small hole remaining covered with wet felt. The felt is covered with sand which is continually kept moist. The three lateral chimneys are then opened and the fire lighted again. The draught is thus reversed and the second stage of the process thus commenced lasts for four days. During this time the water from the felt is heated and fills the kiln with an atmosphere of superheated steam. At the beginning of the second part of the process the bricks have light red color and this changes to uniform dark gray. At the end of four days the bricks are completed.

PUBLICATIONS.

A feature of the *Cosmopolitan Magazine* for November is the portion of the magazine given up to color work, no less than ten superb color illustrations being presented for the first time in magazine history, accompanying an article by Mrs. Roger A. Pryor on Changes in Women's Costumes.

The By-Laws of the Toronto Builders' Exchange have been neatly printed in book form and enclosed in flexible cloth covers, with the name of the Exchange in gilt thereon. In addition to the By-laws the book contains a copy of the Declaration of Incorporation, and a list of the members of the Exchange. We are endebted for a copy to the Secretary.

Mr. H. E. Haferkorn, of Milwaukee, has just published a handy list of books on Fine Arts and Architecture, Painting Sculpture, Decoration, Ornament, Carpentry, Building, Art Industries, etc. This work is an alphabetical reference catalogue, arranged under authors and subjects, and including analytical references to the contents of important works and as such, furnishes in compact form a key to all the literature of value on the subjects named, and is calculated to save the seeker after information a great deal of time which without its aid must be spent in searching through numerous catalogues. The price of this handy list in paper covers, is $3.25; cloth, $3.50; leather, $3.80.

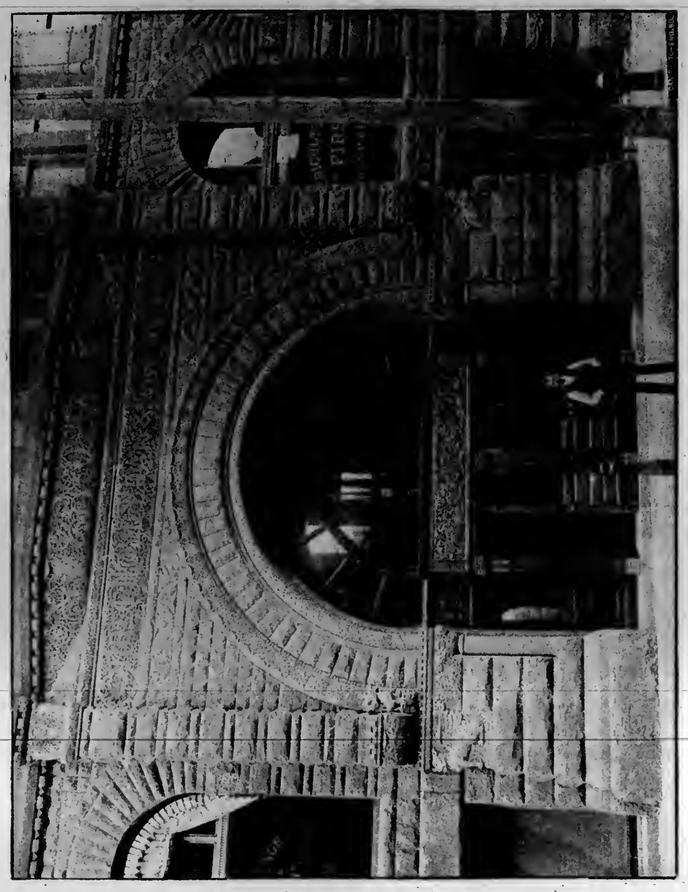
USEFUL HINTS.

CEMENT FOR GLAZED SURFACE.—This cement was invented by Prof. Alexander Winchell, the noted geologist. It adheres perfectly to glazed surfaces, and is excellent for mending broken minerals or fossils. Pulverize two ounces of gum arabic and dissolve it in the quantity of water a laundress would use for the same bulk of starch. Dissolve half an ounce of fine starch and half a ounce of white sugar in the gum solution; cook the mixture in a vessel set in boiling water till it becomes clear. A little gum camphor, oil of cloves or sassafras, will keet it sweet. A little alum adds to the effectiveness and helps preserve the cement.

MAKING BRICK IMPERVIOUS TO MOISTURE.—In reply to "H. G. G.," Galt, Ont, who asks, is there any cheap and reliable way to make bricks water-proof, so that they will be able to resist a water pressure of say 75 to 100 pounds? the *Manufacturer and Builder* says:—The only safe course to pursue in a case like this, would be, in our judgment, to saturate the bricks before laying up, by immersing them in hot asphalt (or a composition containing asphalt), and to bed them in the same material, so that joints as well as bricks would practically form a single homogeneous body of asphalt. Such a wall would, if laid with care, be perfectly impenetrable to the entrance or exit of water. It would not be a cheap way of doing work, but would be efficient in fully answering this inquirer's purpose. A cemented wall would not be water-proof, and especially not where it was required to withstand considerable pressure.

THE T GIRDERS USED BY THE ROMANS.—In discussing the use of iron on a large scale by the Romans, Mr. Gradner writes:—"From Pompeii we might infer the total absence of constructive ironwork in Roman architecture, yet Prof. Aitchison claims that in the Baths of Caracalla large ceiling was supported on iron girders." This fact might be stated less doubtfully than these words would imply, since some tons of broken iron T girders were found a few years ago during the excavation of the great cella soliaris of the Therma of Caracalla. These girders had been cased in bronze, and they were arranged so as to form square panels, which were well filled in with concrete decorated with mosaic and delicate stucco reliefs, all colored and gilt, thus forming a strong and richly-decorated flat ceiling, with a span of enormous width.

The effect produced on the character of cement for mortars by the size or form of the sand employed has been the subject of investigation by M. Feret, a French expert, who prepared artificial sand out of crushed quartzite, with a view to determining its strength as compared with sand of natural formation. The sand as received from the crusher was graded into three degrees of fineness. The first consisted of such grains as would pass through a sieve containing four meshes to the square centimètre, and were retained on a sieve of thirty-six meshes per square centimètre; the second consisted of grains passing through a sieve of thirty-six meshes to the square centimètre, and retained in one of a much finer mesh, while the third consisted of the grains passing this last sieve. Measured dry, each of these samples had practically the same specified weight, the second being slightly the lightest. Mixed in various proportions, it has found that the mixture having the highest specific weight was one comprising six parts of the first sand and four of the third, the weight of this being thirty per cent. more than that of number two.



ENTRANCE TO FREEHOLD LOAN BUILDING, TORONTO.

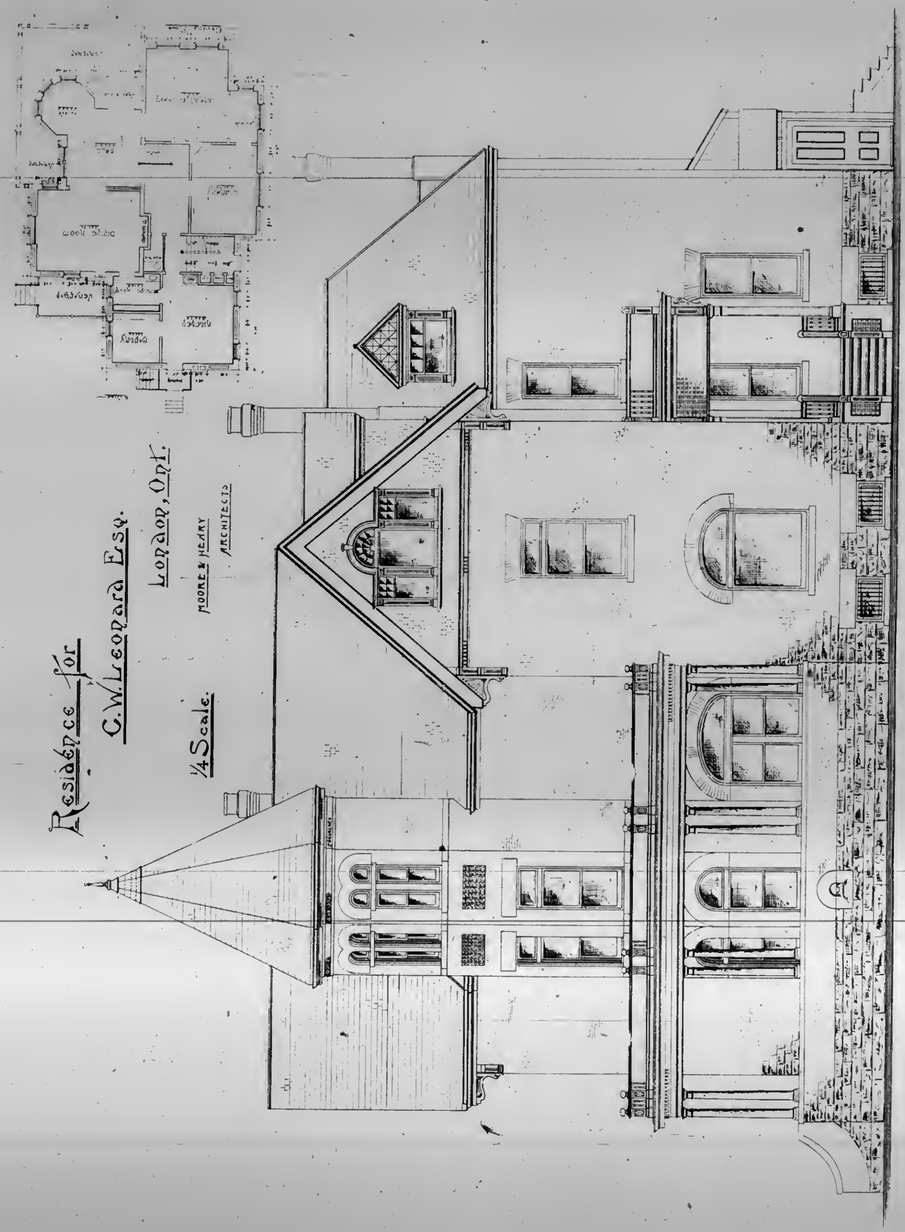
E. J. LENNOX, ARCHITECT. | HOLBROOK & MOLLINGTON, SCULPTORS.

Residence for
C.W. Leonard Esq.
London Ont.

MOORE & HENRY
ARCHITECTS

¼ Scale

Front Elevation

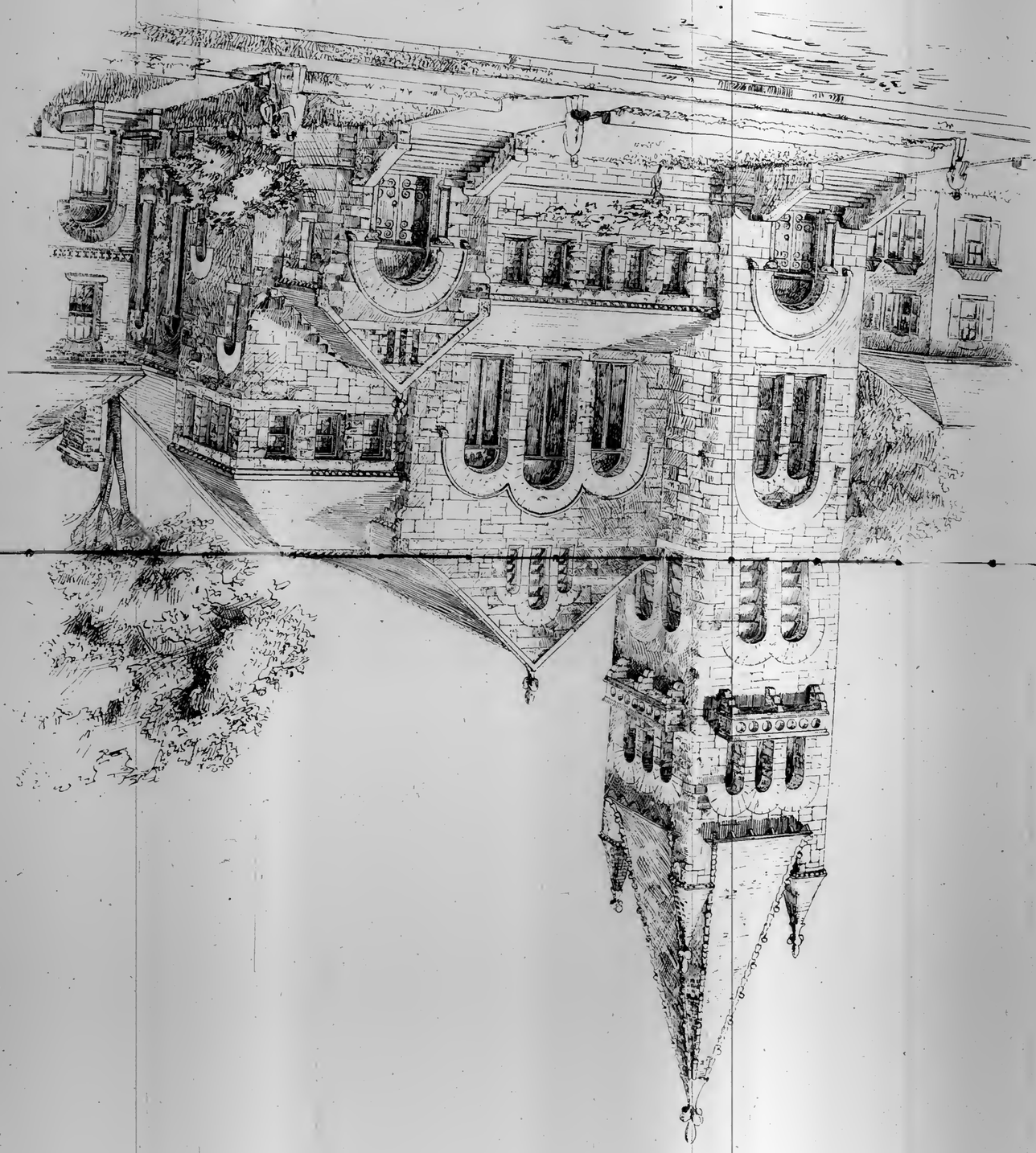


Residence for
C.W. Leonard Esq.
London, Ont.
¼ Scale.
MOORE & HENRY
ARCHITECTS

East Elevation.

WESTMINSTER PRESBYTERIAN CHURCH, TORONTO.

GREGG & GREGG, ARCHITECTS.



CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—NO. XII. DECEMER, 1893 { PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.

64 TEMPLE BUILDING, - MONTREAL.
Bell Telephone 2259.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	D. B. DICK, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	JOHN E. BELCHER, Peterboro'.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

DAVID EWART	Ottawa.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
FRANK DARLING,	Toronto.
W. A. EDWARDS	Hamilton.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	J. NELSON, Montreal.
1ST VICE-PRESIDENT	CHAS. BAILLAIRGE, Quebec.
2ND VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
SECRETARY	JOSEPH HAYNES, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. GENDRON,	Montreal.
J. B. BERTRAND	Quebec.
ERIC MANN	Montreal.
J. VENNE	Montreal.
G. F. TANGUAY	Quebec.

AUDITORS—THEO. DAOUST, J. E. PEACHY.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
GEO. MOIR, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
JOHN BARNARD, Treasurer.
WM. J. HILL.
JOHN ALDRIDGE.
JAS. CRANG.
J. LISTER NICHOLLS.
WM. BOOTH.
JAS. ISAAC.
JOHN LOGAN.
WM. PARK.
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

MUCH interest is felt in the competition for a new City Hall for the City of New York. The competition closed on the first of September. The number of designs submitted was 137, the competitors representing the United States, England, and we understand, Canada also. The proposed cost of the buildings is $7,000,000 It is estimated that the architect's commissions will amount to about $800,000. Much regret is expressed that owing to ill health Mr. Richard M. Hunt is unable to serve on the architectural committee selected to aid the building commissioners in deciding the competition.

AT the annual meeting of the Canadian Society of Civil Engineers, to be held in January, action will be taken on the report of the Committee on Professional Status. The report recommends that land surveyors should be prevented from practising as civil engineers, unless they belong to the Canadian Society of Civil Engineers; that an appeal should be made in each province to have members of the Canadian Society of Civil Engineers recognized as professional men, with right to collect fees; that no practitioner shall be entitled to designate himself as a civil engineer unless he belongs to the Canadian Society of Civil Engineers.

AS a means of making the meetings more instructive and entertaining the Chairman of the Builders' and Contractors' Association of Victoria, N. S. W., recently invited the reading of papers by the members of that body. Who should know, he said, more about the structural portion of edifices than the men who built them, and who were better fitted to expound the laws and regulations affecting them? Even if the papers were merely reminiscent, they would provide better subjects for discussion than the payment of fees and various irrelevant topics. The attention of the officers of the Toronto Builders' Exchange was recently called in these columns to this subject. Papers and discussions on topics connected with building would tend to enliven the meetings of the Exchange throughout the winter; the interchange of experiences and opinions would be mutually helpful, and in giving expression to their views the members would derive intellectual advantage. We hope an attempt will be made to put the suggestion into practice.

THE manufacturers of Canadian cement are complaining of the action of the Dominion Government in using imported cement in the construction of the Soulanges canal. This is the first instance so far as we are aware in which imported cement has been used in Canadian public works of this character. In the construction of the Welland and Sault Ste. Marie canals Canadian cement was employed, and the durability of the material in the case of the Welland canal at least has been amply demonstrated. No reason has been given by the Government for the use of imported cement in the Soulanges canal except that they felt bound to act on the advice of their engineer. It is due, we think, to the manufacturers of Canadian cement that they should know the reasons which prompted the engineer to advise the Government to purchase foreign material, more especially in view of the fact that the native material has undergone such satisfactory tests, and that the cement manufacturing industry in Canada affords employment to a considerable number of persons. In addition to this, the purchasing abroad of what can be obtained at home, is contrary to the policy of encouraging native industries which has been a prominent feature of the Government's platform.

IN response to representations made for several years past by the architects of Toronto, the Fire and Light Committee of the City Council have decided that hereafter on residential streets within the brick limit, Elizabethan architecture will be permitted, so that above the first storey, which must, as before, be of solid brick, timber framing, filled in with Portland cement or stucco, may be used. Several specimens of this style of architecture have been erected under special permit, and the new regulation will, probably, lead to the erection of many houses in the old English style, thus widening the scope of architects for the decorative treatment of their designs, and greatly enhancing the artistic appearance of residence streets. It was decided also, to place the new front, between Yonge, Simcoe, Esplanade and Lake streets, in the brick limit. South of Lake, wooden structures, covered with corrugated iron, galvanized iron and metallic shingles may be erected. On all wooden buildings hereafter galvanized iron and metallic shingles may be used.

THE owners of the building occupied by the Toronto Technical School have notified the management that in future the rental will be $600 per year instead of $300 as heretofore. This notice was not given until after the School had entered upon its winter work, and when removal to other premises could not be attempted. To a letter previously addressed by the Secretary of the School to the owners of the building requesting to know what rental would in future be charged, no reply was given. In view of this, the action of the owners in doubling the rental so late in the year bears the appearance of deliberate sharp practice. In a reference to the successful working of the school in a previous issue, the need of a new building adapted to its present and future requirements was mentioned. The large increase in rental now imposed should determine the erection of a new Technical School building if possible next year. The amount of the present yearly rental is sufficient to pay 5 per cent interest on $12,000, and this sum would form a considerable proportion of the cost of a new building.

THE building permits issued by the City Commissioner for the City of Toronto, for the year 1893, fall short of those of the preceding year by more than $1,000,000. This is partially accounted for by the fact that the permit for the new City and County buildings, amounting to $1,000,000, was included in last year's record. It is yet too early to speak with any degree of authority regarding the outlook for 1894. The opinion prevails, however, that the lowest point has been reached in the depression which has prevailed in Toronto for some years past, and that the tendency will be upward in the future. It seems clear that no building of a speculative character will be done in Toronto for some years to come, and this is regarded by reputable builders and others who have at heart the welfare of the city as something to be thankful for. It is believed that a fair amount of building will be done next year in the business portion of the city. Improvements to buildings used for business purposes have not kept pace with those for residence, and there now seems to be a disposition to even matters up in this direction.

THE sentence of one year's imprisonment which has fallen upon Messrs. McGreevy and Connolly should have a salutary effect upon the propensity for boodling which has prevailed to so great an extent of late in connection with public contracts in Canada, and more especially in the Province of Quebec. The petitions which are being circulated on behalf of the prisoners by persons whose sympathy appears to have overcome their judgment, will have a tendency to destroy the good influence which might otherwise be expected to result from the decision in this case. It is perhaps true that the men upon whom punishment has fallen are not the greatest wrong-doers in the case, but the fact that it is not possible to bring under the power of the law the chief conspirators is no reason for allowing the sinners of lesser degree to escape. It is high time that a check was put on crooked practices in connection with the awarding of public contracts. The system of securing contracts by means of bribery is practiced to such an extent that it has become impossible for firms who are unwilling to resort to this method to obtain any business in certain quarters. The influence of the system upon officials in the public service, and indeed upon the community at large, is pernicious and harmful in the extreme. Furthermore it leads to a great waste of public money, as contracts which are thus purchased are given at figures greatly above what would be obtained if honest competition prevailed. Viewing the subject in these aspects, it should be a matter of congratulation that punishment has overtaken some of those who have been engaged in crooked dealing, and the hope should be entertained that the Government and public corporations of all kinds would set themselves with determinatian to stamp out boodling.

THE improvement of the public highways is a subject which for several years has occupied a considerable measure of public attention in the United States, and we are pleased to notice is now being considered in Canada also. Mr. Andrew Pattullo, of Woodstock, Ont., has been largely instrumental in calling public attention to the subject in Ontario, and a convention to consider the question is shortly to be held. A little consideration is all that is needed to show that if the principal thoroughfares of the country were improved in such a way as to present a smooth solid surface on an unyielding foundation, greater loads than at present could be transported over them, and there would be a great saving in horses and wear and tear of vehicles. At the foundation of the present unsatisfactory and in many instances disgraceful condition of our public highways, is the system of carrying out repairs by statute labor. Under this system men are appointed to supervise and to build roads who have had no experience whatever to fit them for the work, but are in this way allowed to pay their taxes in labor. Under such circumstances it would indeed be surprising if the work were done in anything like a proper or scientific manner. Payment of taxes in rural municipalities should be made in cash, and such portion of the taxes as is to be spent in the improvement of the roads should be expended under the direction of an engineer or other experienced person. In this way more work would be done for the amount now expended, and what is of more importance, it would be done in a proper manner and would not require re-doing year after year. The subject of road improvement is one of primary importance to the farming community. The putting of our main highways in a condition approximating in some degree to that in which the roods are maintained in European countries, would vastly increase the farmer's profits and the value of farm property, and result also in benefitting largely the business community. Engineers and skilled roadmakers as well as manufacturers of road-making materials should be interested in this subject.

AN effort is being made to develop trade relations between Canada and Australia, the Hon. Mr. Bowell, Canadian Minister of Customs, having just returned from a visit to Australia with this object. Dr. Benwick, who acted as commissioner for New South Wales at the World's Fair, expresses the hope that a market can be developed in America for Australian woods, which are a complete contrast in character to those of this continent. They are mostly hardwoods, and are especially adapted for railway ties, block roadways and interior house decoration. The *Australasian Builder and Contractors' News* has a lengthy article on this subject, and cites the fact, mentioned in in the CANADIAN ARCHITECT AND BUILDER, that the City Engineer of Toronto had recommended the paving of the streets of that city with vitrified brick, as proof that there exists an opening in Canada for the use of Australian wood for paving purposes. We have no doubt from the fact that certain Australian woods are being thus employed to a considerable extent in the streets of London, that the material is well adapted for the purpose, but are inclined to question whether it could be transported to Eastern Canada and sold at a price which would enable it to be used in competition with vitrified brick and asphalt. It might be possible to find a market here for certain kinds of interior finishing woods, which might be partially manufactured in Australia and shipped so as not to occupy much space on steamers and cars. This could not very well be done in the case of paving material, hence we fear that its bulk, and the great distance over which it would have to be transported, would forbid its introduction and use in this country. There seems a probability that an exchange of materials can profitably be carried on between Australia and the Province of

British Columbia, and that a market could be found in Canada for certain Australian timbers which are specially adapted for railway ties. While the average life of a railway tie on the C. P. R. is from six to nine years the grey gum-wood, it is said that of Australia will endure for forty years for this purpose. There is also a demand in British Columbia for timber for piling purposes for use in wharves, breakwaters, etc., which will resist the destructive attacks of the *teredo* or sea spider. The native woods at present used for this purpose are protected with creosote and other preparations at a cost of 25 to 30 cents per running foot, and even after having been subjected to these expensive processes the life of piles averages less than ten years. It will readily be seen that the cost of renewing work of this kind at such frequent intervals is very great. It is said that the turpentine tree of New South Wales, when the bark is left on the wood, is absolutely proof against the attacks of the *teredo*. If this can be shown to be the case, and there exists an ample supply of this class of wood, there should be quite an extensive market found for it on the Pacific Coast. On the other hand there has been some export of British Columbia lumber to Australia, and inquiries are being received for British Columbia shingles. Galvanized iron appears to be at present largely used for roofing purposes in Australia, and it is believed that the British Columbia sawn shingle would be much better adapted for the purpose and would afford a more pleasing architectural effect.

THE O. A. A. CONVENTION.

The dullness of business which has given architects leisure to think will perhaps produce fruit in increasing the interest of the Convention which is to be held next January. We understand that invitations have been issued to several members to read a short paper at the Convention. These with the discussion that is likely to follow should make the proceedings lively and instructive. It is better that many should take part in the proceedings of a meeting of that kind than a few; and though a long paper is a serious undertaking, a short one, which does not attempt to treat of a whole subject but only one point, is within the powers of most men and does not require the expenditure of too much time. Paper reading is a valuable exercise for the reader himself. It enables him to "marshall his thoughts more orderly." When he has carried his subject about with him for a few days he finds his ideas about it much clearer and further reaching than they were when he began to write the paper.

ILLUSTRATIONS.

RESIDENCE ON LOWTHER AVENUE, TORONTO.– EDMUND BURKE, ARCHITECT.

MORTUARY CONSERVATORY AT MOUNT PLEASANT CEMETERY, TORONTO.— EDMUND BURKE, ARCHITECT.

The new mortuary has been built upon the foundations of the old vaulted structure, and no changes whatever were made to old front, facing Yonge street. The old building was covered with two semi-circular arches, above which was a single elliptic arch covered with earth. Dampness and decay had so affected the structure that it became unsafe, necessitating the entire removal of the arches to the level of the springing, about 4 feet above the floor of the mortuary.

The new walls were built on the old from this point up to the level of the roadway to the east, a total height of about 22 feet. A very heavy pressure of earth had to be provided for, necessitating large buttresses, thick walls with benches or steps on the outside, and the building of the whole in cement. The interior is faced with white brick.

The ceiling of the mortuary, forming the floor of the conservatory and forcing houses, is formed with 12" I beams at about 5 feet centres, with porous terra cotta arching plastered with Portland cement in the underside and covered with concrete above, forming a foundation for a granolith floor in the forcing houses and tile in the conservatory and mortuary chapel.

The walls of the conservatory and potting houses to the height of about 4 feet are of pressed brick, both inside and out; above they are of wood and glass, as are also the roofs. The chapel and potting house are roofed with red tiles. The conservatory and chapel may be turned practically into one room, the enclosure of the chapel being formed with sliding glazed sashes. The bier is made to descend by means of a hand power lift, and the opening in the floor of chapel is immediately closed by a pair of light folding doors. A low brass rail appropriately hung with curtains surrounds this opening, and a brass lectern is mounted at one end for the use of the officiating clergyman. A fan driven by an electric motor is provided for the ventilation of the mortuary chamber, so arranged that the air is drawn away from the vicinity of the opening for the bier. The heating is by hot water, the pipes, under the benches being 4" diameter and valved in sections for the control of varying temperature.

PAIR OF SEMI-DETACHED RESIDENCES, JARVIS ST., TORONTO, FOR MR. JAMES HEWLETT.—F. H. HERBERT, ARCHITECT.

Each of these houses contains a large reception hall divided from staircase hall by carved and fluted columns; drawing and dining rooms, the latter with handsome open pressed brick fireplace; kitchen, laundry and accessories, and bedroom, billiard room, 2 bath rooms, hot water heating, etc.

DESIGN FOR A SMALL STABLE,

with accommodation for two horses and two or three vehicles. Foundations to be of stone, first story of frame construction and clap-boarded, gables and roof to be shingled, and chimney built of brick. Estimated cost, $300 to $400.

ROAD REFORM.

Editor CANADIAN ARCHITECT AND BUILDER.

I am pleased to notice a decided step has been taken in the long discussed subject of road improvement. The Canadian Institute has done wisely in determining to call a convention for this purpose. It will be practically impossible for a great convention of this nature to be held, at which there will be a great gathering of those who are most directly interested in road reform, without practical benefit arising therefrom. The province is undoubtedly ripe for such an undertaking. Good roads mean more prosperity to farmers than railways, if they could only be made to believe it; the system of farming has made such great advances that farming of to-day is quite different to what it was 20 years ago. If the farmer then could afford to wait for two or three weeks for sleighing or until the frost was out of the ground he cannot do so now. Under the provisions of the municipal drainage, ditches and water courses and many other acts of parliament, municipal improvements of greater or less extent can be effected by means of assessments spread over a period of years. A similar system no doubt can be made applicable to road improvement; the assessment will be so light compared to the advantages obtained from improved roads the ratepayer will not feel it. I hope soon to witness great progress being made in this direction.

PROGRESS.

QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require on lines consistent with the objects of the paper. Every effort will be made to furnish satisfactory answers to all such inquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

W. A. S., Tweed, Ont., writes: I understand that a person holding a School of Practical Science diploma in Architecture is required to serve under articles of apprenticeship for three years, under a member of the Association of Architects. Please let me know through the Question Department of your paper, the terms under which an apprentice serves. Has he to pay, or does he receive anything during his apprenticeship.

ANSWER.—The Ontario Association of Architects has made no rule as to money arrangements between apprentices and principals and we believe there is no rule in the practice of the members of the Association in the matter. The premium seems to be seldom if ever exacted. Some firms have no money consideration either way; some give a small salary, increasing each year.

PERSONAL.

Announcement is made of the intended marriage on the 15th of January, of Mr. Emile Dubé, a well-known contractor of Riviere du Loup, Quebec, to Miss Isabella Lemieux, of the same place.

In painting wood that has been long exposed to the weather, it is economical to add whiting to the oil paint for the first coat, and if the subsequent coats are of lead, or lead and zinc, the job will be thoroughly durable. About a quart of whiting paste to the gallon of oil paint will be about the proportion required, and as much more oil and turpentine may be added as may be necessary.

OTTAWA.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Attention is again being directed by the repairs now being made to the Geological Museum in this city, to the need of a new building which should be better adapted for the purpose. Efforts have been made on more than one occasion by the Royal Society as well as the civic authorities to induce the government to undertake the erection of a new building, but the great cost of a fire-proof structure such as would be required has deterred the government from moving in the matter. It is much to be regretted that the proposal made soon after the death of Sir John Macdonald to erect a building as a memorial to his memory and to serve as a National Museum and Art Gallery, was not carried into execution.

The new R. C. church of St. Joseph, an illustration of which appeared in the CANADIAN ARCHITECT AND BUILDER for October, was dedicated a fortnight ago. The building, which stands on the corner of Wilbrod and Cumberland streets, is constructed of stone, in the Romanesque style, and is surmounted by a lofty octagonal tower. The exterior, with the exception of the main entrances, which show some elaborate stone carving, is devoid of ornamentation. The interior, on the contrary is most elaborately decorated, as is the rule in Roman Catholic Church edifices. The cost of the building was in the neighborhood of $70,000. Mr. W. E. Doran, of Montreal, was the architect.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The statues of Wolfe and Montcalm designed by Hebert for the facade of the Parliament Buildings at Quebec, will shortly be placed in position.

Prof Harry Bamford, M. S. C., late of Victoria University, Manchester, England, has received the appointment of lecturer in the Engineering Department of McGill University, Montreal.

The sum of $11,391,69 has been received and an almost equal amount disbursed by the treasurer of the Maissonneuve Monument to be erected in this city. The work of canvassing for the additinnal $15,000 required is to be at once proceeded with. Mr. Hebert is the sculptor.

St. George's Anglican church on St. Joseph street, is about to celebrate its Jubilee. It is proposed to mark the occasion by the erection of a tower and additions necessary to complete the building at a cost of some $16,000. The church, which occupies a commanding position, is a good example of Gothic architecture. It was the third Anglican church erected in Montreal, the corner stone having been laid by Bishop Mountain on the 8th July, 1842.

In reply to an enquiry, the Hon. Mr. Nantel, Minister of Public Works, stated in the Quebec Legislature recently, that the total amount expended on the enlargement of the Montreal Court House, since 1887, was $649,946.25. This does not include a heavy bill for extras for which the contractor has brought suit. The opinion prevails that the work has been far more profitable for a few individuals than for the people who will have to provide the funds to meet the cost.

The first monthly meeting and dinner of the Province of Quebec Association of Architects was held on November 25rd. The dinner took place at the City Club and was followed by a meeting in the Association rooms. Mr. A. C. Hutchison gave a lecture, illustrated with lime-light views, on the Architecture of the World's Fair. There was a good attendance of members and students. The second dinner and meeting will take place on Thursday, the 14th inst., when there will be a discussion on the advisability of admitting honorary members, and on other subjects of interest to the Association. The students are invited to attend.

Your remarks concerning the necessity for ample provision being made by architects in their calculations for the increasing wind pressures to which apparently buildings in this country are to be subjected, prompts me to remark that in this locality at least, it would seem wise on the part of architects, in the light of recent experience, to make provision against earthquakes also. Solidity is a characteristic of most of our buildings, and to this no doubt is due the fact that so little damage resulted from the recent earth disturbances in this city. In the general alarm which seized upon all classes of our citizens this fact appears to have been overlooked, for there was an effort on the part of everybody to get into the open air.

The new addition, recently completed, to the Art Museum was formally opened by His Excellency, the Governor-General, a fortnight ago. The new building is designed to afford improved class rooms and an additional gallery for exhibition purposes. The Art Association of Montreal was organized in 1879, art classes being formed shortly afterwards. Besides the annual exhibitions there have been held sixteen loan exhibitions. There has also been accumulated a valuable permanent collection of paintings, the nucleus for which was donated by the late Mr. J. Tempest. In connection with the opening ceremony, the hope was expressed that something would be done for the development of art in conjunction with industrial education, in order that the knowledge of art might be employed for the purpose of beautifying manufactures. Mr. A. T. Taylor was the architect of the new building.

An interesting test was recently made at McGill University of the strength of a beam of British Columbia spruce furnished for the purpose by Messrs. T. J. and F. J. Claxton. The beam, which was 25 feet 5 inches in length, 8¾ inches in width, and 17½ inches in depth, was cut from a tree felled about 700 miles north of Victoria a year ago. It was subjected to a transverse test on supports 24 ft. apart on centres, the centre load being applied by increments of 500 lbs., and the deflection noted for each increase The beam failed under a maximum load of 38,250 lbs., and not, as is usual, by the rupture of the fibres on the tension side, but by the crippling of the side in compression. The skin stress developed was also unusually high, being a little over 6,000 lbs. per square inch, while the coefficient of elasticity was 1,670,000. The strength of the British Columbia spruce is, therefore, double that of ordinary spruce or pine.

It is somewhat difficult to understand the recent agitation for the removal from its present site of the Nelson monument in this city, in the light of the fact that the monument was erected by the joint efforts of the French and English residents of the city, the first steps being taken towards its erection at a social assembly at which the news of Nelson's death was announced. Seeing that both nationalities contributed to its erection, and that it has remained in its present position for so many years without objection of any kind being made, it must be assumed that the recent agitation was due to the articles of an inflammatory nature which were published in certain of the papers, and to this cause no doubt must also be attributed the action of the youths who were recently discovered in an attempt to destroy the monument by means of dynamite. The entire agitation has been frowned upon by the more influential class of citizens of both nationalities, whose desire is that the harmony which has prevailed to so large an extent in recent years should continue. While punishment should be meted out to the young men engaged in the attempt to destroy the monument, the fact will no doubt be borne in mind that the papers referred to were the real cause of the unfortunate occurrence, and the severity of their sentence mitigated accordingly.

WINNIPEG.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

If the large number of buildings erected here during the past season is any criterion, Winnipeg has seen the last of the depression which followed her unfortunate boom, and architects and builders may now look forward in pleasant anticipation of "seven years of plenty."

The spell of cold weather which we have been enjoying, or otherwise, during the last few days, has interfered somewhat with the completion of work started late in the season, and the proprietors and contractors interested are watching anxiously for the thaw foretold by the "oldest inhabitants."

A good sign of the times is the excellent business blocks that are being erected in the country towns of Manitoba and the North-West. In many cases the walls are built entirely of stone, or with stone foundation and brick superstructure, and in every case the ground floor is provided with plate glass windows, and would be no discredit to longer established communities.

Plans for the Wesley College which the Methodists propose to erect on Portage Avenue next year, are now being prepared, and the design promises a model educational building. It is to be of stone, four stories in height, and basement. The work throughout to be most substantial. The cost will be about $80,000. This building will add another monument to the energy and enterprise of the above denomination in this country.

The Bank of Ottawa is the most important building erected on Main street this year, and is a good substantial edifice, four stories high. The design might do for a local man, but when one considers that it was prepared by an architect of Toronto, the "Athens" of Ontario, it is certainly disappointing, for it was expected that this enterprising Bank would have provided for the edification of the western rustic a higher type of architecture than he has been accustomed to.

The result of the bye-election which has just taken place here, may materially affect the building trades, and assist the prosperity of Winnipeg. If Mr. Martin, our newly elected member, is successful in persuading the Dominion Government to remove the rapids in the Red River so that firewood, lumber, stone, etc., may be brought here by water from Lake Winnipeg, thus lessening the expense of building by supplying the principal materials used, at a reduced cost. This matter has been under the consideration of the Dominion Government for years, and though fully convinced of its importance, they have allowed procrastination to reign supreme, and like Felix, of old, put off for a more convenient season.

The architecture of Winnipeg is now in a transition state, and the wood, brick veneer and galvanized iron age, is passing away, and is being succeeded by the stone, brick and copper age. In former years the buildings here, with few exceptions, were entirely frame, or frame and brick veneer, with wood sills for foundations resting on the sod, or supported on wood posts or piles; but the public are beginning to realize that it is poor economy not to build for the future as well as for the present, and while they cannot afford to immortalize themselves in blocks of marble, they can build in a substantial and durable manner, with less costly materials, which will not only give them a permanent investment, but will add materially to their comfort, especially during our winter months.

The school board is just completing two very fine 8 room school buildings, one in the south end of the city, and the other in the north end. They are constructed of stone and brick, two stories high with basement, and large hall in roof, which is well lighted by a large skylight. The school board is composed of some of the best men of the city, and deserve credit for the wisdom and forethought they have displayed in the performance of their duties as School Trustees, in purchasing, when increase of population demands more school accommodation, large blocks of land in desirable locations, which will give for all time ample play grounds for the children, and breathing places for the public when the city becomes closely built. On these sites are erected substantial buildings, planned and furnished after the most improved types, and to meet the advanced ideas of the present day.

Among the many legacies inherited from the boom is the saying "good enough," which is frequently made use of by workmen, when their work is objected to. They learned it in the days when houses were rushed up in a week, and the motto was to build honestly if you can, but build, and when a load of timber would be followed to the site of a proposed dwelling by parties anxious to rent or buy in order to secure a dwelling place. The result of the above, and of contractors taking work too cheap, is that to-day an architect has to be very watchful of his buildings in progress in order to obtain a fairly satisfactory job. However, the workmanship is improving and the materials are of a better quality than formerly, for the public are growing more fastidious and require a higher class of work. If contractors would refrain from taking work too low in order to obtain a job, and insist on receiving a proper price, so that there would be no necessity for them to scamp their work in order to obtain a profit, the architect's lot would not be such an unhappy one.

PERSONAL.

Fowler & Bowe, architects, Montreal, have dissolved partnership.

Mr. A. L. Hushands, Architect and Civil Engineer, of Conkshire, Que., has recently been elected a member of the Canadian Society of Civil Engineers.

Ald. J. C. Waine, a prominent builder and contractor, of Sydney, New South Wales, accompanied by his wife, spent a short time in Toronto recently, en route to the World's Fair.

In a recent issue of the *Australasian Builder and Contractors' News*, appears the following:—Mr. W. H. Wheeler, late-Assistant Hon. Secretary of the Architectural and Engineering Association of Victoria, and winner of last year's Prize for the best Design for a Mechanics' Institute to cost £8,000, offered by the Royal Victorian Institute of Architects in connection with the Classes of the above-named Association, sailed on Thursday by the new Canadian liner, Warrimoo, for Vancouver, British Columbia. Mr. Wheeler has been residing for some months in Sidney and its vicinity; but with so great a dearth of architectural-business in that city, as in every other portion of these colonies, he has wisely decided to seek "fresh fields and pastures new" in the great northern Dominion, where we trust his undoubted abilities and steady industry will find employment. Mr. Wheeler carries with him the good wishes of his many old friends in Melbourne, and of not a few, more recently made, in Sydney.

CONTEMPORARY ARCHITECTURE.*

In a previous portion of this address I defended—I hope, in your judgment, successfully—the works of contemporary architects from the reproach of want of originality. It does not, however, follow that the perception of the beautiful displayed in such works is commensurate with the originality of their design. I have, indeed, on a previous occasion recorded my conviction that the craze for novelty in the present day—not alone in art—is excessive, and not infrequently results in the grotesque. Is novelty the goal of our attainment? Is it not rather Beauty? When the Greeks produced what is the purest form of art, so far as we know, that the world has seen, it was not the outcome of a rage for novelty, but of the effort to crystallize in a beautiful form the requirements and conditions of life. It was in the days of their decadence that an intelligent observer recorded of them that "they spent their time in nothing else but either to tell or to hear some new thing." Can it be that such decadence is overtaking us? Judging by some modern works, their authors might not inappropriately be referred to in terms similar to those applied to the late Athenians; for their desire appears to have been, not so much to produce what is beautiful, as to evolve "some new thing." A column was originally designed to support the superincumbent weight known as the entablature, and in such juxtaposition is dignified and consistent; but divorced from such relationship, and applied to the face of a building with nothing to support, it is degraded to the position of an incongruous feature of ornamentation. An Order, again, is composed of certain parts, which, in the relationship they were designed to occupy, produce admittedly proportions that are dignified and beautiful; but when applied—one can scarcely say designed—in a ridiculously attenuated form, with parts misplaced or omitted, the result is grotesque. The conglomeration of familiar forms and features, divorced from the conditions they were designed to fulfil, and thrown together regardless, apparently, of any consideration but the attainment of novelty, produces the incongruous and silly effect that might have been foreseen. Yet by critics who ought to know better this sort of architectural quackery is lauded as original design, and its authors are praised as men of exceptional ability. Whatever it may be, it is certainly not the original work in the true sense of the words, but the parody that passes muster for it with the ignorant. The impress of original power is stamped on features not necessarily new, and imparts to them distinctive life and character, instead of rendering them ridiculous by divorcing them from their proper purpose. Contrast with such grotesque productions the works of the late Sir Charles Barry, and tell me in which you find the truer originality or the purer taste. In Barry's classical work there are dignity, repose, proportion, ample undisturbed wall-space, every feature and moulding adapted to its position, and in all the stamp of individuality without any appearance of straining after novelty. In the hotch-potch work I refer to, there is neither dignity nor repose; features and mouldings are indiscriminately applied, instead of being designed as inherent elements in the composition; and the deplorable absence of purity is in no way compensated by fulsome profusion of ornamentation. This practice of covering every bit of wall-space with ornamentation, composed of details pretty and original in design, but applicable, from their petty scale, to cabinet-work and not to buildings, is the curse of our modern street architecture, and demonstrates an absence of grasp and appreciation of breadth which it is sometimes painful to observe. In walks about London one longs to apply the scalping-knife in stripping off meretricious ornament, in order that the eye may find repose on some bit of undisturbed and undisfigured wall-space.

It is not often I have found myself in sympathy with the utterances of the venerable statesman who now occupies the position of Prime Minister, and it is consequently agreeable to be able to concur in views which he expressed a few months since when speaking of Industry and Art. "There is a circumstance in architecture," Mr. Gladstone said, "which terrifies me, and that is the tendency which appears to prevail in modern domestic architecture. I am speaking of their exteriors, and I refer to their redundant ornamentation. There are a great number of new buildings in London with regard to which, if you look at them, you will find that the architect had either a horror or a dread of leaving bare a single square foot of wall, as if there were something indecent in leaving bare a square foot of wall. . . . . Excess of ornamentation is, of all things, the most hostile to a due appreciation of proportion, because it is in proportion to the preception of breadth and beauty and line, and in the adjustment of lines to one another that the essence of the art lies, and in that you will find the hope of attaining high excellence in great works." Not in great works only, I would add, but in all works, great or small.

But while I deplore this meretricious tendency for redundant ornamentation, and while I decry the craze for oöelty, which together are responsible for disfiguring many of our modern domestic buildings, I yet desire to record my conviction that there is much that is hopeful and promising in contemporary architecture. Even the rage for educing some new things, exaggerated as it is, demonstrates that men prefer to think for themselves rather than to reproduce the works of others. If only the remarkable ability which is displayed in the designs of many recent buildings were directed less to the production of novelty and more to the study of proportion, less to the elaboration of ornament and more to the aspiration for simplicity; if only architects were to lead the taste of the day by impregnating their designs with "the perception of breadth and beauty and line," instead of pandering to the false and meretricious taste of a luxurious age; we should be able to congratulate ourselves—and perhaps at no distant date—on having reached the attainment of an architecture, pure, simple, dignified, and beautiful.

*From the annual address of the President of the Royal Institute of British Architects.

PEMBROKE WATER WORKS.

On November 22nd, 23rd and 24th, the system of waterworks at Pembroke, which has been under construction during this year, was tested by the Chief Engineer, Willis Chipman, of Toronto.

All the water is taken from Lake Allumette through an intake pipe half a mile in length and pumped by Duplex pumps to a Water Tower placed at such elevation as to give an efficient fire service over the business portion of the town. If a serious fire should occur in any of the high residential portions, a check valve at the Tower can be closed from the pump house by an electric switch.

The system consists of about 5 miles of piping with 52 fire hydrants, and the cost will be about $50,000. The pump-house is a very neat structure.

ROOF AND ROOF COVERING.

In actual execution the roof, of course, precedes the roof covering; but in working out the design it is frequently the covering which decides the shape of the roof. When once settled, it fixes at least the lower limit for the pitch, and it may even have an influence on the question of hips or gables. In olden times this influence was marked. In many districts hip tiles were scarcely to be had; lead hips were too costly for common use, and hips made up with slates and mortar were both unsightly and insecure. This difficulty has long since vanished. Facilities for transit are, from one point of view, even too great. Materials can be so readily taken from place to place that local peculiarities in building are tending to die out. The country and one might almost say the world, is getting too much alike all over it, and amongst other things we now find tile hips and ridges everywhere. They have, however, usefulness at least to recommend them. They supply a practical want; but this is more than can be said of all the materials which are nowadays becoming fashionable in localities to which they do not belong. Travelling has become easy; but when all places becomes pretty much alike, what will there be to travel for? It is time that all architects set themselves, as some have done, to fight against this impending uniformity, and it is worth noting how many roofing materials, and how many ways of using those materials, may still be found within the boundaries of England alone.—*Manufacturer and Builder.*

THE VALUE OF TECHNICAL EDUCATION TO ARTISANS IN THE BUILDING TRADES.*

If there be room for difference of opinion in regard to the value of technical education in other industries, there can scarcely be any in regard to this. Undoubtedly of late years, and in the colonies especially, the standard of quality in building work is much lower than that of thirty years ago in the Old Country—the difference being very noticeable to those who come fresh to it from Europe. The reasons for this are several. No doubt the rough and ready style of work in pioneer days, however necessary and valuable in its day, set, quite naturally, a low standard which it has been difficult to raise above. The influence of adventurers and speculators (a race not unknown in Australia) has had also a prejudical effect on the quality of work, and further, the relative expensiveness of labor in comparison with the cost of material has made cheapness of production the end aimed at, rather than quality of product. It will be admitted, I think, that the building trade is second to none in importance. Not only are the numbers of workmen very large, and all trades of an honorable and manly type, but, unlike the cotton-spinner of Manchester, or the cutler of Sheffield, the building artisan finds his trade wherever human beings congregate. He is limited by no locality, or time, or climate. If technical education, as applied to these trades, had no further effect than the raising of their intelligence and status, it would be a powerful factor in the well-being of the community. But apart from the number of artisans directly interested, the welfare of the community is largely bound up with that of the building trade. Next to the supply of food and water, I suppose the provision of healthy, comfortable, well-built houses takes a first place. We all need shelter, and the importance of the kind of dwellings we occupy is evident to all. As for the moral effect on a community it is not easy to estimate the strength of the sentiment which fills the breast of the true born Briton, whose house is his castle (in spite of it being sometimes "in pawn") and to whom the roof and the hearth are still the types (next to the marriage tie) of security, content and permanence.

An experience of over twenty years of active practice as an architect, and the conduct of large classes in technical subjects, bringing me into close touch with some hundreds of young artisans engaged in the various trades, have strongly impressed me with the sense of the value of technical education to the trades in question. I believe it to be the universal experience of architects that an all-round intelligent workman is the exception. A man who can read a plan with readiness, grasp general instruction, and enter fully into the meaning and spirit of a design is rarely to be found. Such a simple elementary work of construction as a king-post truss is seldom understood, and in problems of setting out work, and so on, the most obsolete of rule-of-thumb methods which a knowledge of elementary geometry could suggest. What frequent complaints are made of the ignoring of any necessity for an abutment to resist the thrust of a flat arch, the broken curves of plaster work, the defective construction which manifests itself in huge settlements and cracks, the inability to avoid or detect or remedy most painful blunders in design, decoration and workmanship. How often may one see in local Exhibitions and the like some piece of work designed and executed by an intelligent artisan—a work reflecting credit on a man's industry—and that is all. Yet he will stand by it with a glow of satisfaction on his honest face, amid an admiring group of his friends and neighbors. It may be a dovecot having a flimsy front in ½ in. pine, in imitation of the facade of Milan Cathedral, or an aviary of similar construction with Roman pilasters, Early English arches, and a Greek pediment, with Egyptian ornament and pinnacles of 15th Century French Gothic. Turning then to the specific advantages which technical education should render to artisans, undoubtedly the art of drawing takes a first place. There is no branch of industry in which the ability to use the pencil with freedom is not of great value, and the helpless manner in which the ordinary workman attempts to express his ideas by drawing is notorious. Drawing is a splendid education of both eye and hand; the young student is taught to draw out and improve the natural powers of his hand before it has become stiff and flexible and habituated by custom to certain set motions. It trains both the eye and the hand to be more efficient instruments of the mind, and is an excellent discipline for the mind itself. I would rather have every young artisan instructed in the use of scales, the art of reading a plan with readiness, the practice of projection, and obtain such a general insight into the art of building construction that all branches of the trades may be seen in their true relation with each other. He should also have some teaching in the art of physical science—some real knowledge, however limited in extent, of the ordinary laws of nature—useful not only for the grasp of facts but as a training in the scientific spirit and way of looking at things.

Passing, now, to the various trades, let me briefly enumerate some of the salient points in which a knowledge of the principles of Art and Science will be of direct value to the workman. Take first the mason, a man who, in my opinion, is second to none in intelligence and ability. The geological history of the stones which he has to work will guide him in selecting, working and setting of them. Geometry is required to set out his working lines and moulds and patterns, and a knowledge of the laws of mechanics and of general design will also be of service. The bricklayer will find a knowledge of applied mechanics and statics of great advantage; also such a knowledge of chemistry as will guide him in the use of limes and cements, the proportions of motar, concretes, &c. Geometry will of course be of service in setting out his work, though this is generally done by the carpenter—a usage which has tended, I fear, to render the bricklayer less interested in such matters than is for his advantage as an intelligent artisan. The carpenter requires such a knowledge of the proportions of timber that he may select and wisely use them. Geometry, projection, the nature of strains and stresses, and the nature, application, and characteristics of building materials, are as serviceable to him as to any workman on the building. The plumber should have an acquaintance with chemistry and metallurgy, the properties of solids, liquids and gases, and metals and alloys, construction of joints, principles of traps and other sanitary details and general principles of sanitation. The plasterer needs a similar knowledge of chemistry of limes and cements as is found useful to the bricklayer. He needs further a training in practical geometry, in modelling and the principles of Classic and Gothic ornament, in addition to the power of sketching, which all artisans require. The smith and founder should be well grounded in metallurgy, statics and applied mechanics, mechanical drawing and elementary geometry.

The slater, in the work of ordinary plain slating, works mechanically, and only needs a knowledge of geometry in the event of carrying out elaborate patterns. The painter and glazier requires a scientific acquaintance with the materials he uses, some knowledge of geometry and the laws of the color, as well as a training in decorative design and principles of Art.

I can understand the question arising, why has the technical education of the past twenty-five years effected so little improvement in the personnel and work of the artisan? There are, I believe, several reasons for the slow progress which has been made. In the first instance, primary education in the Old Country twenty-five years ago was very different from that which is now equipping the young for the battle of life. Technical instructors were also men who very largely needed themselves to be trained—a band of efficient teachers could scarcely be expected to spring from the earth with full equipment. A heavy mass of inertness had also to be set moving, and the beginnings were necessarily slow, difficult and tentative in their nature. I think further, that it must be admitted that the instructors were generally of the wrong class—as a rule, they were free-hand drawing masters, excellent men in their way, but with only just sufficient knowledge of technical branches of study to pass examinations for which they were required to coach their students, and with practically no acquaintance with trades and callings for which the students were being trained. The methods of teaching were, in consequence, often defective and the aims also were by no means above reproach. The tendency at any rate was to draw students away from their handicrafts to become draughtsmen. The temptation for young artisans to do this is unfortunately very strong, and when in the actual training of a man his handicraft was ignored it materially resulted in spoiling many a good mechanic and added to that large and shiftless body, the army of ill-equipped draughtsmen, architects and engineers. Admitting all this, however, I maintain that much has been done by technical education to maintain the status of the workman and, if not to improve, to arrest the decline in the standard of work. Dealing now with a matter within my own knowledge, I can point to young men who, having received a training in the principles of Art and Science affecting their trades, are of distinctly greater value to their employers, have risen to the position of foremen and overseers, and have a better prospect of permanent employment when work is scarce. It must be conceded that technical education is not a failure, when it imparts such a stimulus to young men that they desire to enter callings where manual skill, combined with dexterity and trained intelligence and eye, are essential conditions of success. It does excellent work if it helps beginners in life to take part in some work requiring special skill, instead of drifting into that vague profession of clerkship, which is too often taken to because a youth has no training or talent that would fit him for the more honorable calling of a producer.

Chrome green is made from a precipitate of chrome yellow mixed with a precipitate of Prussian blue.

CLAY EMBANKMENTS.—The support of embankments, where clay forms a considerable part of the material, is a kind of mystery to the unskilled owner and builder of such embankments. In Marine Country, opposite the city, for example, there are clay strata all over the slopes, and slides thus caused can be seen on every hand, so the conclusion is that clay will not stand as an embankment unless held by bulkheads of masonry or wood. The fact is, however, that clay stands very well at an angle of 45 degrees, or 1 to 1, if saturated. It is all a question of water. No other material is so much affected by saturation. It is at the same time the best and worst material for an embankment. A range of 16 to 45 degrees between drained and undrained embankments is phenomenal. Clay embankments require drains to be placed at frequent intervals, and should have laths of wood, straw or other substance laid in, to form leading channels or perforations connecting to the drains.—*Industry.*

* Abstract of paper presented to the Australian Association for the Advancement of Science by Mr. Hillson Beasley, A. R. I. B. A., Lecturer on Architecture at the Working Men's College, Melbourne, &c., &c.

CANADIAN LIME FOR THE AMERICAN MARKET.

THE report comes from Boston that a syndicate of American capitalists, among whom is Mr. Frank Jones, who is interested in kilns at Sherbrooke, Que., is about to purchase the lime-kilns of Bras d'Or, on the island of Cape Breton, Nova Scotia, and at St. John, N. B. This action is to be taken in view of the probable reduction of the duty on lime under the amended American tariff.

The Boston despatch referring to this matter says that it is believed that under a low rate of duty a very large market for Canadian lime would be found in the New England States. Before the McKinley bill went into effect Canadian lime was admitted under a trifling tariff of about three cents a barrel. It overran the market in Boston, and practically had control of the trade. Despite the fact that Bras d'Or lime is not of as good a quality as Rockland lime, the difference in price incident upon the low tariff and the cheaper labor of Canada compelled the builders to use this lime. The McKinley bill put a duty of about 13 cents a barrel on Canadian lime and this had the effect of evening up the prices. The new tariff bill practically puts Canadian lime back to where it was. It is quite probable that again the builders will have to take notice of the big difference in price and fall back to the use of Canadian lime. Though wages are higher in Maine than in Canada, under a tariff the price of lime has actually fallen, so that it is selling cheaper now than at any other time in its history.

WIND PRESSURE.*

A paper on the above subject was read at the recent meeting of the Australian Association for the Advancement of Science, at Adelaide, by Professor Kernot, of the Melbourne University. The paper, which was of considerable length, commenced by referring to the great inconsistencies appearing in engineering and architectural practice, with regard to wind bracing of chimneys, roofs, bridges, etc., and to the great variation in the anemometric results given by the meteorological observatories; some observatories, such as Bidstone, near Liverpool (England) and Sydney recording pressures, or velocities corresponding to pressures of 90 lbs. or 100 lbs. per square foot, while others, such as Greenwich and Edinburgh, Melbourne and Adeliade, give results only one-third as great; and it was pointed out that these latter results correspond fairly well with usual experience with railway carriages and chimneys, great numbers of which would overturn with pressures of not more than 30 lbs. per square foot, and yet as a matter of fact do not overturn, and are regarded by the public as perfectly safe. Reference was next made to the experiments tried by Sir B. Baker at the Forth Bridge, which showed that the average pressure on surfaces as large as railway carriages, houses or bridges, never exceeded two-thirds of that upon small surfaces of one or two square feet such as have been used at observatories, and also that an inertia effect which is frequently overlooked may cause some forms of anemometer to give false results enormously exceeding the correct indication. The very elaborate experiments of Mr. O. T. Crosby, detailed in *Engineering* of 13th June, 1890, were next dealt with. These experiments showed that the pressure varied directly as the velocity, whereas all the early investigators, from the time of Smeaton onwards, made it vary as the square of the velocity. Experiments made by the author of the paper, at speeds varying from 2 to 15 miles per hour, were described, which agreed with the earlier authorities, and tended to negative Crosby's results. It was pointed out, however, that further tests on a greatly extended range of velocities were needed. The paper next described an apparatus devised by the author for determining the relative pressure of the wind on flat plates, cubes, cylinders, spheres and other geometrical forms. This apparatus consists of a screw propeller similar to that used on steamers, 28 inches diameter and 48 inches pitch on a 30-inch tube. This propeller is caused to revolve at speeds varying from 400 to 800 revolutions per minute by means of a gas engine. The helical currents of air proceeding from the propeller are gathered up and discharged in one approximately steady jet of 12 inches by 10 inches section, by means of a radial diaphragm and a conical mouthpiece, having its axis tangential to the helical direction of the air. In front of this jet was placed the object to be tested, supported upon a very delicately made carriage running on an accurately levelled surface plate, the force exerted being measured by a delicate spring balance, the accuracy of which has been verified by means of standard weights. A large number of experiments were made with this apparatus, and many interesting and valuable facts elucidated. The ratio existing between the normal pressure on a sloping surface, such as a roof, and that upon a vertical plane was found to agree with the table given in Stoney on Stresses, p. 524; but it was found that this result applied only to roofs supported on thin columns under which the wind could blow freely. When the roof was placed upon a wall, as in an ordinary building, the wall deflected the current of air upwards, and greatly reduced the pressure on the roof. If the wall was provided with a parapet of ordinary proportions this effect was still more marked, the pressure being reduced to one third of what it would otherwise have been. In the case of a roof of 30 deg. pitch the pressure was actually reversed the roof having a slight tendency to lift. In these experiments the parapet was made only one-sixth the height of the roof measured from the level of the eaves to the ridge. Experiments were also tried as to the effect of a wind blowing in at the open end of a building having the sides and other end completely closed, and it was found that the internal pressure tending to lift the roof was equal to the pressure of the wind on a flat vertical surface. The pressure upon one side of a cube, or of a block proportioned like an ordinary carriage, was found to be ·9 of that upon a thin plate of the same area. The same result was obtained for a square tower. If the cube or tower was placed so that the wind blew in the direction of a diagonal, the total pressure was just the same as when one side was presented. A square pyramid whose height was three times its base and which represented a common form of church spire experienced ·8 of the pressure upon a thin plate equal to one of its sides, but if an angle was turned to the wind the pressure was increased by fully 20 per cent., a curious contrast to the action on a cube or square tower. A bridge consisting of two plate girders connected by a deck at the top was found to experience ·9 of the pressure on a thin plate equal in size to one girder, when the distance between the girders was equal to their depth, and this was increased by one-fifth when the distance between the girders was double the depth. A lattice work in which the area of the openings was 55 per cent. of the whole area experienced a pressure of 80 per cent. of that upon a plate of the same area. The pressure upon cylinders and cones was proved to be equal to half that upon the diametral planes, and that upon an octagonal prism to be 20 per cent. greater than upon the circumscribing cylinder. A sphere was subject to a pressure of ·36 of that upon a thin circular plate of equal diameter. A hemispherical cup gave the same result as the sphere; when its convexity was turned to the wind the pressure was 1·15 of that on a flat plate of equal diameter. When a plain surface parallel to the direction of the wind was brought nearly into contact with a cylinder or sphere, the pressure on the latter bodies was augmented by about 20 per cent., owing to the lateral escape of the air being checked. Thus it is possible for the security of a tower or chimney to be impaired by the erection of a building nearly touching it on one side. A number of interesting experiments were made upon the shelter which one surface affords to another. This shelter was found to extend in front to a distance about equal to the breadth of the sheltering surface, and behind to several times that distance. For example, a 9-inch disc being used as the sheltering surface, and a 6-inch disc being placed two inches in front of it, the latter received only two thirds of the pressure it endured if the larger disc was removed, and this reduction in pressure was perceptible, though to a less extent, at all distances up to 9-inches. Behind flat surfaces eddies were found to exist, which caused other surfaces placed behind to be urged forward with considerable force. For example, a 7-inch disc placed behind a 6-inch disc, and 4 inches from it was urged forward with one fifth of the pressure with which it was urged backward when the 9-inch disc was removed. In conclusion it was recommended that 20 lb. per square foot be taken as the maximum wind pressure upon areas of not less than 300 square feet, and 30 lb. for smaller areas in positions of full exposure in the southern and south-eastern parts of Australia; that in more or less sheltered positions these values might be reduced according to judgment, the minimum for extremely sheltered positions being taken as one half the above figures; that the pressure on chimneys, towers, spires, roofs, and other objects be deduced from those on thin plates of equal area by means of the results previously given; and that a factor of safety of two for cases of simple stability, and three where the question is one of strength should be employed.

* Abridgement of paper by Prof. Kernot, Professor of Engineering at the Melbourne University, and published in the *Australasian Builder and Contractors' News.*

PUBLICATIONS.

The R. I. B. A. Kalendar for 1893-94, containing as usual some 300 pages of information concerning the Royal Institute of British Architects, is received.

A SPLENDID CEMENT FOR CELLAR FLOORS.—Numerous methods for making cement floors have been presented; among them the following is said to be the most desirable, producing the best results: Take of coarse gravel or broken stone and sand, 4 parts, and 1 part each of lime and cement. Mix in a shallow box, shovelling over, from end to end, till thoroughly mixed. The sand, gravel and cement, are mixed together dry. The lime is slaked separately and mixed, with just enough mortar to cement it well together. Six or eight inches of the mixture is then put on the bottom, and when well set, another coating put on, consisting of 1 part of cement and 2 of sand. The same process will serve for building a cistern where no brick is intended to be used in bottom or side walls. A cement of 1 part sand, 2 parts ashes and 3 parts clay, mixed with linseed oil, spread over a base of concrete just described, makes a surface very hard and durable and smooth, and said to resist the weather, almost, if not quite as well, as marble.

SANITATION AND HEATING

SCHEMING CONTRACTORS.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—As manufacturers of heating apparatus in Canada, we have found for some time past that a considerable difference exists between many contractors throughout the country in the figures that are given for installation of heating plant. We have frequently given the subject considerable thought and have tried to ascertain how it was that such a difference existed between tenders when the architect's specifications stated in detail exactly what quantity of surface was required, and the class of work that was to be done. During the past year in working very quietly to get at the bottom of the matter, we have found that much blame must be laid at the door of the architects, inasmuch as they call for certain goods in their specifications, ask for the work to be done upon a certain line, and then allow the contractors to skimp the work and put in only 75 feet of radiation where 100 feet was originally specified, and the result of this is that Jones who figured on a certain job at $1,000 is left out in the cold because Smith takes the same contract for $750.

We have before our notice to-day a case in which a steam job has been figured on. The architect's specification was handed out to the contractors A and B. A figures on the job and specifies 1724 square feet of radiating surface, and B 1256 square feet of radiating surface. Still the architect lets the contract to B who is short 468 feet of surface on a small job, and A loses the contract feeling that his friend B buys goods considerably less than he does.

We think that it is nearly time that the architects of this Dominion should insist upon the proper quantity of heating surface being put in buildings; as there are to-day in our estimation a very great number of heating engineers who skimp their work at every opportunity. We could give volumes of reports of work of this kind that has come before our notice, but think that this may be sufficient to direct the attention of architects to the practice and bring about more equitable conditions in the heating trade.

"ZERO."

A METHOD OF CELLAR VENTILATION.

A plan by which a cellar may be thoroughly ventilated has recently been worked out by a heating engineer in an American city. The design was made for a billiard saloon in a large cellar situated beneath a restaurant. In this scheme air is taken in through areas in the rear of the cellar, and is to be forced through galvanized iron ducts extending entirely around the bottom of the basement room under a row of chairs provided for spectators, which are ranged round the apartment.

The lower part of this duct—that is to say, that part which lies on the floor of the basement—is provided with openings that deliver the air forced in through corresponding openings through the floor into the cellar below, where, in winter, it is moderately warmed by passing it through box coils, whence it passes through distributing ducts arranged under the floor to numerous registers, arranged around the room, and opening just above the platform for chairs that entirely conceal the main duct. The plenum is obtained by the use of a blower driven by a gas engine placed in the cellar below; but this may possibly be supplanted by an electric engine when the instalment is erected.

SHAVINGS.

New buildings to the value of $140,000 were erected during the past year at Regina, N. W. T.

Much regret is expressed at the failure of Mr. Samuel Swanton, who has been in business in Toronto as a contractor for a quarter of a century.

Among the new books recently added to the Toronto Public Library collection, is one by W. A. S. Benson, on "Elements of Handicraft and Design."

The Manchester ship canal is to be opened for traffic on the first of the New Year, and it is said that a Nova Scotia vessel laden with lumber will be the first to pass through.

One of the oldest and most handsome houses in the city of St. John, N. B., erected on Waterloo street by the late Mr. Carvell in 1864, at a cost of $45,000, was totally destroyed by fire a fortnight ago.

In a recent test case, the validity of the by-law passed by the City Council of Toronto making it compulsory on contractors for city works to pay their employees a minimum wage of 15 cents per hour, was upheld.

The jubilee of the erection on John street, Toronto, of St. George's Church, was celebrated a few days ago, on which occasion there were exhibited the church seal, the original subscription book, a manuscript history of the church, and the silver trowel used by Bishop Strachan in consecrating the church on the 19th of August, 1844.

The General Hospital Board of the City of Kingston has accepted at the hands of Archbishop Cleary, a statue in memory of the Irish emigrants who died at Kingston during the plague of 1847. The statue, which represents a life size figure of an angel, was cut in Italy from Carrara marble. The pedestal will be of Sutherland Falls marble.

DECORATION AND FURNITURE

THE SELECTION OF WALL PAPER.

IN the selection of wall paper the first thing to be taken into consideration is, of course, the purpose for which the papered room is to be used. The selection of paper in that regard depends says *Painting and Decorating*, mainly on the taste of the buyer. But there is another consideration which does not altogether depend on taste, but has to follow certain rules and laws, and this is the amount of light which a room receives. With a room which receives only a moderate amount of light it will be necessary to paper the walls with a light wallpaper, while a room which receives a strong light should be papered the reverse. The next thing to be taken into consideration is the combination of colors, when all the doors of the connecting apartments are opened. It is a main point to have such a combination of different wallpapers, that a whole line of rooms make a harmonious and artistic appearance. The following will make pleasing combinations: Brown-red and olive green, red and green, blue and grey or brown, violet and yellow, but poor and displeasing effects will result if such combinations are used as yellow next to green, violet next to blue, or green next to blue. The same law applies to the selection of furniture stuff, and also in curtains and hangings. Harmony in form and color should not only rule in the single apartment, but the different rooms should form an artistic combination, and this can be effected even with the plainest of furnishing.

Now, it is too frequently a fact, and one which practical paperhangers and decorators will sustain, that in many of the finest houses, where, in regard to furniture and other decorations, the greatest luxury is to be found, hardly any attention is paid to an artistic and harmonious papering and decorating of the walls. There is missing the interest and right understanding of the decorative art. Therefore it is best to employ an experienced decorator and paperhanger and trust to his ability and integrity, until one is enabled through study of decorations and the decorative art to make all needed arrangements personally. It must never be forgotten that it is mainly through the decorations of the walls that the room derives its particular character, be this harmonious, enlivening, sombre or peaceful. It is through the decorations of the walls that the visitor is enabled to form an opinion as to the good or bad taste of the owner.

WROUGHT IRON WORK.

SPEAKING of art work in wrought iron the *Trefoil* remarks: Wrought iron for every purpose is now becoming very popular. It is used for grilles over the door, in the vestibule, for railings and balconies, etc., and wherever found seems to carry with it a recommendation of its own appropriateness.

The dull and yet lustrous color given to iron by the Bower-Barff process is peculiarly quiet and effective, and harmonizes particularly well with both wood and stone.

That the iron is practically rustless, and does not have to be cleaned with that scrupulous and constant care that brass work requires, recommends its use the more, while the artistic merit of grilles now made speaks highly for the taste of the market that requires such work, and stand in strange contrast to the barren lack of even an attempt at any effect whatever in the cast iron models of the past.

The annual Exhibition of the Toronto Art Students' League will open on the 18th inst., and continue until the 23rd inst., in the League rooms, Imperial Bank Building. A souvenir calendar containing poems by Canadian writers and illustrated by members of the League, is to be issued as was done last year.

Mr. Sandford Fleming, C.M.G., is endeavoring to bring about the establishment of a National Gallery of Historic Pictures, and has offered to subscribe a liberal amount annually for ten years for this object, provided there is the prospect that by similar contributions the sum required can be raised within that period.

Mr. Joseph Powell, architect, of Hamilton, is being mentioned as likely to be chosen as a candidate in the approaching election in Haldimand to represent the McCarthy party.

The report of a novel incident comes to us from Ridgeway, Ont. A resident of that town, Mr. Andrew Benner, recently purchased a farm in the locality, and proceeded to make alterations and repairs in the old farm house. Instead of handing the work over to a contractor, he engaged carpenters and acted in the capacity of superintendent of works. While thus engaged he discovered securely hidden away behind the plaster, two well filled canvas bags, containing some $7,000 in gold. The existence of this large amount of money in such an unexpected place is accounted for by the fact that a former owner of the house had thus secreted his wealth with the purpose of keeping it out of the hands of a spendthrift son, and being one day suddenly stricken with appoplexy, passed away without making known the location of the money. Since then the farm is said to have passed through the hands of several owners before being purchased by Mr. Benner, the lucky discoverer of the money.

THE ART OF SUCCESSFUL ADVERTISING.

By ERNEST H. HEINRICHS.

Advertising has become generally recognized as a necessary and important adjunct to every business, trade, profession and mercantile or commercial enterprise. The cobbler advertises his handiwork on the window-ledge; the grocer puts his best stock of vegetables on the sidewalk; the clothier, the dry-goods man and the furniture dealer fill the pages of the newspapers; the actor seeks to attract the attention of the public in flaming posters, and the manufacturer advertises his specialties in the trade papers and magazines. The time worn axiom that good goods do not need advertising is now relegated into the deepest recesses of the business man's vault containing memories of the past, and is brought out only to serve as a dampener upon a two persevering advertising solicitor. In this age of keen competition, it is not likely that any man will have a purchaser for his goods simply because they have the characteristic of excellence. He must promulgate their distinctive advantages or their superiority.

To do this successfully, he must advertise. There are as many ways of advertising as there are roads leading to Rome, and the question is how to find the right one.

To the writer it seems that the first point to be considered is, how much money will the capital of the business to be advertised permit to be used for this purpose? This point, once disposed of, will immediately suggest another one,—how may this sum be expended to the best advantage, or, how can the business be advertised most effectually with this stipulated sum.

The thorough sturdy of these points is of the utmost importance. There must be method pursued in the manner of advertising, if it is to be profitable, else there will be absolute failure. One who decides to embark in any enterprise invariably makes it his first business to find out how much it will cost him to make a start. The same principle applies to advertising. It is a business in itself, the management of which requires the greatest care and attention.

Some people say that they give the papers an advertisement occasionally just to get on the good side of them; others, that they give some man from the papers an advertisement, because he is a "jolly, good fellow." In fact, one gentleman remarked to the writer some time ago that "there is a good deal of sentiment connected with advertising!" Now there is much truth in what this gentleman said, and more is the pity. It is this kind of advertising which is dangerous, inasmuch as it reflects upon advertising as a legitimate business, because it deteriorates to a form of bribery, and it disheartens as well as disgusts both the reputable publisher and the honest advertiser.

Having decided how much money may be spent in advertising, the next question is, how and where is it to be done? To settle this question is very difficult, for the reason that the mediums for advertising are legion. Many old advertisers believe that advertising by circular letter affords the surest and best way to reach a customer. They argue that if they send out a stamped envelope with a type-written page or two of matter inside, the recipient will surely read these pages. Then there are others, who are not particular about having the matter even type-written; they are satisfied to get up an elegant advertisement, have a printer strike off as many copies as they have customers on their books, and then they send these circulars to their customers. Again, there are those who now and again get up a catalogue, in which are set forth descriptions in general and in detail of everything they sell, and they send these catalogues wherever they hope to catch a probable purchaser. Then there are firms who rely entirely upon their agents and representatives to advertise their goods by word of mouth. Most advertisers, however, consider all these methods auxiliary; they help a little, but they do not do much good alone. It may be safely asserted that newspapers, magazines, and trade papers, are now recognized as the standard advertising mediums.

The object of advertising is to make certain statements known to the public at large. Hence the more people see the advertisement the more thoroughly does it fulfil its mission. Of course this opinion may be questioned by the advertiser of specialties, who desires to reach a certain class of people only, but this statement is meant to apply to advertising in general, though it would require merely a slight modification to apply to all cases. Nevertheless, one fact, borne out by the most successful advertisers in America and in Europe, is that what is broadly understood by newspaper advertising is the best and cheapest advertising that can be had. The term "newspaper" includes of course periodicals of every class.

In choosing a publication some people have very peculiar ideas; if they see a paper with a large number of advertising pages, they take it for granted that an advertisement in such a paper means money thrown away, because the advertisement will be crowded out of sight. This is a mistake. The best papers, as a rule, have the largest amount of advertising; hence they must be the best advertising mediums. The best papers are apt to be the most widely read, so that advertisements in them must of necessity become widely circulated, which is the great object of advertising. To this reasoning it may be replied that it does not follow, that because an advertisement is circulated among ten thousand people, ten thousand people will read it. Certainly not, but an advertisement circulated among ten thousand people stands a better chance of being read ten thousand times than an advertisement circulated among only five thousand people. Apart from this deduction of simple logic it must not be forgotten that advertisements are read with as much interest as any other portion of a newspaper. This may not always have been so, but it is nevertheless true to-day. It may be that the busy man will carelessly pass over the advertising columns of the daily newspaper, but the housewife will read them twice and thus make up for his neglect. But take the popular magazines of to-day, the advertising pages of which are truly remarkable, not alone in their appearance, but also as regards their contents. Does any one dare to assert that an advertisement placed anywhere in these pages is a lost investment? The advertising pages of these periodicals represent from month to month the most striking reflection of the commercial, the industrial, and the financial, as well as the intellectual, progress of this country, and the intelligent readers of these publications are just as much interested in the perusal of the advertising pages as of the essays, stories and other features.

A business man, having decided to advertise, and having set apart a certain sum for this purpose, should go to that publication which is read by the largest number of people interested in his business, which most probably will be that publication which has the most advertisements and pays the most attention to the manner of setting up and arranging the advertising pages.

The advertising rates in the best publications are very low. Many people, and even some advertisers of experience, will doubt this statement, but that does not detract from its correctness. The trouble is we expect too much from an advertisement. It must not be supposed that a single advertisement, for which perhaps $50 has been paid, is going to fill a store with customers for a year to come, thus bringing a profit on the investment of probably ten hundred per cent. Most people are satisfied, if they make one hundred per cent. on their invested capital, and everybody should commend them for their modesty. Why, then, should a larger profit be expected from an advertisement than from any other investment?

Advertising once commenced, must be kept up, and if conducted with the same thoughtfulness, the same care, and the same business methods exercised in any other enterprise, an advertisement will always prove a profitable investment.

There is one other feature connected with the business of advertising, which, although the writer has so far not made mention of it, is nevertheless of no less importance than the others. This is the manner of composing an advertisement. It is impossible to form any set of standard rules as a guide for the composition of advertisements, except in so far as that they should in all cases be so worded that they will at once attract attention and be read. To be brief, concise, clear, and to the point in writing an advertisement is undoubtedly commendable, and a plain statement is always more liable to carry weight with the reader than a long string of ambiguous phrases, which have no defined meaning when analyzed.—*Engineering Magazine.*

HOW TO USE CEMENT.

The following general rules referring to the practical use of cement are reprinted from the *National Building Register*:

QUALITY OF SAND—The sand should be clean, sharp and coarse. When the sand is mixed with loam the mortar will set comparatively slow, and the work will be comparatively weak. Fine sand, and especially water-worn sand, delays the setting of the cement, and deteriorates strength. Damp sand should be mixed thoroughly and uniformly together, when both are dry, and no water should be applied until immediately before the mortar is wanted for use.

PROPORTION OF SAND—The larger the proportion of cement the stronger the work. One part of good cement to two parts sand is allowable for ordinary work; but for cisterns, cellars, and work requiring special care, half and half is the better proportion. For floors, the cement should be increased toward the surface.

WATER IN CONCRETE—Use no more water in cement than absolutely necessary. Cement requires but a very small quantity of water in crystallizing. Merely dampening the material gives the best results. Any water in excess necessarily evaporates and leaves the hardened cement comparatively weak and porous.

CONCRETE IN WATER—Whenever concrete is used under water, care must be taken that the water is still. So say all English and American authorities. In laying cellar floors, or constructing cisterns or similar work, care must be taken to avoid *pressure of exterior water*. Cement will not crystallize when disturbed by the force of currents, or pressure of water, but will resist currents and pressure after hardening only. In still water good cement will harden quicker than in air, and when kept in water will be stronger than when kept in air. Cements which harden especially quick in air are usually slow or worthless in water.

HOW TO PUT DOWN CONCRETE—When strong work is wanted, for cellar floors and all similar work, the concrete should be dampened and tamped down to place, with the back of a spade, or better, with the end of a plank or rammer; then finished off with a trowel, thus levelling and compacting the work. Only persons ignorant of the business will lay a floor or walk with soft cement mortar. All artificial stone is made in a similar way to that described, and, when set, is strong and hard as stone.

DELAY IN USE—Do not permit the mortar to exhaust its setting properties by delaying its use when ready. Inferior cements only will remain standing in the mortar-bed any length of time without serious injury.

STONE AND BRICK WORK—In buildings constructed of stone or brick, the best protection from dampness and decay, and also from the danger of cyclones, is a mortar of cement and coarse sand. The extra cost is inconsiderable, and the increased value of the structure very great. Chimneys laid in this manner never blow down, and cellars whose foundations are thus laid are always free from atmospheric moisture. Cement may also be mixed with lime mortar for plastering and other purposes, to great advantage.

EFFECT OF FROST AND COLD—At a temperature less than 60 degrees Fahrenheit, all good cement sets slowly, though surely, but if allowed to freeze its value is seriously impaired. In cold weather or cold water do not fear to wait for your concrete to crystallize.

DAMAGE FROM MOISTURE—Good cement is not injured by age, if carefully preserved from moisture. Lumps in bags or barrels of cement are caused by exposure to moisture. They prove the originally good quality of the cement.

LEGAL DECISIONS.

Mr. Justice Ouimet, of Montreal, in the case of Beaulieu vs. Brouillet, decided a point of much interest to architects. The action was taken to recover an amount alleged to be due under a written building contract for certain work done, and an additional sum for extras. The plaintiff had endeavored to produce evidence to establish the value of these extras: but the defendant objected, and the objection has been maintained. It is held that an architect can only claim for work done under written contract, and in the absence of a written agreement or an admission under oath by the person for whom the work was done as to the value of the extra work, no claim can be entertained. In the present case the plaintiff had neglected to have a written agreement drawn up before commencing the extra work.

UNIFORM FORM OF PROPOSAL.

As the result of joint deliberation on the part of a Committee of the Builders' and Traders' Exchange of Milwaukee, and the Architects of that city, the use in future of the following uniform form of proposal is recommended:

Milwaukee, Wis. .....189..

NOTICE.

THIS BID IS GIVEN UPON THE FOLLOWING EXPRESS CONDITIONS, VIZ:

1. All bids are to be made known upon the awarding of contract or within five (5) days of the opening of the bids.

2. It is expressly agreed by the bidder that he will make contract for the price named within ten (10) days from the specified time set for receiving bids.

3. Where the owner or agent demands a bond from the contractor, the contractor shall be entitled to a bond from the owner or agent for the prompt payment of the sums named in the contract, and for the faithful performance of such other conditions and terms as may be set forth in said contract.

4. The contractor shall be entitled to 5 per cent. on all materials furnished by the architect, owner or agent upon which materials the undersigned has bid and contracted for.

To.....Architects:

The undersigned propose to furnish all the material and to perform all the labor required for the.....work of a.....to be built for Mr.....in accordance with the plans and specifications for the sum of

.....*Dollars* ($.....)
.....*Dollars* ($.....)
.....*Dollars* ($.....)

Remarks.....

Name.....

Address.....

USEFUL HINTS.

A yellowish-brown luminous paint is obtained from 48 parts auripigment and 34 parts luminous calcium sulphide.

One-fifth more siding and flooring is needed than the number of square feet of surface to be covered, because of the lap in the siding and machinery.

The ends of all timbers, and especially of large beams should be free (for it is through the ends that moisture chiefly evaporates). They should on no account be embedded in mortar. Beams may appear sound externally and be rotten within, for the outside, being in contact with the air, becomes dryer than the interior. It is well, therefore, to saw and reverse all large scantling.

PLASTER USED FOR FLOORING.—It is stated by an exchange that French builders, who have carried the art of hardening plaster to where it is used for flooring, either in place of wood or tile, employ for this purpose six parts of good quality of plaster intimately mixed with one part of freshly slacked white lime finely sifted. The mixture as thus composed is laid down in as quick time as possible, care being taken that the trowel is not used upon the surface for too long a time; after this the floor is allowed to become very dry, and is subsequently saturated in the most thorough manner with sulphate of iron or zinc, the iron giving the strongest surface, its resistance to breaking being found to be 20 times the strength of ordinary plaster. It appears that with sulphate of zinc the floors remain white, while when iron is used it becomes the color of rusted iron; but if linseed oil, boiled with litharge, be applied to the surface, it becomes of an attractive mahogany color, this being especially the case if a coat of copal varnish is added.

To test the purity of white lead is not a difficult matter, and does not necessitate a knowledge of chemistry. The simplest way is to crush a small quantity of dry lead on a sheet of paper, fold it, and holding it over a plate or saucer, set fire to it. The heat will change the white lead, if pure, into metallic lead, which will drop in the form of shining grains; if it is adulterated, no indications of metal will be apparent. Another method is to spread a thick layer of the lead over a very thin pine board. On burning it, the metallic particles will be visible only when the lead is pure. A more accurate method than either is that of using charcoal and blow-pipe. Take a flat piece of charcoal about three inches long, one inch wide, and one-fourth of an inch thick, hollow out a small cavity and place within it a piece of the suspected lead about the size of a pea. Then take a blow-pipe and a spirit lamp, and direct the flame on the lead; keep up a continual and steady blowing, and allow the blue part of the flame to reach the lead. In a couple of minutes the lead, if pure, will be reduced to a small shining piece of pure metallic lead; if it be adulterated, no amount of blowing will produce the same result. A tobacco pipe (common clay), having a small stem, may, at a pinch, be used as a blowpipe.

The work of rebuilding the St. Johns Stone Chinaware Company's factory at St. Johns, Que., is actively progressing.

At Guelph, during 1893, buildings were erected to the value of $100,000, and on other improvements there was expended $10,000.

Resin is utilized for making the varnish used by Venetian blind manufacturers for painting their blinds. This varnish is mixed with the desired color, mostly green, and when painted gives a hard gloss enamel surface.

Room Mouldings

New goods just opened. Rich and effective designs specially coloured to match our WALL PAPERS and Ingrains; also CHAIR RAILS, CEILING and PANEL BEADS, COVES, etc., in GOLD and shaded effects, Natural OAKS, etc.

We colour mouldings to match any paper.

M. STAUNTON & CO.
6 KING STREET WEST.

DIAMOND TILES

"Empire" Patent Shingles

CORRUGATED IRON.
V CRIMPED AND PRESSED
STANDING SEAM ROOFING
for all classes of buildings.

Hayes' Patent Steel Lath

WRITE FOR PRICES.

Eastlake Patent Shingles

METALLIC ROOFING CO., LIMITED.
MANUFACTURERS
706 Craig Street, MONTREAL. 82 Yonge Street, TORONTO.

UNIFORM FORM OF PROPOSAL.

As the result of joint deliberation on the part of a Committee of the Builders' and Traders' Exchange of Milwaukee, and the Architects of that city, the use in future of the following uniform form of proposal is recommended:

Milwaukee, Wis......189..

NOTICE.

THIS BID IS GIVEN UPON THE FOLLOWING EXPRESS CONDITIONS, VIZ:

1. All bids are to be made known upon the awarding of contract or within five (5) days of the opening of the bids.

2. It is expressly agreed by the bidder that he will make contract for the price named within ten (10) days from the specified time set for receiving bids.

3. Where the owner or agent demands a bond from the contractor, the contractor shall be eotitled to a bond from the owner or agent for the prompt payment of the sums named in the contract, and for the faithful performance of such other conditions and terms as may be set forth in said contract.

4. The contractor shall be entitled to 5 per cent. on all materials furnished by the architect, owner or agent upon which materials the undersigned has bid and contracted for.

To.....Architects:

The undersigned propose to furnish all the material and to perform all the labor required for the.....work of a.....to be built for Mr.....in accordance with the plans and specifications for the sum of

.....*Dollars* ($.....)
.....*Dollars* ($.....)
.....*Dollars* ($.....)

Remarks.....

Name.....
Address.....

USEFUL HINTS.

A yellowish-brown luminous paint is obtained from 48 parts auripigment and 34 parts luminous calcium sulphide.

One-fifth more siding and flooring is needed than the number of square feet of surface to be covered, because of the lap in the siding and machinery.

The ends of all timbers, and especially of large beams should be free (for it is through the ends that moisture chiefly evaporates). They should on no account be embedded in mortar. Beams may appear sound externally and be rotten within, for the outside, being in contact with the air, becomes dryer than the interior. It is well, therefore, to saw and reverse all large scantling.

PLASTER USED FOR FLOORING.—It is stated by an exchange that French builders, who have carried the art of hardening plaster to where it is used for flooring, either in place of wood or tile, employ for this purpose six parts of good quality of plaster intimately mixed with one part of freshly slacked white lime finely sifted. The mixture as thus composed is laid down in as quick time as possible, care being taken that the trowel is not used upon the surface for too long a time; after this the floor is allowed to become very dry, and is subsequently saturated in the most thorough manner with sulphate of iron or zinc, the iron giving the strongest surface, its resistance to breaking being found to be 20 times the strength of ordinary plaster. It appears that with sulphate of zinc the floors remain white, while when iron is used it becomes the color of rusted iron; but if linseed oil, boiled with litharge, be applied to the surface, it becomes of an attractive mahogany color, this being especially the case if a coat of copal varnish is added.

To test the purity of white lead is not a difficult matter, and does not necessitate a knowledge of chemistry. The simplest way is to crush a small quantity of dry lead on a sheet of paper, fold it, and holding it over a plate or saucer, set fire to it. The heat will change the white lead, if pure, into metallic lead, which will drop in the form of shining grains; if it is adulterated, no indications of metal will be apparent. Another method is to spread a thick layer of the lead over a very thin pine board. On burning it, the metallic particles will be visible only when the lead is pure. A more accurate method than either is that of using charcoal and blow-pipe. Take a flat piece of charcoal about three inches long, one inch wide, and one-fourth of an inch thick, hollow out a small cavity and place within it a piece of the suspected lead about the size of a pea. Then take a blow-pipe and a spirit lamp, and direct the flame on the lead; keep up a continual and steady blowing, and allow the blue part of the flame to reach the lead. In a couple of minutes the lead, if pure, will be reduced to a small shining piece of pure metallic lead; if it be adulterated, no amount of blowing will produce the same result. A tobacco pipe (common clay), having a small stem, may, at a pinch, be used as a blowpipe.

The work of rebuilding the St. Johns Stone Chinaware Company's factory at St. Johns, Que., is actively progressing.

At Guelph, during 1893, buildings were erected to the value of $100,000, and on other improvements there was expended $10,000.

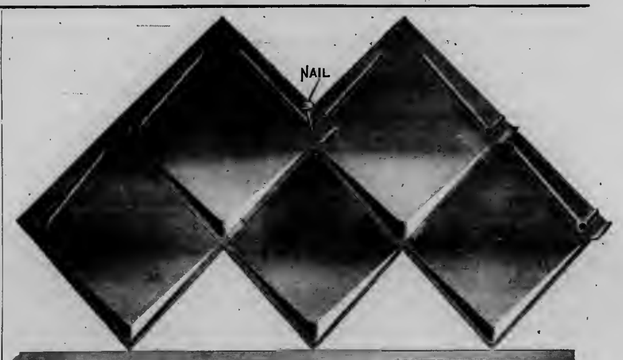
Resin is utilized for making the varnish used by Venetian blind manufacturers for painting their blinds. This varnish is mixed with the desired color, mostly green, and when painted gives a hard gloss enamel surface.

Room Mouldings

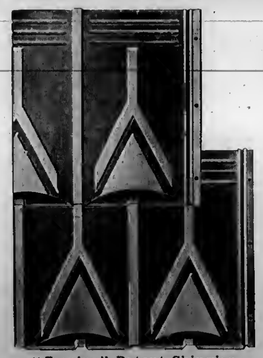
New goods just opened. Rich and effective designs specially coloured to match our WALL PAPERS and Ingrains; also CHAIR RAILS, CEILING and PANEL BEADS, COVES, etc., in GOLD and shaded effects, Natural OAKS, etc.

We colour mouldings to match any paper.

M. STAUNTON & CO.
6 KING STREET WEST.



DIAMOND TILES



"Empire" Patent Shingles

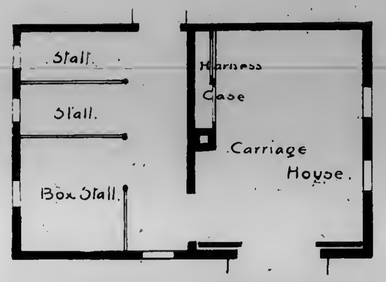
CORRUGATED IRON.
V CRIMPED AND PRESSED
STANDING SEAM ROOFING
for all classes of buildings.
Hayes' Patent Steel Lath
WRITE FOR PRICES.

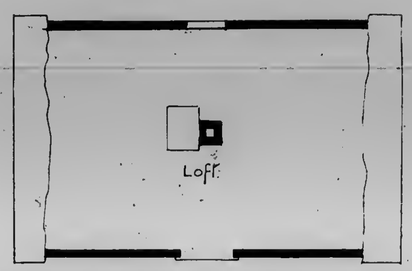
Eastlake Patent Shingles

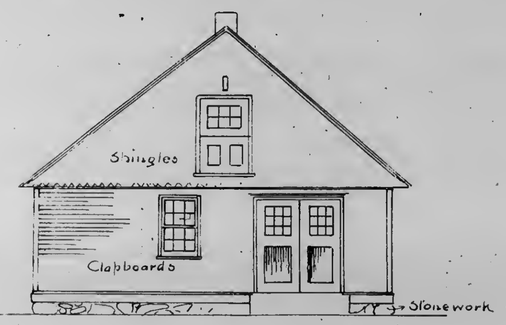
METALLIC ROOFING CO., LIMITED.
MANUFACTURERS
706 Craig Street, MONTREAL. 82 Yonge Street, TORONTO.

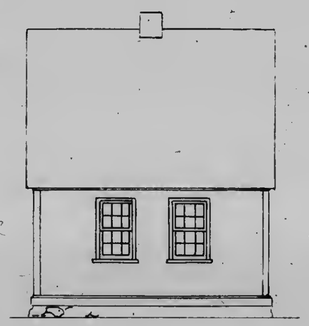
SEMI-DETACHED RESIDENCES, JARVIS STREET, TORONTO.
F. H. HERBERT, Architect

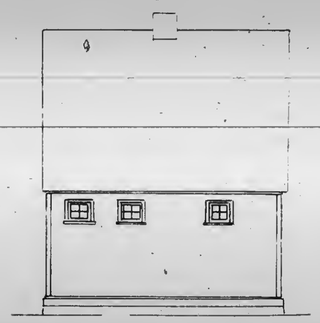
DESIGN for a SMALL STABLE.



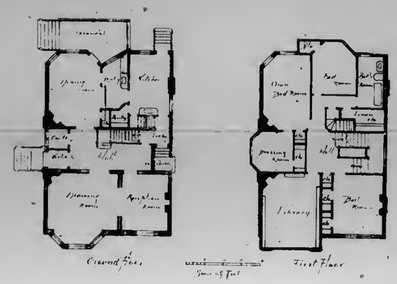






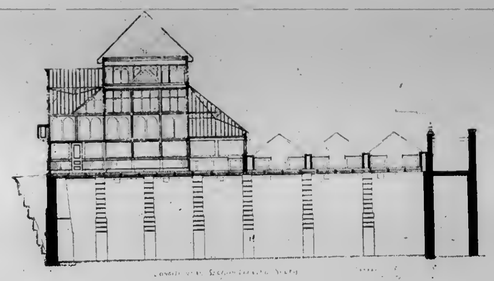


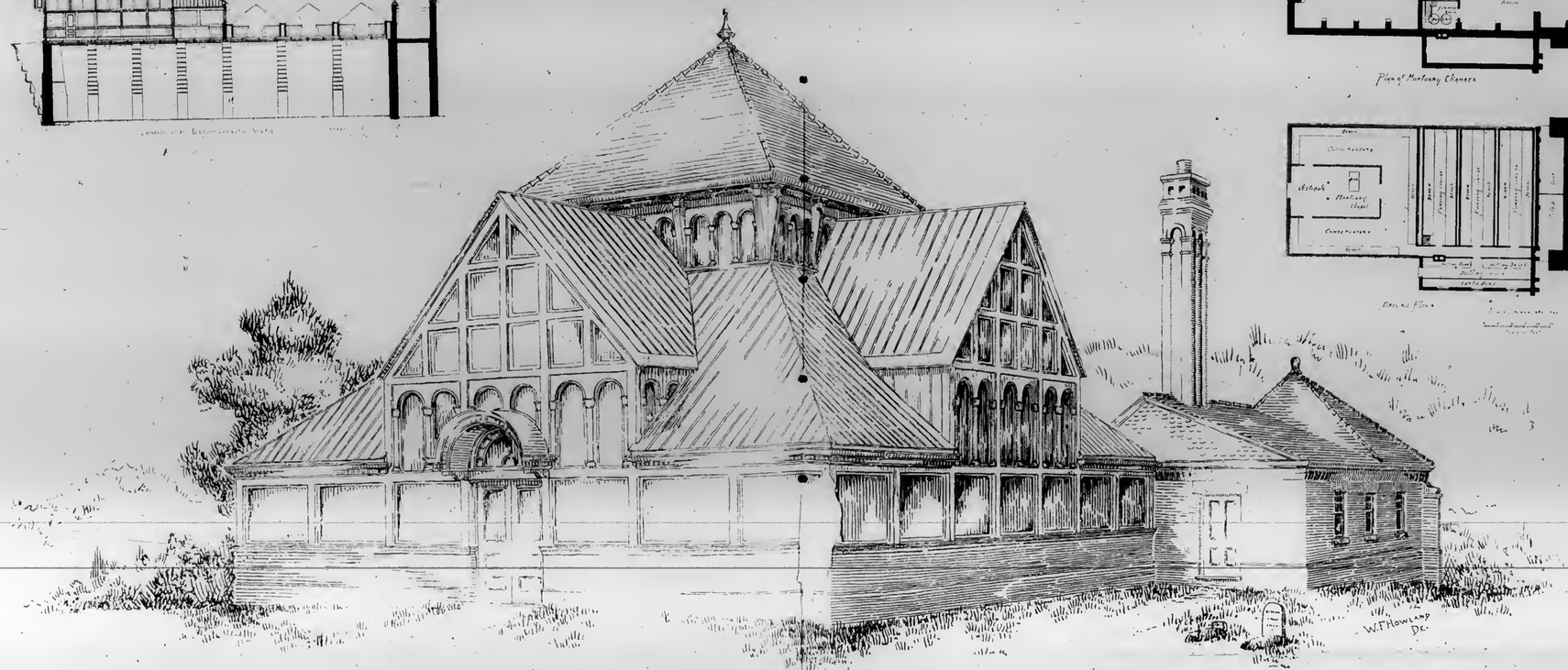
Scale 5 10 15 30 feet

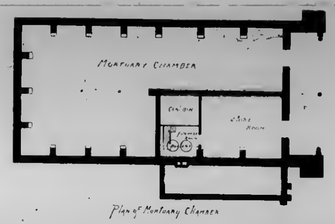


RESIDENCE ON LOWTHER AVE
TORONTO, CANADA.

EDMUND BURKE ARCHITECT.







Plan of Mortuary Chamber

MORTUARY CHAPEL AND CONSERVATORY AT MOUNT PLEASANT CEMETERY, TORONTO.

EDMUND BURKE, ARCHITECT.

CANADIAN

ARCHITECT AND BUILDER

VOL. VII.

1894:
C. H. MORTIMER, Publisher
TORONTO—CANADA

INDEX

	Page
Architect, The Practice and Province of the	137
Architectural Practice, Business side of	149
Architectural Practice, Ethics of	150
Australia, Openings for Trade with	37
Art Institute, Sackville, N. B.	61
American Society of Civil Engineers	73
Arts and Crafts Association, Hamilton	74
Artistic Sentiment, Growth of in Canada	85
Alterations, Methods of Making	86
Arbitration	86
Architects, Public Appreciation of the Duties of	86
American Institute of Architects	109, 138
Architecture, Public Interest in	110
Architectural Competitions	144
Architects, Some Aspects of the Mutual Partnership of	116
Air, Measuring	123
Architects, Advice to Young	127
Arbitration, An Interesting	140
Architecture, Discoveries in	145
Architect, The	42
Architectural Styles, Current	44
Architecture, The Necessity for a Canadian School of	70
Architecture at the Montreal Art Gallery	70
Architecture, Piers in	5-vii
Building in the Northwest	152
Building By-Law, Hamilton	62
Building Conditions	62
Bicycle, Accommodation for the	97
British Institute, Colonial Products at	110
Building Work, Prices for	111
B. C. Institute of Architects	12, 121
Builders' and Employers' League, N. Y.	122
Bricks and Terra Cotta, Buff	137
Buildings of the Dominion	14, 113
Brevities, Useful Office	117
Baillairgé, Mr. Chas.	123
Bystander, The	139, 151
Buildings, Collapse of	141
Building Papers, Regarding	8-ix
Building Stones, Notes upon Testing	8-viii
Building Material, New	8-vii
Brick and Stone, Roman Construction in	4-viii
Brick Masonry, Transverse Strength of	57
Battle Cement Works at Thoroid	51
Building Stones, Canadian, at the World's Fair	10
Brick, The Strength of	18
Brickwork, English and Italian	18
Burke, Edmund	22
Building Materials in the Northwest	34
Building, Some Points on	47
Concrete Construction	130
Canadian, A Successful Young	155
Concrete Construction, Its Practical Application	158
Clay-Working Methods, Improvements in	37
Church Buildings, Proposal to Tax	37
Charity, Dispensing of Public	38
City Engineer's Department, Toronto	38
Current Architectural Styles, Lecture on	46
Customs Duties on Building Materials	50
Curran Bridge Investigation	62
Contractors, Need of Organization of	62
Church Buildings, Costly	97
Contracting, Risks in	98
Competition, Chicago Court House	122
Concrete and Cement, Uses of	137
Contracts, Conditions of	138
Cast Iron Columns, A Failure of	87
Canadian Society of Civil Engineers	2
C. A. & B. Competition	3, 23, 43, 54, 67, 145
Correspondence	4, 22, 42, 48, 55, 64, 79, 82, 87, 109, 101, 112, 125, 142, 154-5
Cathedral of Holy Trinity, Quebec	5
Canadian Institute of Architects, Proposed	8
Central Ontario School of Art and Industrial Design	9
Canadian City Engineers	13
Competitions, New York City Hall	14
Cements, Canadian vs. Foreign	15
Canadian Contractor's Handbook	17
Competitions	34, 99, 125
Carving	46, 90
Court Houses at Winnipeg, Man., and Tacoma	53
Color in Art, The Harmony and Functions of	56, 68
Cellars, Waterproof	63
Color Decoration, External for Buildings	146
Cast Iron Pipes, Impact Tests under Hydrostatic Pressure	144
Clippings, A Simple System of Filing	X-ix
Chimneys, Concerning	134
Cement, Canadian, Lime and Clay Products	132
Cornices, Plaster	116
Competition, London Public Library	113, 126
Colors in Different Lights, Treatment of	105
Cornices, Plaster, How to run them	7-vii
Christ Church Cathedral	89
Color in Building	91
Casting in Plaster from Life	7-ix
Chimneys, Expansion of	106
Chimney, New, at Toronto Railway Co.'s Power House	112
Doors, Construction of Hardwood	35
Design, How to Study	102
Device, A Useful	01-x
Drills, Electric Percussion and Rotary	141
Decoration, House	115
Enquiry, An	156
Electric Launch	50
Elevated Railway, Proposed in Montreal	73
Exhibition, Dominion, at Toronto	74
Exposition, Toronto International	52
Explosives, Modern	83
Estimates and Quantities	88
Estimating	89, 101, 114
Elevator, A New Stone	136
Enamelling, Cast Iron	134
Fire Proof Construction	19
Fire Doors, A Test of	57
Foundations	57, 133
Fire Proof Floor Construction, The Wuensch and Melan Systems	80
Fire Proof Floors	82
Flooring, Maple	8-vii
Foundation Stones, Ceremonies Attending the Laying of	116
Furnace, Gas, House Heating	134
Government Buildings, Methods of Designing	50, 61, 98, 109
Groins, Centering for	9-vii
Girder, A Monster	10-viii
Howard Park, Repairs to Residence in	85
Hotel, Proposed First-class, for Toronto	137
Heating, Points on	8
Hoisting Machinery	53
Heating Problems	9-ix
Heating, Characteristic Features of Hot-Water	153
Iron Construction for Dwellings	110
Ice Carnivals	121
Intercommunication Column	23, 43, 54, 67, 78
Kiln, Simple way to determine the temperature of	12-viii
League for the Adornment of the City of Chicago, Proposed Organization of	160
Landslide at St. Alban's, Que.	73
Lumber, Kiln-Drying	98
Labor Day	110
Lime, A Study in	13
Legal Decisions	18, 51, 83, 156
Lime, Use of, in Mortar	59
Lien Act, Mechanics', Quebec	53
Municipal Advisory Art Committees	150
Meat Curing Establishment, Collingwood	156
Mosaics laid in Gold	3
Moulding	4
Manufactures and Materials	15
Mouldings, Early English	18
Marble, Producing, from Earthy Limestone	4-vii
Massey Music Hall	74
Masonry, The Effect of Frost on Green	76
Moving a Building, A Notable Case of	78
Marble, Cape Breton	82
Mortar, Sand in	87
Masonry, Measuring	96
Masonry Work	10-vi
National Association of Builders	21-37
New York, Building Activity in	49
Niagara Falls, Utilizing the Power of	110
Nails, Wire	118
Ontario Legislative Buildings	37, 61
Ontario Association of Architects	21, 22, 24, 40, 51, 144, 149, 150
Ontario Architects' Act	73
Practical Suggestions for Builders	49, 61
Public Works, Day Labor on	61
Plumbers, non-registered, Legal Standing of	73
Plumbing By-Law, Montreal	85, 92
Plans, Architectural, Customs Appraisement of	86
Province of Quebec Association of Architects	76, 122, 128, 150
Paint from Slate Dust	10-x
Paving Blocks, Australian Wood, for Canada	105
Perspective Process	108
Plaster Decoration, Moresque	120
Plumbers' Examination Papers	134
Plastering, French Ornamental	104
Portland Cement, Notes on Recent Additions to our Knowledge of	58
Personal	4, 2-vii, 39, 60, 79, 94, 106, 123, 141 156
Plaster, Casting in, from Life	7-ix
Painting Interior Wood Work	6
Plate Glass Casting	19
Patents, Recent Canadian	36, 94, 143
Publications	55, 5-viii, 83, 94, 106, 115, 143, 159
Quebec in 1894	16
Royal Institute of British Architects	37, 137
Roofing, Dangerous Methods of	50
Rooters, Change in Business of	97
Roof Trusses	15
Rocks	41
Royal Canadian Academy	51
Rough-Casting in Canada	71
Radiation, The Difference in Amount of, Required in Buildings of good and poor Construction	93
Students, A Water-color Class for	153
Students, Architectural	153
Students' Department	21
Sample Copies, Free	38
School Buildings, New, in Toronto	61
Stone, Building, Canadian vs. Foreign	74
Strikes in the United States	86
Students, Suggestions to	98
Scaffolding, An Unusual Piece of	100
Sir John Macdonald, Statue of	122
Slate, How Mined	118
Stones, Creosote	114
Shoring	90
Stone Channelling	6-viii
St. John's, Nfld., Notes from	9
Scroll Saw, The Empire	18
Students, Notice to	23
Shavings	35, 60, 72
Stewart, The Late Colonel	63
Students' Negligence	67
Staining, Wood	127
Toronto Municipal Buildings	38, 51, 73
Tanks, Water, Cement	12-vii
Toronto Island, Improvement of	38, 49
Trunk Sewer, Toronto	85
Trade Revival	109
Terra Cotta, Porous, Tests of	121
Tiles	11-x
Toronto Builders' Exchange	2, 39, 88, 99
Tiles, Setting and Burning Roof	3
Toronto Art Students' League	6
Toronto Architectural Club	23
Toronto Technical School	39
Trade Papers as Advertising Mediums	6-viii
Trade Notes	89
Trade Commissions to Architects	89
Terra Cotta, Proper use of	150
Useful Hints	20, 36, 43, 3-vii-viii, 54, 69, 84, 87, 100, 116, 9-viii, 11-ix 12-x, xi
Union Depot, Toronto, New	91
Will, A Peculiar	49
Winnipeg, Building Progress in	85
Wages, On the Adaptation of a Price Book to meet Varying Rates of	77
Windows, Geometrical Decorated	117
Walls, A Statement in favor of Hollow Brick	147
Whitewash, to Stick	11-vii

ILLUSTRATIONS.

	No.
Art Institute, Mount Allison Ladies College Sackville, N. B.	IV
Bits from my Sketch-book	I
Brewery Building, Montreal	II
Banco di San Spirito, Rome	V
B. C. Institute of Architects, Portraits of Officers of	X
Church and Presbytery of the Parish of the Sacred Heart, Montreal	IX
C. A. and B. Competition	I, II, III, V, VI
Certosa di Pavia, Finesta Sulla, Tacciata Della Chiesa, Italy	I
Chateau D'Azay-Le-deau, France	I
Cottage to cost $1 , Design for	V
Cottage at Valo	VI
Christ Church Cathedral	VII
Fence and gates, Wrought Iron, to Residence of Mr. A. A. Allan, Toronto	XI
Hotel, Small, at Vancouver	VIII
House for Mr. Dubuc, Montreal	XI
Houses for Dr. Campbell, Montreal	X
House, Old, at Brunswick, Germany	II
House, Design for Country or Suburban	IV
Houses to be erected at Kamloops	XII
Insurance Building, Galt, Design for	XI
Legislative Buildings, New, Victoria B. C.	VII
Library Building, London,	XII
Mission Church, Brantford	VIII
Mantel, Drawing Room	III
Old Mens' Refuge, Vancouver, B. C.	XI
Orillia Town Hall and Market Buildings	VII
Protestant Orphan Asylum, Montreal, Competitive Design for	VII, X
Residence, Suburban	VI
Residence of Mr. Tuckett, Hamilton	VI
Relief Ornament and Where to Use It	IX
Railway Station at Duddswell Junction	II
Residence for Mr. Hugh Graham, Montreal	XII
Residence of Mrs. McNally, Weston	X
Residence of Dr. Charlton	X
Residence of Mr. W. T. McMullin, Woodstock	VII
St. Laurent, Rouen, France	IV
Sketches, Some Wayside	II
State Capital, Olympia, W. T., Competitive Design for	VIII
St. Sepulchre's Round Church, of Cambridge, Sketches from	VIII
Tower of Pallazzo Vecchio, Florence, Italy	XI
Towers and Steeples	I
Union Station, Toronto	IX
Wells Cathedral, West End of Nave	I

NEW YEAR NUMBER - PRICE, 35 CENTS.

CANADIAN ARCHITECT AND BUILDER.

VOL. VII.—No. 1. JANUARY, 1894 { PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher.
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
64 TEMPLE BUILDING, - MONTREAL.
Bell Telephone 2290.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 10th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1893.

PRESIDENT	D. B. DICK, Toronto.
1ST VICE-PRESIDENT	KING ARNOLDI, Ottawa.
2ND VICE-PRESIDENT	JOHN E. BELCHER, Peterboro'.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

DAVID EWART	Ottawa.
S. G. CURRY	Toronto.
S. H. TOWNSEND	Toronto.
FRANK DARLING,	Toronto.
W. A. EDWARDS	Hamilton.

REGISTRAR AND LIBRARIAN:
W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	J. NELSON, Montreal.
1ST VICE-PRESIDENT	CHAS. BAILLAIRGÉ, Quebec.
2ND VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
SECRETARY	JOSEPH HAYNES, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. GENDRON,	Montreal.
J. B. BERTRAND	Quebec.
ERIC MANN	Montreal.
J. VENNE	Montreal.
G. TANGUAY	Quebec.

AUDITORS—THEO. DAOUST, J. F. PEACHY.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.	J. LISTER NICHOLLS.
WM. PARK, 1st Vice-President.	WM. BOOTH.
GEO. OAKLEY, 2nd Vice-President.	JAS. ISAAC.
DAVID WILLIAMS, Treasurer.	JOHN LOGAN.
WM. J. HILL.	JAS. THOMSON
JOHN ALDRIDGE.	H. MARTIN.
JAS. CRANG.	

JOHN L. PHILLIPS, Secretary.

AT the time of going to press the members of the Ontario Association of Architects are meeting in annual convention in the School of Practical Science, Toronto. A full report of the proceedings will be published in the CANADIAN ARCHITECT AND BUILDER for February.

1894.

THE commencement of a new year, which will be the seventh in the life of this Journal, prompts a few remarks of a personal character, and concerning the professional and business interests with which we stand identified.

IT will be observed that in this first number of the new year a departure has been made from our usual practice of publishing illustrations of exclusively Canadian buildings. Having been repeatedly requested to reproduce occasionally foreign subjects, it was decided to give up the present number to illustrations of work of this character, and the cover design, for which we are indebted to Mr. Ernest Wilby, was worked out in harmony with this idea. It is our purpose in future to reproduce from time to time suchspecimens of the work of foreign architects as it is hoped will prove interesting and instructive to our readers.

Regarding the CANADIAN ARCHITECT AND BUILDER, it can be said that despite some adverse influences, it continues to make steady progress. Additions to the number of its subscribers throughout Canada, and especially the towns and cities of the Northwest, have of late been gratifyingly large. As an index to the esteem in which the ARCHITECT AND BUILDER is held by some of its subscribers, we quote from the letter of an architect in a western Ontario city as follows: "I take all the best architectural publications in the States—six in number—and yours—and not considering price, I think yours the best of the lot for everyday practical work, and for good solid reading." The writer of this letter adds, "Can you suggest anything I can do to help you—if so, it shall be done." It would enhance not a little the interest and prosperity of the Journal, if every architect, builder and contractor who is a subscriber, would evince similar anxiety to individually assist its development. To those who have been negligent in this particular, the present affords a good opportunity to turn over a new leaf.

A strong effort will be put forth to give to the ARCHITECT AND BUILDER during 1894 a greater interest than it has ever had before, and without lessening its value to architects, to make it the source of information of a useful character to master builders and contractors. The co-operation of our readers is invited. Let us know what class of information is most required and we will endeavor to supply it. Especially do we invite requests for information on problems arising out of construction work of any kind; in such cases an earnest effort will be made to throw light on the difficulty. If knowledge of new and improved methods has been acquired let us know about it so that our readers may share the advantage. There has in the past been too little in the nature of exchange of experiences on this line. Let us have more of it in the future, and the result will be beneficial to everybody. Let no reader think he "knows it all"—he doesn't. If he will give others the benefit of what he does know he can depend on receiving equally valuable information in return.

In the advertisement pages of the ARCHITECT AND BUILDER are represented the leading manufacturers and dealers in building materials and appliances. The attention of architects and

builders is constantly being drawn in these pages to improvement in materials, and no progressive architect or builder should fail to examine these announcements with the same degree of attention which he bestows on any other department of the Journal. It is the wide-awake, progressive manufacturer and dealer who advertises, and who is able to place at the disposal of architects and builders the newest and most improved materials, and is consequently most deserving of encouragement and patronage. The successful results achieved in modern buildings are due in no small measure to men of this class.

We have made a certain amount of careful enquiry since the opening of the year, in order to gain what knowledge we might regarding the building outlook for 1894, this being always a subject of paramount importance to the many whose interests are largely dependent upon building enterprise. These enquiries indicate that a fairly active season is in prospect, and that taking the country as a whole the volume of building operations in 1894 will equal if not exceed that of last year. If this should prove to be the case there should be little cause for disappointment in view of the world-wide depression which at present exists. It must be remembered that most Canadian cities with the exception of Toronto were more than usually active in building enterprise last year. This is especially true of Montreal, London, Ottawa and Winnipeg. In Toronto the existence of well-known local causes operated to check development in this line; and yet even in Toronto a considerable amount of the best class of building was done, and all are agreed that so far as that city is concerned if no improvement may be expected as compared with last season, there will be no retrogression. The remodelling of existing buildings which began a year or two ago may be expected to continue for some time to come. This applies not only to buildings used for business purposes, but also to central residential properties. It is learned that there is a brisk demand for modern residences in central localities, and that as fast as houses are modernized they are tenanted. If this fact were impressed on the attention of owners of central property, much of which is now unremunerative because of the lack of accommodation afforded by old style houses, extensive improvements would doubtless follow.

There is another direction in which improvement is demanded and which would tend to enhance considerably building activity in Toronto during the coming season. There is urgent need, as was pointed out by the Mayor in his inaugural address, for large additions to the school accommodation throughout the city. At present the School Board are obliged to rent upwards of thirty rooms to provide for the large number of pupils who for lack of room cannot be admitted to the school buildings. For this temporary accommodation, which is necessarily defective, the School Board pays a rental of about $7,000 per year. This amount capitalized at 4 per cent. would pay interest on $175,000. It is estimated that the additional accommodation required could be provided by building additions to the present school buildings at a cost of $75,000 to $80,000. The interest on this expenditure would be $3,000 to $3,500, or half the sum which must now be paid as rent for inferior accommodation. Thus by enlarging the present schools a saving of upwards of $3,000 per year might be effected, more satisfactory accommodation provided, and a large sum of money expended which would assist in tiding builders and builders' supply houses over the brief period which will elapse before a decided improvement in conditions shall take place. There is additional reason for proceeding at once with this work in the fact that there is never likely to come a time when it can be carried out at less cost. We hope that the City Council will take cognizance of these facts, and when the estimates of the School Board come up for consideration, vote the amount required to enlarge the schools.

Outside of Toronto indications of considerable activity are already apparent, and as above stated, we believe the season will develop satisfactorily. A certain number of persons, including architects and supply firms, appear to have become suddenly discouraged, and are doing little else than putting on long faces and predicting that things are going to the "bow-wows." Such persons are doing not a little to retard the improved conditions which all are looking for and which there is no reason to suppose will be much longer delayed. Let everybody put a cheerful courage on, and do what is possible to inspire confidence in the future; in this way "good times" will the sooner be brought about. There is cause for the greatest encouragement in the knowledge of the fact that while Canada is less prosperous than at some former periods in her history, she is to-day experiencing in a lesser degree than any other country on the face of the globe the existing commercial depression, and as a consequence will be among the first of the nations to feel the benefit of the rising tide of returning prosperity. Let us stop croaking and go to work to make the best of the situation, which after all, isn't half so bad as some have pictured it.

WE are much gratified by the interest manifested in our students' competition for a Town House, the result of which is announced in another part of this paper. Fifteen designs in all were received in this competition, representing the work of students in the provinces of Ontario, Quebec and British Columbia. The interest which has thus been shown shall encourage us to announce other competitions from time to time in the future.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

The eigth annual meeting of the above Society took place in Montreal on the 10 and 11th inst. There was a good attendance of members. The chair was occupied by the President, Mr. E. P. Hannaford.

The subject of organizing the Society into a close corporation, was reported on by a committee, the carrying into effect of the proposal being supported by Mr. Alan Macdougall, of Toronto. It was decided, however, that no present action should be taken.

The treasurer's report showed a very satisfactory state of the finances, and that in all respects the Society was in a flourishing condition.

By invitation of the Montreal Street Railway Management an interesting visit was made to the Company's new power station, and on the evening of the second day the annual dinner was held at the Windsor, the occasion proving to be most enjoyable.

The election of officers resulted as follows: President, P. Alexander Peterson; Vice-Presidents, H. Wallis, P. W. St. George, Montreal, and Alan Macdougall, Toronto; Secretary, Prof. McLeod; Treasurer, K. W. Blackwell; Librarian, W. McNab.

TORONTO BUILDERS' EXCHANGE.

The annual meeting of the Builders' Exchange of Toronto was held in the rooms of the Association, 8 Victoria st., on Monday, January 15th, at 3.30 p. m., the President, Wm. Pears, presiding.

The following were present; Wm. Pears, Jas. Crang, Jno. Aldridge, Mr. Tasker, (rep. the Don Brick Co.) J. Vokes, H. Martin, J. Thompson, Mr. Hewitt, Jr., T. Cannon, Sr., T. Cannon, Jr., Jno. Lucas, Geo. Wright, J. Bedford, Edw. Gearing, Ben. Brick, Jno. Maloney, Jno. Barnard, W. Page, F. B. Lockwood, Jno. Vick, C. S. Boon, Jno. Russell, Geo. Oakley, Wm. Park, Wickett Bros., Curtis & Rowe, Jas. Priestley, Isaac Price, Bayliss & McCurdy and Thos. Aikenhead.

The Treasurer's report, attested by the auditors, showed the finances to be in a satisfactory condition. The Secretary's report showed the membership to comprize the names of 120 firms representing all branches of the building trade and the supply business. The directors report was discussed with much interest. The Lien Law Committee were praised for the satisfactory work accomplished in connection with the amendment to the Lien Act. The president in commenting upon the bill, expressed his opinion that the amendments would tend to put the building trade upon a more satisfactory foundation, and that rash speculation in building would be less likely to occur in the future.

The following officers were elected for 1894:—Wm. Pears, President, re-elected, unanimously; 1st Vice-President, Wm. Park; 2nd Vice-President, Geo. Oakley, re-elected; Treasurer, David Williams, re-elected. The following were elected upon the Board of Directors: Jno. Aldridge, Jas. Thomson, Wm. Booth, Jas. Crang, H. Martin. In addition to the above the Board will be supplemented by one representative from each Trade Section of the Exchange. The auditors for 1894 are Messrs. Geo. Clay and Frederic Holmes

The President-elect thanked the Exchange for the honor of his re-election, and also congratulated the members upon the satisfactory progress of the Exchange, in spite of dull times.

ILLUSTRATIONS.

C. A. & B. COMPETITION FOR A TOWN HOUSE—DESIGN BY "IGNORAMUS" (MR. J. EUGENE PAYETTE, MONTREAL) AWARDED FIRST POSITION.

"BITS FROM MY SKETCH BOOK"—BY EUSTACE G. BIRD.

CERTOSA DI PAVIA, FINESTA SULLA, FACCIATA DELLA CHIESA, ITALY.

TOWERS AND STEEPLES—SIR CHRISTOPHER WREN, ARCHITECT.—(REPRODUCED FROM ORIGINAL DRAWINGS BY MR. A. T. TAYLOR, F.R.I.B.A., MONTREAL).

CHATEAU D'AZAY-LE-RIDEAU, FRANCE.

THE WEST END OF NAVE, WELLS' CATHEDRAL.—FROM A DRAWING BY MR. E. WILBY.

The portion of nave shown in this view dates from the earlier part of the 13th Century. The strong Romanesque feeling running through the whole design is quite exceptional in a building of so late a date. It may be seen in the form of the clustered piers, the profile of the arch mouldings, in the continuous mould to triforium arcade, and in the square or octagonal abaci to capitals in place of the more usual circular Early English.

UPPER PART OF MAGDALEN TOWER, MAGDALEN COLLEGE, OXFORD.

"Magadalen College" said Lady Macaulay, "is one of the most remarkable of our academical institutions. Its graceful tower catches afar off the eye of the traveller who comes by road from London. As he approaches he finds that this tower rises from an embattled pile, low and irregular, yet singularly venerable, which, embowered in verdure, overhangs the sluggish waters of the Cherwell."

The window tracery and other carved work has been carefully restored and a new stone figure of St. Mary placed in the middle pinnacle on the eastern side. The tower is 150 feet high, and contains a "ring" of ten bells. It was built in 1492-1507 A.D; and for simplicity of design and graceful proportions it is unequalled in England.

EUSTACE G. BIRD.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION FOR A TOWN HOUSE.

THE best designs received in this competition have faults which would negative their actual erection without alteration, but there is sufficient merit in them and sufficient evidence of study to fully merit the award of the prizes offered. The three best designs are by "Ignoramus," "Gotham," and "Colonial," the three prizes have been given to them in that order.

"Ignoramus" sends in a design, published in this number, which has the defect of not being essentially a town house, and the further defect of an attic (reached by a stair crossing a window) which, slim as it appears in plan, would be still worse in execution, and it is obvious that he was quite aware of this from the floor lines which he has set against the elevations. But the other floors are good, especially the ground floor, which is very well arranged for comfort and interior effect, and on the whole there is an originality and thought shown.

"Gotham" has a good design also. It is a great question whether it would not be better if turned over so as to get the dining room on the south. The arrangement of the front bedroom is unstudied, and the back stairs rather too close work and too dark for comfort. The style of exterior treatment is very good and simple.

"Colonial" has a very clear drawing. The plan is more complex than those of the first two and has many faults. The main stair is ill planned and could have been right in the same space. The kitchen is too small; the dining room is all doors and windows. The stable is impractical.

The other competitors have been arranged approximately in order but without the same effort at certainty as was made in arranging the relative positions of the first three. The following points with reference to them may be noted:

"Demos," who makes a good fourth, has a rather commonplace plan but an elevation showing considerable merit and feeling for brickwork.

"Peck" has some excellent points, and is none the worse for not having very salient features. All is in fairly good quiet taste. He should black his walls in plan for reproduction on a reduced scale.

"Module" has not fulfilled the conditions. There is not enough room left on the lot for light on one side and a driveway on the other. The floor plan thus gets a roominess to which it is not entitled. The elevation shows understanding of colonial work.

"Hasty"—The kitchen is too small. The pantry is only a bit of passage. The dining room is 12'6" wide, has a mantel on one side and a radiator on the other. This interference with the passageway on both sides would be a serious inconvenience in so narrow a room. The bedroom floor is not well studied. The exterior is unpretending but not bad.

"1894" has a very good plan, a little ambitious, but without falling into striking defects. The exterior is not pleasing, but is also not commonplace.

"Far" has made an initial mistake in having planned a basement kitchen. In spite of the space thus gained on the ground floor he has not succeeded in giving an impression of space. The elevations show originality, though in a crude stage.

"Scribbler" has a very good straightforward plan, but with all the rooms to the north, and the south occupied by stairs and a long passage. The design is poor.

"Victoria" has a basement kitchen at the extreme front (under the drawing room) and a dining room at the extreme back on a floor above. It would be hard to atone for this to a housekeeper by any other convenience proceeding from this arrangement, and there does not seem to be anything of the kind. The storey thrown over the driveway is a good idea.

"Cosmo"—The elevations (drawn in a scratchy way) are good—much better than the plan, which seems to show inexperience. The stairway is badly placed, right at the front door.

"Gamut," "Jack" and "Enchell" seem hardly up to the competition.

SETTING AND BURNING ROOF TILES.

IN setting plain roofing tiles the first thing to do is to see that the kiln bottom is in proper shape. This should fall from the sides to the center about 1½ inch, that is, it should be 1½ inch lower in the middle than the outer sides; this tends, when the sinking of the goods commences, to bring them together for mutual support. On the other hand, if the kiln bottoms are dead level, the setting is liable to open in firing, and the tiles reel in various directions, causing great waste. In setting plain roof tiles, these should be set in courses, each course covering a certain extent of ground before No. 2 course is set, and not built up in bungs, which is sometimes done. The latter system gives no tie of support; plain tiles in setting should be interlocked; each 10 or 11 tiles, as the case may be, should be set on the header and stretcher principle. This forms another tie to keep from reeling, and every other tile should be reversed, *i.e.*, the plain end of one tile resting against the *nib* of the previous one, leaving a cavity between the tiles for the draught. In setting pin tiles, say 8 or 10 tiles in a bung, divide the number given in equal quantity, and bring them together in a convex form; this gives you heat passage through the centre as well as the angle of the bung, set on the header and stretcher plan, same as the nib tile. Firing should be done with great caution; all through the burning special care should be taken until the fire is clear through, which should be done in a steady and progressive manner.

MOSAICS LAID IN GOLD.

The church of St. Mark, in Vencie, is said to contain the finest mosaics in the world. And, indeed, in not many places will they be found laid in such costly beds and with such extravagant profusion. On the walls, the ceilings and cupolas the tiny bits of rare marble are laid in exquisite designs on a bed of gold. Of these there are over 40,000 square feet of surface, the effect of the colored marble, each individual piece surrounded by its thread of gold, impress the beholder with a sense of grandure and beauty rarely experienced in gazing at the best efforts of the builder's art.

A Michigan paper announces the receipt by a local builder of a large shipment of cedar lumber from Messrs. Geo. Cassidy & Company, Victoria, B. C., and describes the material as follows:—It is absolutely clear, lighter in weight than pine, of beautiful color and texture, and best of all, not more expensive than our best clear dry pine, very little of which is now obtainable at any price. This wood is growing rapidly in public favor for interior finishing, its natural shades and graining, when it is properly filled and oil polished, being equal to the most expensive hardwoods. It also takes the place of baswood and more expensive material for carriage work.

WINNIPEG.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

There is little or no stir in the building line here at present—not even a rumour about an office building, or new opera house. "'Tis strange, 'tis passing strange," for at this time each year we are entertained with graphic descriptions of costly "sky-scrapers" to be erected the following spring—and as for opera houses, they are without number—designed and fitted up in the most improved style, and second to none, here or elsewhere. The newspapers are always "creditably informed" that the "capital" has been subscribed, and that the work will be proceeded with at once, if not sooner. In spring the snow disappears—carrying with it those visions grand, and with them the hopes of the architects, who then dream of what might have been if their clients—the men of ideas—had only succeeded in dazzling the men of dollars, with the prospect of reaping a golden harvest from the investment of the capital required to carry out their ambitious projects.

Some three years since the Y.M.C.A. purchased an excellent site for their new home at the corner of Portage avenue and Smith street, and they have paid off the major portion of the purchase money. Some of the leading men of the city have promised, as soon as the balance is paid, and the property free of encumbrance, to erect thereon an association building designed "up to date," for it has become a recognized fact that it is a benefit, not only to the young men themselves, but also to the community at large—for the former to have a home to which they are ever welcome, and a place of recreation, where they can enjoyably spend their evenings, and improve themselves spiritually, mentally and physically.

The Hudson's Bay Company, under the management of Mr. Chipman, the Commissioner (who took charge about two years ago) are like the bears in the spring time awakening from their lethargy, and shewing evidence of renewed life—making their influence felt throughout Manitoba and the North-West, while their unprofitable branches are being lopped of. The company, octopus like, stretch forth and take possession of new and promising districts, consequently they have to expend a considerable amount each year providing new buildings in which to carry on their ever increasing business. This necessarily stimulates trade in the country, and is a benefit to all.

Winnipeg should congratulate herself that the Hudson's Bay flats, lying between Main street and the Red River, are no longer to remain the eyesore they have hitherto been, for the proprietors (the Hudson's Bay Co.) have decided to turn them into athletic and racing grounds. This is one of the most laudable enterprises ever undertaken here, and will without doubt prove a great boon to the citizens, for the grounds are in the heart of the city, where everyone can go for a day's enjoyment without cost or fatigue. The grading was commenced last autumn, and this year fences, grand stand, stables and other buildings will be erected.

The Provincial Government provided in the estimates for the current year, the sum of $45,000 for the erection of a Normal School building, and last spring they applied to the Dominion Government to grant a portion of the old driving park—fronting on Broadway—for a site for the proposed building. The Dominion Government consented to give the site, but afterwards, at the solicitation of the Winnipeg Cricket Club—who, from some misunderstanding, thought their grounds adjoining, and consequently their game would be seriously interfered with—were the building erected there. The Dominion Government reconsidered the matter and declined to convey the land to the Province. It is to be hoped that "the powers that be" will give the matter their favorable consideration, now that W.C.C. have received light, and find that they were making "a mountain out of a mole hill." This site is one of the finest, if not the finest, for the purpose, being next and opposite the Government buildings and in the centre of the fashionable south end, where parents are willing to pay the additional fee required to permit their children to attend the model classes in connection with the Normal School.

Regret has been expressed that in a progressive city such as this, which can boast of excellent ward schools and colleges, that the Normal School should have no home of its own in which to carry on its important work, and complete the links of the chain of our admirable system of education, because, forsooth, the noble game of cricket must not be interfered with.

When old Fort Garry was removed to make way for the onward march of civilization, the arched stone gateway alone remained. With battlements bleached and walls worn by time and tempest, it stands as an object lesson, reminding the passing beholder of the exciting scenes and stirring times which occurred within its massive portals during the early days when this country—now beginning to blossom as a rose—was known as the "Great Lone Land." Among the many suggestions regarding its preservation, one of the best is, that the city purchase the site on which it stands for a public park, the situation and the fine trees making it an excellent property for the purpose. Another suggestion is for the Provincial Government to remove the gateway, and re erect at the entrance of the grounds of either the Government House or the Legislative buildings, which, if acted upon, would combine sentiment with utility. The Historical and Scientific Society of Winnipeg invited in the autumn subscriptions towards a fund for the restoration of this interesting relic of ages passed away, but unfortunately their invitation was not responded to with the outburst of enthusiasm so common in more sentimental countries. We are a plain practical people and little affected by sentiment, especially at this season when paterfamilias is reminded daily that the coal pile is growing beautifully less, and the weather delightfully colder. Should this famed monument historique, which seems to be "nobody's child," crumble to dust, and be lost to coming generations, a blot will ever rest on the fair name of those in authority, and children yet unborn will rise up and call them—well, not exactly blessed—for their indifference and parsimony in not preserving what will then be known as the lost stones of Fort Garry.

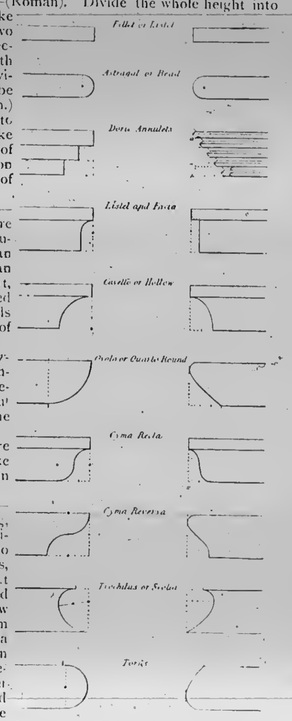
MOULDINGS.

Fillet or Listel right-angled mouldings require no description.

The Astragal or Bead.—To describe this moulding, divide its height into two equal parts, and from the point of division as a centre, describe a semi-circle, which is the contour of the astragal.

Doric Annulets.—The left-hand figure shows the Roman, and the right-hand figure the Grecian form of this building. To describe the latter, proceed thus: Divide the height *b a* into four equal parts, and make the projection equal to three of them. The vertical divisions give the lines of the under side of the annulets, and the height of each annulet, *c*, *c*, is equal to one-fifth of the projection; the upper surface of *c* is at right angles to the lines of slope.

Listel and Fascia.—(Roman). Divide the whole height into four equal parts, make the listel equal to two of these, and its projection equal to two. With the third vertical division as a center, describe a quadrant. (Grecian.)—Divide the height into four equal parts, make the fillet equal to one of them, and its projection equal to three-fourths of its height.



Cavette or Hollow.—In Roman architecture this moulding is a circular quadrant; in Grecian architecture it is an ellipitical quadrant, which may be described by any of the methods given in the first part of the work.

Ogolo or Quarter-round—This is a convex moulding, the reverse of the cavetto, but described in the same manner.

Cyma Recta.—A curve of double curvature, like former, and formed in same manner.

Trochilus of Scotia.—A hollow moulding, which, in Roman architecture is formed of two unequal circular arcs, thus: Divide the height into ten equal parts, and at the sixth division draw a horizontal line. From the seventh division as a center, and with seven divisions as radius, describe from the lower part of the moulding and arc, cutting the above horizontal line, and join the center and the point of intersection by a line which bisects; and from the point of bisection as a center, with half the length of the line as radius, describe an arc to form the upper part of the curve. There are many other methods of drawing this moulding. The Grecian trochilus is an elliptical or parabolic curve, the proportions of which are shown by the divisions of the dotted lines.

The Torus.—The Roman moulding is semi-cylindrical, and its contour is of course a semicircle. The Grecian moulding is either elliptical or parabolic; and although this and the other Greek mouldings may be drawn, as we have said, by one or other of the methods of drawing ellipses and parabolas, described in the first part of the work, and by other methods about to be illustrated, it is much better to become accustomed to sketch them by the eye, first setting off their projections, as shown in this plate, by the divisions of the dotted lines.

PERSONAL.

Mr. John Day, architect, Guelph, Ont., has recently returned from a visit to Kansas City.

F. G. Beckett, who for several years was a student of architecture in Toronto and at Cornell University, has entered upon the practice of his profession in Toronto.

Mr. Henry James, chief architect of the Militia Department at Ottawa, died at his residence in that city on the 28th of November, at the age of 55 years. Mr. James entered the Department of Public Works in 1878, and was appointed chief architect of the Militia Department in 1886. Prior to that time he practiced as a civil engineer.

CATHEDRAL OF THE HOLY TRINITY, QUEBEC.*

BY H. STAVELEY.

IN the Quebec *Gazette* of 8th Sept., 1796, appears an account of a great fire, which ten days before had devastated a large part of the upper town, and in the course of which the church and convent of the Order of Recollects were destroyed. The site upon which these buildings stood is that which is bounded towards the north by St. Anne street, towards the south by St. Lewis street, towards the west by Garden street, and on the east by the Parade Grounds, or Place D'Armes.

After the fire the government took possession of the property, and had the ruins of the former buildings levelled to the ground. Three years subsequently the Right Rev. Jacob Mountain, D. D., first Bishop of Quebec, induced King George III at his own cost to build the "Cathedral Church of the Holy Trinity," upon the site above designated. On the 11th November, 1799, a commission was appointed by Letters Patent, consisting of the Lord Bishop of Quebec, the Chief Justice of Lower Canada, the Rector of Quebec, and the Attorney General, for the purpose of building this church.

Plans and specifications were obtained, and Capt. Robe, of the Royal Artillery, was appointed superintendent of the work. For these services we learn that he received £300 in all probability sterling, or say $1,458. As the expenditure totalled about $80,000, we must conclude that the architect was moved by higher motives than those of the "Tariff" to perform the duties, which, after a lapse of nearly 100 years, one is willing to admit were well done. Possibly, however, the Captain's income was not altogether dependent upon the exercise of his architectural talent. Capt. Robe's own record tells us that he was materially assisted by Capt. Hill, of the Royal Artillery, to whom he gives credit for the "general plan". "The detailed plans of the several parts," however, he says, were drawn by himself. Further on we are told, that throughout, "I (Capt. Robe), had continually the aid of Capt. Hall's judgment and good taste." The unselfishness of Capt. Robe's statements makes one feel an admiration for him which is increased as we further hear from him in what manner he obtained the thoughts and inspiration which enabled him to produce the church, whose quiet dignity, pleasing proportions, and chaste architectural detail have combined to endear it to all whose happiness it is to worship within its walls; to such, it is, as many have expressed it, "a dear old church."

Following Captain Robe's description we learn that the dimensions of the church were taken from those of the Church of St. Martin's-in-the-Fields, London, and which is illustrated in Gibb's Book of Architecture, published in the year 1728. The east and west ends are ornamented with pilasters of the Ionic according to Palladio, and supporting a modillion cornice and pediment, but without a frieze. This idea was taken from the Pantheon at Rome, so executed, and was done to give more boldness to the pilasters for the intended height of the building. The pilasters project less than Palladio's rule directs, owing to the Point aux Trembles stone which, in the then state of the quarries, could not be got in masses large enough, without an "enormous expense." The pediments are surmounted with oblate vases, which at the angles of the building serve as flues for the stoves within the church. As the vases are not now on either pediments or at the angles of the building, it must be supposed that for some good reason they have been removed; as regards those which served as flues, they have been replaced with very everyday square chimney tops.

The tower, 24 feet square, contains 8 bells, which were placed therein in 1830 at a cost of $2,800—defrayed by subscription.

The whole designs within the church are of the ancient Ionic order, but from the proportions of different approved masters, according to their situation. The Venetian window at the east end is the Ionic of Vitruvius, according to Vignola. The pulpit (long since replaced by the one now in use) is the Ionic of Alberti, and is described as follows: "The ancient oaken pulpit placed in the centre, was in form a twelve-sided polygon, and was reached on either side by staircases entered from the front, and meeting in a platform in rear. Directly in front of and attached to the pulpit, was the reading desk with a door on each side, and in front of this the clerk's desk"—verily a three-decker of "ye olden tymes." As evidencing how time changes all things earthly, it may be noted that the pulpit now in use will most likely soon give place to a more elegant one, in memory of the late revered Bishop Williams, or if the memorial should take another form, than that of a new pulpit, the position of the latter must perforce be changed in view of the recent decision to place choir seats in the chancel, in consequence of which the pulpit will now be placed towards the north side of the nave.

Capt. Robe also informs us that the organ (long since departed) is a design of his own, and that the fret work of the great arch, over the nave, 41 feet from the floor, is his own, being an imitation of ancient stucco work, but deeming plaster to be an unsuitable material for this climate, had adopted wood—taking his idea from the common mode of ceiling rooms in Quebec, with board and batten, but aiming at a better effect, had crossed the battens diagonally.

The columns and entablature between nave and aisles, and supporting the arched roof, are of Ionic from Palladio, as correctly followed as wood work would admit.

The floors and pews, the bishop's throne, the gallery fronts, the chancel rails, etc., are all of oak. The columns are of pitch pine encased with "other wood," many times painted. The arched ceiling is entirely of pine, also painted. The chancel is semi-circular inside, on a radius of 18 feet. On the wall within the chancel to the south side of the altar are the "Ten Commandments," in two large tablets, having broad gilt cable borders. On the north side are two similar tablets, containing the Apostles' Creed and the Lord's Prayer.

The Bishop's throne is situated on the south side of the chancel, with the font immediately opposite thereto. Stalls are provided for the Dean, Archdeacon and Canons of the Cathedral to the number of eight seats, and as before intimated, in a few days choir seats for 24 persons will be placed in front of the clergy stalls, half on the north side and half on the south side of the chancel.

In the centre aisle there are about fifteen massive oaken benches used by the children of the Orphan Homes; they are movable, and in case of funerals and processions, are taken away, and the central aisle or passage is left clear for its full width of ten feet.

The records shew that the masons began laying the foundations on the 11th August, 1800. Service was performed in the church on the 4th August, 1804. Considering the size of the building—135 feet long, 73 feet wide and 40 feet high to eaves of roof—and its generally plain character, it may be gathered that no extraordinary speed was attained in its erection, but as substantiality and a due and proper regard for procuring dry, well seasoned wood, were in those days esteemed of more value than now, we may suppose that the length of time occupied in building the church was more a matter of choice than of necessity.

Beneath the chancel floor repose the mortal remains of Charles, Duke of Richmond, Lenox and Autugny, who died at Richmond, in Upper Canada, on the 29th of August, 1819, marked by a brass plate sunk in the floor, and the Right Reverend Jacob Mountain, D.D., first Bishop of Quebec, who died in the year 1825.

Throughout this venerable edifice are many handsome mural tablets in memory of distinguished persons, including those above mentioned; also Bishop Stuart, Lieut.-General Hunter, Lieut.-Governor of Upper Canada, 1805; Hon. John Stewart, Hon. Carleton Thomas Moncton, son of Viscount Galway; Rev. G. V. Housman, for twenty-nine years rector of Quebec, and about twenty others, all most interesting to examine, bringing to mind as they do, men and events of the century now drawing to its close, and of men who figured prominently in the ancient city in days of yore.

Stained glass windows of more or less merit also keep fresh in memory many citizens whose good deeds are worthy of commemoration. Foremost among these is the beautiful east end window, the central light containing the "Ascension," with the "Baptism" and "Transfiguration" in the side lights, symbolic representation of the four Evangelists occupying the space above and beneath the latter. This is to the memory of the second Bishop Mountain, third Bishop of Quebec. A very handsome window has also been erected to the memory of Judge Stuart and Judge Black (half brothers)—and others in remembrance of Archibald Campbell, Agnes Campbell, Geo. B. Symes, and Mrs. Young.

Strangers visiting the church are often puzzled as to the meaning of two old flags which hang in the chancel, all tattered and torn. They were formerly the regimental colors of H.M. 69th regiment of foot, and were deposited for safe keeping in the cathedral 22nd June, 1870, when new colors were presented to the regiment by H.R.H. Prince Arthur, then Lieutenant in the P.C.O. Rifle Brigade.

The splendid communion service of this church, consisting of twelve massive pieces of solid silver, was the special gift of King George III. They are exquisitely engraved and embossed with the Royal Arms and the Arms of the Diocese. The alms dish is a particularly beautiful work of art, the bottom being a representation in relief of the Lord's Supper.

Such is a brief and imperfect sketch of a venerable building dear to the hearts of many, not only of those still residing in the city of Quebec, but to hundreds whose lot is now cast in far distant parts. There are those whose early recollections of the old church come back to them in far-off India, in New Zealand, in old England, and our own North-West; and sure we are that often times their mental vision recalls the graceful proportions, the lofty vault, the antiquated oaken pews and open benches, dark with age, the curtained pew for vice-regal use, the Episcopal throne, whence has issued in their childhood's days the peaceful words of the benediction from the saintly lips of a Mountain or a Williams—the mural tablets and brasses, the stained glass windows—all make up a picture never to be effaced from the memory of those whose privilege it has been to worship within its ancient walls, and to join in the glorious liturgy of the Church of England, which has ever been rendered in this church with due dignity and solemnity.

* The writer of this article has drawn his information from a "Monograph" by J. C. Wurtele, Esq., entitled "The English Cathedral of Quebec" and read before the Literary and Historical Society of Quebec, 10th March, 1891.

TORONTO ART STUDENTS' LEAGUE

THE annual exhibition of the Toronto Art Students' League, occurring almost simultaneously with the appearance of their highly decorative calendar for 1894, brings prominently before the literary and artistic public, the existence of an institution which has been quietly working its way upward, and which, in very many respects holds a unique place among the art organizations of our country. Its history is neither very long nor very eventful. It is a story of steady unobtrusive development by a healthy natural growth from a small beginning to a sturdier and maturer vigor.

On September, 22nd, 1886, a circular was sent forth by Mr. A. H. Howard to the artists and art students of the city, calling them to a meeting for the formation of a club, which, relying on the added strength that comes from union, should be in a position to afford better opportunity for the prosecution of art studies than could be secured by any individual action. The date fixed for the meeting was Friday evening, Sept. 24th, and the place a little room at 56 King street east, kindly loaned by Mr. O. R. Hughes, and at that time and place the art faithful gathered together. It was by no means a large, and perhaps not a particularly awe-inspiring assemblage. The room was an upper room, and according to the story of some who were there, it was very decidedly "upper," with an approach to it that is said to have been much darker and much more difficult and dangerous than the passage to Hades as pictured by reliable writers of ancient times.

SUMMER SKETCHING CLASS. CHATEAU RICHER, QUEBEC.

These untoward circumstances, however, proved to be no bar to the fulfilment of the purpose for which the meeting was called. There were present Messrs. A. H. Howard, W. D. Blatchly, C. M. Manly, O. R. Hughes, J. D. Kelly, and others proposed for membership were Messrs. Wm. Thomson, Parker Newton and O. P. Staples. The usual resolutions were drawn up and carried unanimously, of course, and the life of the League dates from that meeting.

According to Mr. Howard's first notice, sketching from life was to be a special feature of the club's work, and, in addition to this, a paper had been prepared by Mr. Manly outlining a scheme for the carrying on of a series of monthly sketches on given subjects suited to the requirements of landscape and figure men. The meeting adopted these two features as the foundation upon which the club should build. Provision was made for supplying a model's "throne" and a model's own reflector lamp; several other lamps were added to the one already in their possession, and in a new brilliance as befitted a lover of light rather than darkness, the infant League set out on the straight and narrow path of art.

Someone had to send out notices and write minutes, and Mr. Hughes was made secretary; some one had to hold the money, and Mr. Howard was made treasurer; a president would only be in the way, and none was appointed.

For a time there were many ups and downs, with apparently a majority in favor of the "downs." Models continually failed to keep appointments and when they did appear insisted on being paid, coal-men clamored, the landlord had to be satisfied, and the frequently recurring minute "Resolved that members be urgently requested to pay all arrears of fees" seems to suggest an impending financial embarrassment. The rough places, however, gradually became smooth and the general state of affairs soon assumed a more hopeful aspect.

On April 1st, 1889, the institution removed to its present rooms in the Imperial Bank building, Leader Lane, and with its removal it cast off the most unsatisfactory features of the Bohemianism that had held a dominant place in its old habitation. With an increase in membership, accompanied by a corresponding increase in the financial receipts, it was in a position to make its new abode comfortable with a plentiful supply of light and heat, to procure additional furnishings and provide for drawing from the life several evenings a week instead of one as before. An elaborate constitution was framed and Mr. Blatchly was elected the first president. Mr. Blatchly successfully fulfilled the duties of this position until 1890, when he withdrew and was succeeded by Mr. Wm. Thomson, who in turn withdrew in 1891 and was succeeded by Mr. R. Holmes. The management of the business is vested in an executive committee of eleven members elected annually on the first Tuesday in March.

The committee for the present year is composed of: Mr. R. Holmes, President; Mr. J. D. Kelly, Vice-president; Miss J. M. F. Adams, Treasurer; Mr. W. W. Alexander, Cor. Secretary; Mr. F. H. Brigden, Rec. Secretary; Miss G. E. Spurr, Chairman House Committee; Mr. W. D. Blatchly, Chairman School Committee; Mr. J. Willson, Chairman Library Committee.

The League is a co-operative concern. All members share alike in meeting the expenses and enjoying the privileges. There are no paid officers or instructors. The membership fees are, for men, $3.00 for entrance and $2.00 per month during the eight working months of the year; and $2.00 entrance and $1.50 per month for ladies; and the amount received goes to pay current expenses. The treasurer is instructed to make a reserve sufficient to meet expenses of the summer months, and if any surplus remains, the library or the house-furnishings or the models' wardrobe derives the benefit of it. The institution is first and foremost a life-class, and seems to have set itself firmly in the one resolve, unalterable as the laws of the Medes and Persians, that it shall draw directly from the life, and if necessary every other consideration must bend in obedience to the carrying out of this line of action.

The life-class meets always three evenings a week and frequently as often as five evenings a week, and a programme is laid out, providing for about an equal number of nude and costume studies. For some time considerable difficulty was experienced in securing suitable models, and many are the funny stories told of models who prided themselves on their physique because it tipped the scale at two hundred pounds. This difficulty has, however, been largely overcome by a system of persistently paying the best prices and demanding the best service, and during last year out of nearly one hundred evenings there were only three occasions when models failed to keep their appointments, and their places had to be taken by volunteers from the members.

SUMMER SKETCHING CLASS—QUEBEC.

The lighting of the place was another problem that required time and patience and some ingenuity for its solution, and it was only after a long series of experiments that a satisfactory light for the model was secured. The model's light at present in use consists of several strong gas jets brought so closely together as to form practically one light, which is provided with a large reflector, while several movable joints in the pipe admit of its being placed in any position required. Then around the room, above and to the back of the members at work is a double semi-circle of gas jets provided with shades, which are designed to prevent an interference of these lights with the light on the model.

The series of monthly compositions still remains a most important feature of the League's programme of work. The life-class is intended to supply the means of obtaining an intimate acquaintance with the form, proportions and construction of the figure, together with a knowledge of the textures of drapery and the folds it assumes under varying conditions; and an acuteness of perception, an accuracy of drawing and a facility in the

use of materials comes from the constant exercise in these directions afforded by the work of this class. All these are, however, only the language with which the artist speaks, the medium through which he has to set forth his thoughts, and the composition class is designed to afford him a familiarity in the application of his language to the expression of his ideas in an artistic way. Three subjects are announced every month and the compositions brought in on the first Monday of the following month. "The Wayside Inn," "The Path through the Orchard," and "In Durance Vile" are the subjects for the present month, and give

LIFE CLASS—A NUDE STUDY.

a very fair idea of the character of the subjects selected. Taking one of these as a title, each member is supposed to prepare an illustration in black-and-white or color, choosing his incident, arranging his leading lines and distributing his masses of light and shade according to his own conception of the subject and his own ideas of what a pictorial composition should be.

The drawing from photographs is of a somewhat similar character. There are many of the League members who "press the button and do the rest" with no mean power, and their work does good service in this department. A suitable subject containing some point of pictorial value is selected and a number of prints of it distributed among the members. Each one, then, taking the prominent point in the print for the basis of a composition, adds figures or other accessories as his imagination suggests or the requirements of the subject demand. The illustration we present by Mr. D. F. Thomson, is from a 4×5 snap shot showing only the cow with a glimpse of the river bordered by trees. When the sketches are brought in they are numbered, and tickets marked with corresponding numbers are drawn by the contributors from the official League hat, and sketch No. 1 becomes the property of the holder of ticket No. 1, and so on until the collection is disposed of.

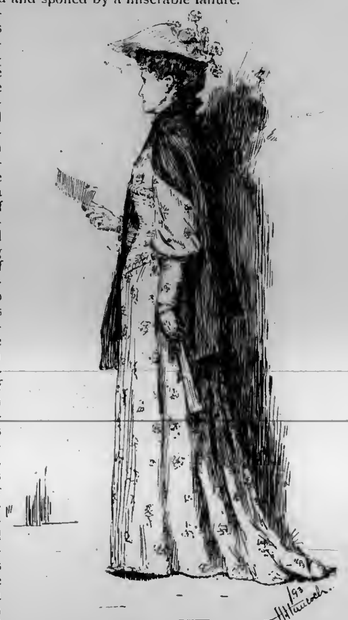
The N. D. S. L. club is a feature of the League's work which makes very serious demands upon the patience and perseverance of its members. A story is told of a musician who affirmed that a day's neglect of practice could be felt by himself, that two days' neglect was noticeable by his friends, while on the third day the public was sensible of the falling off. The N. D. S. L. club has been formed in the League to encourage among its members a system of every day practice in their work. The title is formed of the initial letters of the motto "Nulla Dies Sine Linea" (no day without a line), and every member of the League who is prepared to undertake the making every day of a sketch, however pretentious or however slight, is recognized as a member of this inner circle.

In addition to the life-class and business evenings an evening is frequently given over to the reading and discussion of papers on art matters prepared or selected by the members, followed on special occasions by "a trifling foolish banquet" with the singing of many songs and the telling of many tales. A favorite recreation for a part of such an evening is five-points. For this idle diversion, pieces of paper of uniform size are prepared and marked with five points jotted down pretty much at random, and a serious struggle ensues as each one wrestles with the problem of constructing a figure with hands fitting on two of the given points, feet on another two and a head on the fifth.

The months of summer are spent in the woods and the fields. Every Saturday is set apart for sketching excursions by the whole League, and smaller meets are generally held on Wednesdays, while special arrangements are made for more extended trips covering several days or several weeks, and in this way during the summer as well as the winter, the members are held together by a bond of common interest; and the loyalty to their institution so eminently characteristic of the League membership is not to be wondered at when one considers how intimately the interests of the individual are bound up in the interests of the body.

At the close of the summer an exhibition of the summer's work is held. It is a private exhibition to be viewed only by the members themselves and their intimate friends. There is no jury; the committee hang successes and failures alike, and many are the lessons such a collection can teach, with here a scrap of scribbler-paper bearing a delightful sketch and there a piece of good paper dirtied and spoiled by a miserable failure.

The public exhibition is always held in December. An interesting feature of the last two of these has been a collection of the original drawings contributed to certain publications prepared by the League, with a collection also of negatives, printing blocks and proofs illustrating the processes of reproduction employed. Made up as it is of persons engaged in practical art work the League had for some time entertained the idea of issuing some such illustrated publication, and this idea took practical shape in 1892. Arrangements were made for publishing a calendar for the following year, and early in December it put in its appearance in the form of a booklet of 24 pages with a lithographed cover in pale blue and gold bearing the title "Ninety-Three." There were 12 pages of drawings made up of four calendars of three months, each and illustrations characteristic of the Canadian seasons contributed by different members of the League, while on the opposite pages were appropriate quotations from the verses of Canadian writers. The favor with which this attempt was received encouraged the League to further efforts in the same line, and the kindly accorded co-operation of a number of literary people has made possible the production of "Ninety-Four," with a genuinely high degree of literary and artistic excellence. The literary part of the book consists of hitherto unpublished



LIFE CLASS—A COSTUME STUDY.

verses by a number of the poets of our country, and as many as fifteen members of the League are represented by drawings, which consist of decorative settings harmonizing with the character of the literary contributions, four calendar pages and four full-page drawings illustrating the seasons. The cover is from a delicate and graceful design in purple gray, carmine, gold and white by Mr. A. H. Howard, and the excellence of the printing and engraving is assuredly a matter of very gratifying surprise. In these publications all the contributions have been volunteered purely as a labor of love, and no member personally derives any pecuniary profit from their success. If the venture prove profitable financially the surplus goes into the general locker, and as the League relies entirely on its own resources without support from the government or wealthy patrons, its treasury frequently has plenty of room for additions.

PROPOSED CANADIAN INSTITUTE OF ARCHITECTS.

At a recent meeting of the Montreal members of the Province of Quebec Association of Architects, Mr. J. R. Gardiner gave an address on the desirability of forming a Canadian Institute of Architects, and suggested the following as a basis of organization :—

Membership to consist of all members of the four provincial bodies, viz, Ontario, Quebec, Maritime Provinces and the Western Provinces. Any architect in the Maritime or Western Provinces to be made a member direct to the Canadian Institute instead of through the Provincial body until having a body of their own.

The Council of the Canadian Institute to consist of members of the four provinces elected by their several bodies. Each Province to select two members for the first 50 members on their roll book, three members if more than 50, and four if over one hundred. The province of Québec to be represented by not more than two out of three or four members out of one nationality. In case where there is no provincial body, members of that province will be able to vote through the Dominion body.

The duties of the Dominion Association will be : 1, To amend the charter, which is to include a tariff of professional charges, which is to be passed in the Dominion Parliament so as to be legally the same throughout the Dominion, a copy of the tariff to be sent to every member; 2, To set examination papers which are to be sent to the provincial bodies on the same date, and where there are sufficient numbers of candidates to be worth while having an examination. The said examination papers to be returned after the examination, sealed, to the Canadian Institute, who will examine same and report at their meeting; 3, To set rules for the guidance of members in competitions; 4, To hold competitions for members and students at which prizes and travelling studentship will be awarded annually; 5th, To decide any arguments brought up by the provincial body; 6th, The Council to meet semi-annually in Toronto and Montreal. The first meeting to be in Toronto.

POINTS ON HEATING.

ONE of the greatest, if not the greatest, natural force in existence for the carrying off of heat is wind, and when we know something of the effects of wind in cooling buildings we learn to consider it more carefully, and plan more thoughtfully for the admission of light. For instance, in experiments with glass houses, a room heated to 70° with the outside temperature at zero, in still weather the inside temperature will be lowered 20° in five minutes and 45 seconds; with the wind blowing three miles an hour the same result will be attained in two minutes and thirty-five seconds. When, however, this wind reaches a velocity of 27 miles an hour the time required to lower the temperature 20° is only 48 seconds. Now it will be readily seen of what vast importance is the consideration of this one element alone, especially when we remember that there is hardly a day passes during the cold weather in our climate, where the velocity of the wind does not reach and many times go beyond the latter figure.

The materials entering into the construction of a building all have a known conducting power, and had we time and space we could give the ascertained conducting power in tabular form. It is not the intent of this short article to go into details, but in a few instances to give the reader some points of vital importance provided he intends to build.

The manner in which a building is put together determines largely how much of a plant will be required to heat it comfortably. If built in a loose manner, so that, as the saying is, "you can through a cat through the crevices," no heating engineer, however expert a calculator he may be, could tell to a certainty, how much heat would be required; for ofttimes a building of this construction will require many times more heat than one well built.

People often remark that were they able they would build a brick house, believing that such a house would be much warmer than a frame one. But on the contrary, experiment has shown that a frame building lathed and plastered inside, and covered outside with paper felt, sheathed and clapboarded, will lose seventy-five per cent. less heat than a brick one of the same thickness of wall. There is a loss of about 25 per cent. more heat without the paper felt than with. There is another thing that people do not often think of in the construction of buildings and that is the amount of glass that is used in the building of the structure. More window surface than just enough to properly light a room is a constant expense in cold weather and the expense is no inconsiderable amount when the time extends over a period of years. The comparative loss of heat between a square foot of glass and a square foot of 12 inch brick wall is as 1 to 6, that is a square foot of glass will lose as much heat as 6 square feet of 12 inch brick wall. Not many people consider the advantages to be obtained by the use of what is termed the double sash. Careful experiments show that when fitted with this kind of sash 75 per cent. less heat is lost than with the single window.

TORONTO ART STUDENTS' LEAGUE—DRAWING FROM PHOTOGRAPH.

NOTES FROM ST. JOHNS, N. F.

AS everyone knows, the city of St. John's has untortunately suffered from two large conflagrations; that of 1846, however, was not so disastrous as the recent one, which broke out after six weeks drought when everything was dry as tinder; owing to this and the high winds then raging, it soon got beyond control, and before night the whole of the eastern and central portions of the city was in flames. It must have been a magnificent sight, harmonizing well with the rugged grandeur of its surroundings, and enough even to satisfy the ultra-æsthetic cravings of a hero.

The loss was very great; all the principal public buildings were destroyed, as also were the leading wholesale and retail houses and the better class of residences. Except on the main thoroughfare, Water street, where it has been a necessity since the fire of 1846 to build in some incombustible material, there were very few brick or stone buildings. This fact explains to a certain extent the fire getting so great a hold on the city.

From an architectural point of view the most unfortunate occurrence was the burning of the Church of England Cathedral. This, said to be the finest specimen of Gothic on this side the Atlantic, was one of the masterpieces of the late Sir Gilbert Scott. It was designed in the style of the Early English period of Gothic, and even in its ruined condition, one can see how successfully the designer mastered his problem. The effect is obtained more by perfect proportions and careful massing of the parts than any elaborateness in detail—resulting in a noble piece of architecture.

The nave was started as far back as 18?—, but the chancel and transepts were only completed a few years before the fire. Even then the building was not finished, as it still lacked the upper portion of the large central tower. Some are sanguine that it will yet be finished, but it is to be feared that many years must pass before this consummation. Only the outside walls of the nave are left standing, the whole of the stone arcading being a mass of ruins. The chancel and transepts, although badly damaged, did not suffer so much as the nave, and these portions of the cathedral are being restored to be used by the congregation till funds permit of the whole building being finished.

It is both surprising and refreshing to find such an architectural monument in this country of fog and ice, which one usually thinks of only in connection with cod fish and seals, and which during part of the year is surrounded by a small army of icebergs, looking like so many ghosts as they silently glide by. The unexpectedness of such a thing no doubt lends an additional charm, and the building, set off by a background of rugged picturesqueness, is a pleasing sight to the stranger.

For some time after the fire the burnt-out portions of the city presented a novel and curious spectacle—streets and streets of ruined houses, and in the majority of cases only heaps of rubbish to indicate what had once been. Here and there where had stood a number of frame buildings, one would come across a perfect forest of chimneys, standing stark and bare, some looking like grim pillars set up to commemorate the fiery scourge, and others, where two breasts had been brought into one stack, like great Gothic arches of a ruined cathedral.

Some very quaint bits were to be found; indeed it needed very little sometimes when looking at a building with the electric light streaming through window openings and fissures, to imagine onesself back in the Old Country viewing some old castle or abbey by moonlight. The stunted and blackened piles of the wharves show to what an extent the fire went; not only this, but the sidewalks were completely destroyed, as were also the fish flakes on the eastern side of the harbor where the cod fish used to be dried.

The burning of the cathedral was not only the unfortunate happening of the fire, but it was the most unexpected, for everyone considered it fireproof; this belief was really the cause of its destruction, as the interior was filled with furniture and goods by those whose homes were burning, and although the cathedral stands in an isolated position, the heat of the fire ultimately cracked the lead glazing, the sparks flying through the chaotic mass of household belongings stored therein, and before anything could be done the entire building was filled with furious flames, bursting out through the roof and licking the stone walls as if greedy that nothing should be left. This instance gives some idea of the fierceness of the fire and its unrelenting hold.

The city is built around the harbor—one of the finest in the world—and rises picturesquely from the water's edge. When entering the "Narrows" one sees row upon row of houses, each one seeming to spring from that below. The view culminates in the two cathedrals, which stand like sentinels over the city, forming a fitting apex to the grouped up medley of walls and roofs. The extreme hilliness of the place renders building in some parts somewhat more difficult than usual, nor is this the only obstacle, for the city is built on solid rock, which necessitates a great deal of blasting. On the harbor side of Water street, however, there is much made up ground, and here piling must be resorted to before anything can be done. In one respect Water street when rebuilt will be much improved. Before the fire all or nearly all the buildings were finished with pitched roofs in such a way that the unfortunate pedestrian in winter often had to run for his life. This can still be witnessed in the old portion of the city. In the new buildings the roofs are all flat, as they should be when brought out to the street line in a climate like this.

Of all the new buildings put up on Water street at present, not more than a dozen can lay claim to any architectural merit, for the jerry builder has been at work, and some awful looking piles of brick and mortar meet the eye. Where he has attempted anything it is only a futile effort to copy some architect's design, with the usual result of poor detail, absurd proportions, and general incongruity.

There will be one part of St. Johns with a group of buildings worthy of any city, for within a stone's throw of the two cathedrals will be the Church of England Synod halls and schools with residences, the Presbyterian church, the Methodist college, the Gower Street Methodist church, the Congregational church, Presentation Convent, the Christian Brothers' College, the two Bishops' residences, and the Anglican clergy house. The locality, which might appropriately be called "The Architectural Square," is well-chosen, for the gently rising ground gives a pleasing relief and masses the buildings well one with another. The government and other public buildings in different parts of the city will certainly add to its architectural attractions, but beyond these and the buildings already mentioned there will not be anything that should be called architecture. There are a great many frame buildings springing up like mushrooms all over the place, having no particular merit but that of fulfilling their primary purpose of affording shelter from the elements.

St. John's has been a busy place during the past summer, and much has been done to obliterate traces of the fire. Even now, though, these are only too apparent. There will be less building next season if one can judge from present indications, and after that, affairs will be pretty much in their normal condition.

C. H. A. B.

THE CENTRAL ONTARIO SCHOOL OF ART AND INDUSTRIAL DESIGN.

Architects should take an interest in the progress of this school and it would be well for architectural students to attend some of its classes. The school is now in its fourth session and is steadily growing. The course is based upon study from the antique and from life as the means of highest training for eye and hand in preparation for design of all kinds. These classes, which are under the care of the best instructor procurable in Toronto, form the whole course for some students who are aiming merely at skill in drawing and painting. But the ultimate aim of the school is to form a centre of education in the arts of industrial design as well as in the graphic arts. On the board of directors are, besides artists and architects, several of the leading manufactures and producers of objects requiring design. Work in the precious metals, lithography and engraving, furniture, carpet weaving, stained glass and decoration are all represented on the board. An analysis of the students' register shows among the students lithographers, glass stainers, decorators, designers, carvers in wood and stone, cabinet makers, jewellers, painters and engravers. Efforts are continually being made to extend the usefulness of the school in the direction of teaching industrial design. The larger the school becomes the greater will be its power of enlarging this department. For this reason it is to be hoped that it will continue to increase and be such a centre of teaching in art as will realize its name to the full. It is better to have one good school than many indifferent ones. Centralization of schools means concentration of the students' fees and power therefore to employ the best teachers. One teacher can handle many students, and there is a distinct gain to the art student in being one of a large number rather than one of a few. In no other class of work is the benefit of association with others so great. The students in the large ateliers of Paris derive as much benefit from their manner of working together as they do from the occasional visits of the great man under whose name they are associated. It would be a good thing for Toronto and for the country if this school can fostered so as to become a great central school of art with funds large enough to attract to its teaching staff men of the best class.

It is worth pointing out to architects that subscribers of $10 per annum are entitled to send one student to the evening classes. It may sometimes be worth while to invest this much in training a promising student who cannot himself afford to pay for instruction.

PAINTING INTERIOR WOODWORK.

Some people seem to think that as soon as wood is used inside a house, there arises a deadly sin against the proprieties if it be painted, and hence all interior woodwork should be finished in its natural colour and grain. How can they reconcile the uncompromising hardness and coldness with which an unstained or unpainted piece of oak or white pine will obtrude itself into any scheme of decoration consisting of soft warm colours. It were far better to stain the wood in harmony with the general decorative effect—not to imitate some other wood, be it understood, but to get the desirable colour, for harmony with its surroundings. But really there can be no objection to good honest paint in soft, flat colour, or in brilliant and polished china gloss if it be desired. If it be honest to paint the outside of our dwellings in colours to please us, what harm can there be in choosing such colors as may be agreeable for our inside finish, and boldly painting the woodwork to suit our decorative scheme? This idea is gaining ground, and the area of varnish-finish is almost ended; or at least the time when varnish alone was considered to convey a title to respectability, and when painted interior woodwork was supposed to be sure indication of poverty and social inferiority, for now even the richest and most favoured socially dare to paint their woodwork, if its suits them best to do so.—*Furniture and Decoration.*

CANADIAN BUILDING STONES AT THE WORLD'S FAIR.

A PROMINENT and interesting feature of the admirable collection of Canadian minerals shown at the World's Fair, was the variety of specimens of building stones from the several provinces of the Dominion. These specimens were collected by the Dominion Government Survey at Ottawa, and by the Ontario Government Mining Bureau, Toronto, and from these sources we have obtained the particulars hereinafter printed in regard to them:

In material of this description, Ontario is particularly rich. Many excellent varieties of limestone, freestone and sandstone occur. The first named yields an excellent quality of quicklime. The Guelph dolomites are well adapted for building purposes. The hard, close grained, Kingston limestone is quarried from beds varying in thickness from six inches to a foot, and although of a dark grey color when fresh, it bleaches to an agreeable whitish hue in the course of a few years.

At many places the crystalline limestone is fine enough to work as marble. At Dorion in Thunder Bay District, it is of a flesh color, variegated with veins. Elsewhere in the stone district is found an argillaceous limestone of a milk white, branded with pale grey, and of a rich brown and pale green (mottled), known as Penessie Marble. Another variety called "Serpentine Marble," possesses good colors, but does not take a high polish. Renfrew County yields the largest quantity of marble for commercial purposes.

Good marble, black, white and pink is found at Madoc in the County of Hastings, and Barrie township in Frontenac County.

At Cornwall, on the River St. Lawrence, a fairly good quality of black "marble" is being worked.

Extensive deposits of Medina sandstone are worked at the Forks of the River Credit in the County of Peel.

Several points along the north shore of Lake Superior yield sandstone of the very best quality.

Good granite, rich in color and free from flaws, is found in many places; West of Fort William it occurs of a brownish grey in some localities, elsewhere it inclines to a pale purple. Near the City of Kingston the color strongly resembles that of Peterhead granite, but is a brighter red.

Black Syenites are found along the north shore of Lake Superior.

In addition to Ontario's exhibit, there were shown at Chicago some fine samples of sandstone of a fine grained nature by New Brunswick, Nova Scotia, North West Territories and British Columbia, together with a large collection of marbles and granites from various parts of the Dominion shown by the Geological Survey.

The following particulars of the character and variety of Canadian exhibits of building stones, the purposes for which they seem to be adapted, and the sources of supply, are expected to prove of much interest to architects, engineers, builders and others interested in knowing what native material in this line is obtainable.

LIMESTONES.

John Hyslop, Goderich, Ont.—Six-inch cube of limestone, dressed—About thirty feet of this rock, in beds from three to six feet thick, is exposed in a cliff at Mr. Hyslop's quarry, and large blocks can be easily obtained. The stone makes good lime, but is chiefly used for building purposes. The piers of the Maitland bridge at Goderich, and the Goderich Jail are built of it.

Geological Survey—Six-inch cube limestone, dressed—From the quarry of Mr. White, Pembroke, Ont. The beds are from three to twelve inches thick. The stone is largely employed in the town of Pembroke, and has been used to some extent for bridges, &c. An analysis of a specimen, similar to that exhibited, gave,—carbonate of lime, 83·96; carbonate of magnesia 9·29; carbonate of iron, 0·69; insoluble, 6·06.

Geological Survey.—Six-inch cube of limestone, dressed—From the quarry of Mr. John Mahoney, Que.

Geological Survey.—Six-inch cube of limestone, dressed—From the quarry of Mr. C. B. Wright. These quarries have been extensively worked for a long time, the beds, which are almost horizontal, having been removed over a large area for a depth of fifteen feet. Blocks ten by five by three feet can be taken out, and are sold at from 25 to 35 cents per cubic foot. Most of this stone is used for building purposes in the city of Ottawa. The upper portion of some of the beds presents a banded structure, the lower portion being finely granular. The stone is easily dressed and susceptible of high polish and sharp tooling.

Geological Survey.—Six-inch cubes of grey and white limestone, dressed—From an extensive band of crystalline limestone at Portage du Fort, Lichfield, Que. The beds, which vary in thickness, are sometimes grey in color, alternating with others which are almost pure white. The stone takes a good polish and weathers evenly.

Duddswell Marble and Lime Co., Marbleton, Que.—Six-inch cube of limestone, dressed.

Geological Survey,—A six-inch cube of limestone dressed—Montreal, Q.

Geological Survey.—A six-inch cube of limestone, dressed—Point aux Trembles, Q.

Worthington & Co., Montreal, Q.—Six-inch cube of limestone, dressed—At the quarry of Messrs. Worthington & Co., Terrebonne, Q., the beds of limestone worked are from eight inches to four or five feet thick, and are cut by joints from ten to forty feet apart, which greatly facilitates the quarrying. The stone is of excellent quality, and blocks of any required size can easily be obtained. It is carried to Montreal, a distance of sixteen miles, in scows towed by steam tugs.

Charles Dussault, La Chevrotiere, Q.—Six-inch cube of limestone, dressed—The Trenton formation, which is the next in succession above the Birdseye and Black River, yields excellent building stone, at Montreal, at Chevrotiere nearly forty miles above Quebec, and at many intermediate places. The beds are from three to eighteen inches thick at the bottom, passing toward the top into a black nodular bituminous limestone; which is interstratified, in irregular layers of from one to three inches thick, with black bituminous shale.

Public Works Department, Quebec, Q.—Six-inch cube of limestone, dressed, from Deschambault quarry, Que.—In this quarry the beds vary from nine inches to three feet in thickness, and the finest stone suitable for all the better class cut stone work can be obtained. It has been used extensively in the cities of Quebec and Montreal for the last thirty years.

Geological Survey.—Six-inch cube of dolomite, dressed—This greyish-brown dolomite is from the quarries of the Canadian Pacific Railway, and Mr. McEwan, at Beckwith, Ont. It is used for window and door sills, and also largely for general building purposes. The stone when first quarried is very soft, but hardens on exposure. The roundhouse at Brockville, as well as bridges and culverts along the line of the Brockville and Ottawa Railway, are built of it. Blocks 3 × 3 × 15 feet can be obtained.

The following exhibits were included in the Ontario Government collection:

P. A. Johnston, St. Davids, Ont.,—Six-inch cube, dressed, from Queenston Quarry.

Union Co-operative Stone Co., Thorold, Ont.—Six-inch cube, dressed from Thorold quarry.

Robt. McInnes, Owen Sound, Ont.—Six-inch cube, dressed.

T. J. Kilpatrick, Kingston, Ont.—Six-inch cube, dressed, from Wolfe Island Quarry.

John Battle, Thorold, Ont.—Small rough block,

D. Kennedy, Guelph, Ont.—12 inch dolomite cube, dressed; 6 × 9 block, dressed.

P. A. Johnston, Queenston.—Paving block.

Geo. Farquhar, Toronto Stone Co., Toronto, Ont.—twelve inch cube, dressed.

Dressed Magnesian blocks, from Elora, Ont.

Robt. L. Gibson, Beamsville, Ont.—Dressed block, 2 × 1 × 1 foot.

City of Ottawa.—Dressed and polished block, 20 × 12 × 7 inches.

Town of Thorold.—Cubic foot, dressed and polished.

Town of Fergus.—Magesian block, black, dressed.

Mr. White, Anderton, Essex Co.—9 inch cube.

Pelee Island, Ont.—Six-inch dressed cube.

SANDSTONE AND FREESTONE.

The following exhibits were included in the collection of the Geological Survey, Ottawa:—

Vancouver Coal Mining and Land Company, (Limited), S. Robbins, Supt., Nanaimo B. C.—Six-inch cube of sandstone, dressed.—From quarries on Newcastle Island, B. C. Among the coal-bearing rocks on Newcastle Island there are beds of brownish-grey sandstone, which afford excellent material for building and flagging stones. The upper beds are of the best quality, and it was from one of these that Mr. E. E. Emery, of San Francisco, obtained the stone for the construction of portions of the mint in that city. Blocks for pillars were taken out, which after dressing were twenty-seven feet six inches in length, and three feet ten inches in diameter. Flagstones, with even surfaces, as much as ten feet square, have also been obtained, and are easily quarried, and it is not unlikely that some of the measures will afford good grind-stones.

The Chicago and Verte Island Stone Co. of Chicago, U. S. A.—Six-inch cube of sandstone, dressed.—From quarries on Verte Island, Nipigon Bay, Lake Superior, Ont. This stone is known to have a thickness of thirty feet. The upper bed alone is twenty feet thick. Mr. Geo. P. Merrill, of the United States Geological Survey, recently made a microscopic examination of it, and found it to be composed of quartz and felspar, with a very little mica. The crushing strength is reported to be 11,500 lbs. to the square inch. Thus far it has been used principally in the United States.

Credit Forks Stone Co., Credit Forks, Ont.—Six-inch cube of sandstone, dressed.—From quarries at Caledon, Ont. The brownish-red variety of the stone occurs in beds six feet thick, and is underlaid by a greyish or whitish sandstone. The beds have been stripped over an area of four acres and the stone removed to a depth of fifteen feet.

Six-inch cube of sandstone, dressed.—From Skead's quarry, about four miles from Ottawa. The stone is very fine grained, of a brownish grey colour, and would make handsome buildings. It appears, however, to be difficult to quarry, the blocks obtained being of very irregular form, owing to somewhat conchoidal fracture. A dressed specimen, about seven feet long, may be seen in the coping of the wall round the grounds of the Parliament Buildings at Ottawa, but it can only be distinguished from the adjoining blocks of Ohio stone by its finer texture.

Six-inch cube of sandstone, dressed.—From Mr. John Rankin's quarry, near Pembroke, Ont. The stone occurs in beds from six to twenty inches thick. It is easily worked, and although soft, is tough and retains sharp angles. The Pembroke court house is built of it, and it is sometimes employed for making monuments.

Caledonia Freestone Company.—Six-inch cube of sandstone, dressed.—From quarries at Rockland, N. B.

R. B. Heustis.—Six-inch cube of sandstone, dressed.—From quarry at Wallace, Cumberland County, N. S.—The specimen contributed by Mr. Heustis is from a quarry at Wallace situated about 150 feet above high water mark, and only 600 yards from a good harbor. The beds are horizontal, and for the first fifteen feet from the surface vary in thickness from four inches thick to two feet; below this there is a massive bed, which according to Mr. Heustis, is from three to eight feet thick. It is divided into rectangular masses by joints from six to fourteen feet apart, which greatly facilitate the quarrying. The price of the stone delivered on board vessels in the harbor is from forty to sixty cents per cubic foot. Blocks containing 160 cubic feet have been shipped. The quarry is held by a stock joint company.

Nova Scotia Advisory Board.—Nine-inch cube of brown sandstone, dressed; nine-inch cube of chocolate sandstone, dressed.—From McKenzie's quarry, Pictou, N. S. In addition to the above, the Nova Scotia Advisory Board exhibits eleven dressed specimens of sandstone and two of limestone, from various localities in Nova Scotia.

The following exhibits were included in the Ontario Government collection:—

Carroll & Vick, Toronto.—Six-inch dressed cubes brown and grey freestone; block of Credit Valley brown freestone, (medina formation) 2′ 7″ × 2′ 3″ × 2′ 10″. The top is artistically carved in Romanesque style, having in the center of carving a shield bearing the Ontario coat of arms. These specimens were taken from Credit Forks Quarries, 40 miles north west of Toronto, on C. P. R railway.

Dressed block freestone (banded) from near Perth, Ont., also twelve-inch dressed cube (double banded), twelve-inch dressed cube (white,) window sill (white), from same locality.

Chicago and Verte Island Stone Co., Port Arthur, Ont.—Dressed six-inch sandstone cube; dressed six-inch cube (red).

P. M. McDonald, Perth Ont.—Half dressed six-inch cube.

Indian Mission Quarry, McKay's mountain, Thunder Bay.—Specimen argillaceous sandstone.

C. F. Gildersleeve, Kingston.—Small rough block red sandstone, from quarry near Kingston; sandstone modules, sandstone (red and buff banded) and sandstone (deep red) from Cataraqui Quarries.

McKellar Bros., Fort William, Ont.—Small rough block white sandstone; half dressed six-inch cube from quarry at Rossport, Nipigon Bay.

J. C. Goddard, Toronto, twelve-inch dressed freestone cube, from quarry Orangeville, Ont.

GRANITE.

The following exhibits were included in the Ontario Government collection:—

Rat Portage collection (no locality given)—large rough hewn blocks, colors red and grey, and from Ignace station on the C. P. Railway, 150 miles west of Fort William, a block (banded gneissoid) 5½ × 5½ inches, dressed and polished, also block 6½ × 10½ × 8 inches, dressed and polished. The material is said to exist in immense quantities in the locality from which these specimens were taken.

From Pearl River Station, Township of McTavish, west of Black Bay, Lake Superior.—A six-inch cube dressed and polished and a block 5 × 5¾ × 8 inches, dressed and polished. This stone is wine color, of fine grain, and

seems well adapted for monumental work, pillars, etc. It exists in area of many square miles.

From Kingston, Ont.— Block (red) 6 × 10 × 6¾ inches, dressed and polished; round column (red) 7 inches high and 5 inches in diameter; seven-inch cube (red) dressed and polished; tapering pillar (red) 22 inches high and 6 inches square at base, polished.

W. C. Caldwell, M. P. P., Lanark.—Two large blocks, dressed; polished on one side. The location in Renfrew County, from which these specimens were taken is an extensive one. The quality and color of the stone are excellent. Mr. Caldwell also showed small polished specimens from various localities in the Counties of Frontenac and Lanark; small specimens, illustrative of various localities in Ontario, from Lake Huron to the Ottawa Valley, and a large block (red) dressed and polished on one side, from the north shore of Lake Huron.

The following exhibits were included in the collection of the Dominion Geological Survey:—

R. Forsyth, Montreal—Cube of granite.—From Beebe Plain, Stanstead, Q.—Granite occurs in abundance in Barnston, Stanstead, and elsewhere in the "Eastern Townships" of the Province of Quebec. In the last-named township it occupies an area of six square miles. The granite is composed of white quartz, white felspar, and black mica, and takes a fine polish. It is easily worked, and in many localities can be obtained in blocks of any required size. The new Eastern Townships Bank at Sherbrooke is built of it, and it was used many years ago for bridges on the St. Lawrence and Atlantic Railway. Mr. Forsyth also exhibited a 6 inch cube dressed, and a small column, dressed, from quarries at Birch Cove, Halifax, Nova Scotia.

Milne, Coutts & Co., St. George, N. B.—Red granite, polished.

Hon. John Young, Montreal.—Specimens of salmon-red syenite, from the east side of the harbor of Kingston. The rock is exposed for a length of more than a quarter of a mile, with a breadth of upwards of 100 yards, and has a face of ninety feet, overlooking the harbor. It dresses easily and takes a fine polish.

Bay of Fundy Red Granite Co.—A monument of red syenite polished, three feet two inches square at the base, and fifteen feet high. Value $1000; four head-stones polished; two urns; from quarries at St. George, Charlotte County, C. B.

MARBLE.

The following exhibits, formed part of the Ontario Government collection. In every case except that of Renfrew marbles, the specimens were obtained from surface deposits. At Madoc and Hungerford a little has been done by way of development, but not enough to test fully the qualities of the deposits:—

Jas. E. Harrison, Bridgewater, Ont.—White dressed and polished specimens and a grey and white banded six-inch cube, dressed; white column and base; specimens of grey marble.

J. Smith & Co., Sydenham, Ont.—Small blocks of pale green clouded and pinkish white, half dressed and polished on one side; and a grey banded block 6½ inches, polished.

C. P. Brown, Sault Ste Marie.—Small rough specimen of green clouded, from Echo Lake, Thunder Bay.

From 20 miles west of Wolfe River Station on the Canadian Pacific Railway, Thunder Bay District, a small block, black and grey, 5¾ × 5¾ × 3 inches, polished—It occurs plentifully as a horizontal bed about twenty feet thick, interstratified with indurated red marble, and with marble of other colors. This is a beautifully variegated marble that might be effectively utilized for mantels and other indoor work. From the same locality was shown a small slab 6 × 13 × 1 inch, light purple, veined with greenish grey and brown.

From west of Nipigon Station, a slab 21 × 9½ inches, polished, of so-called Nipigon marble.—Plentiful on line of Canadian Pacific Railway, close to Nipigon Bay. Approaching argillite in composition; does not take a high polish.

Collections of "Marbles" from Nipigon series, Wolfe Lake, Thunder Bay District.—This handsome collection of polished cubes, varying in size from two to six inches, represents material said to exist in considerable quantities. Though not susceptible to high polish, they are rich in color, the tints varying from a mellow grey, through deeper shades to light pinks, purples, greens, and browns. Some are banded, some clouded, and others veined. For mantles, panels, mosaics, and interior work of various kinds, they produce a good effect. In quality they are too argillaceous to be classed as true marbles.

The following exhibits from Madoc, Ont., were made by Mr. P. W. Ellis, Toronto, for the Hungerford Marble Co.—Small block, black, 6 × 6 × 3½ inches; paper weight, black, 3½ × 3 × 1 inch; paper weight, black, with white streaks, 3½ × 3 × 1 inch; turned paper weight, pink; turned paper weight, grey, dark mottled; turned pillar cap, grey, dark veined, 13 inches high; slab, white, for table top 20 × 24 inches; white, turned pillar, 14 inches high; white card receiver; pillar, black, 6 feet 6 inches high; white block, 8 × 9 × 9½ inches, dressed and polished; white, 10 inch cube dressed and polished.

Crescent Gold Mining Co., Malone, Ont.—White slab, 7 × 30 inches, reported to possess excellent working qualities.

The following specimens were obtained from the Sanford property, township of Barrie, County of Frontenac:—

Pink of rich tint, small pillar 13 inches high; pink, block 6½ × 6 × 5; pink, slab 12 × 8 inches; white slab 13¾ × 14¾ inches; white turned pillar 17 inches high and 5 inches in diameter; grey, with brown veins, pillar 14 inches high and 4 inches diameter; white slab 10¾ × 15¼ inches; grey, light clouded, slab 10¾ × 15¾ inches dressed and polished; pinkish white with dark grey veins, slab 10 × 11½ inches, dressed and polished; white, with brown veins, small pillar 14½ inches high, 4¾ inches diameter, dressed and polished; white, with brown veins, 9 × 11½ × 2 inches, dressed and polished; white, with brown veins, 6 inch cube, dressed and polished; white, 6 inch cube, dressed and polished; grey, small block 6 × 6 × 5 inches, dressed and polished; grey, small block 5 × 5 × 4 inches, dressed and polished; greyish white, with dark grey veins, dressed and polished.

The following exhibits were included in the collection of the Dominion Government Survey:—

From Mount Mark, near Horne Lake, Vancouver Island.—Short column and pedestal of marble.—The crystalline limestones of Mount Mark occur in very thick beds, interstratified with diorite. They are capable of affording a great variety of marbles suitable for ornamental purposes, though not fine enough for statuary. White, dove-gray, and bluish tints are the most common; but some varieties contain reddish and greenish bands. Large blocks, entirely free from flaws, could be easily obtained.

From Arnprior, Ont.—Marble, striped, light and grey.

From Gloucester, Ont.—Brownish grey specimens.

Grenville, Que.—Yellowish-white.

Point Claire—Brownish black and greenish black specimens.—In the township of Grenville and its augmentation, a band of crystalline limestone, containing *Eozoon Canadense*, has an extensive run through the country; and affords in many cases a peculiar variety of marble, having a white ground marked with small green spots of serpentine, which occasionally forms angular masses several inches in diameter. The serpentine usually runs in bands marking the stratification of the rock. These bands, as in the case of the Arnprior marble, are sometimes even, and at other times corrugated, giving diversities of pattern. Sometimes the serpentine, instead of green, is sulphur yellow, as in the specimen from Grenville. In many parts of the country, the Laurentian limestones are tolerably free from foreign minerals, and give white marbles. These, however, are usually too coarse-grained for statuary purposes, and sometimes they are barred with slightly different colours. Such is the case with the crystalline limestone occurring in the township of Elzevir. Many years ago, a mill for cutting and polishing marble was erected on the Calumet, but the demand for the marble was not sufficient to make the enterprise profitable.

L'Original, Ont.—Grey marble, with thickly disseminated white spots; Dark gray marble, with more thinly disseminated white spots.—The bed from which the specimen (*a*) is taken, varies in thickness from three to six inches; it is near the surface, and easily quarried, but has hitherto been but little used. The locality is a quarter of a mile from the south bank of the Ottawa, four miles west of L'Original village, and sixty-four above Montreal. The white spots are caused by small bivalve shells (*Atrypa plena*) filled with calc-spar. Of the darker variety (*b*) there are two beds, of six inches and one foot respectively near the surface, and overlying the previous bed (*a*). Blocks large enough for chimney-pieces and tables are readily obtained.

Jas. Worthington & Co.—Montreal, specimen of grey marble.

From Montreal, Que.—Specimens of grey marble from the Trenton and Chazy formations.

From St. Dominique, Que.—Specimens of dove grey and dove grey with white spots.

From St. Armand, Que.—Specimens of white, white clouded with pale green, and dove grey marked with white and black. The material, which takes a high polish, occurs in great abundance in the vicinity of Phillipsburg on Lake Champlain.—About a mile and a half south eastward from Phillipsburg there occurs a black marble, similar to this specimen. The beds dip to the eastward at an angle of about twelve degrees; a quarry was many years ago opened on one of them, which has a considerable thickness. The stone was exported to the United States, and much esteemed in New York, but the opening of quarries of black marble at Glen's Falls, where there is good water power, interfered with the demand, and caused the enterprise to be abandoned.

From Caughnawaga, Que.—Specimens of grey and grey with red spots.—Similar grey marbles with red spots (generally corals), occur in the same formation as the rock of Caughnawaga, behind the city of Montreal, and on Isle Bizard. In all of these localities the rock is filled with fossils, which are plainly seen on the polished surfaces.

From Dudswell, Que.—Specimens of cream white, striped with yellow; dark grey and yellowish, fawn yellow and white.—The specimens exhibited of cream white and yellow, and dark grey and yellow, are from beds that overlie one another. The yellow streaks in both of these marbles are composed of dolomite, while the light ground of the one, and the dark ground of the other, are of carbonate of lime. When the dark grey approaches black, which it sometimes does and the yellow streaks are narrow, the marble bears a strong resemblance to the Porter marble from Northern Italy, sometimes known as *black and gold*. On analysis, the resemblance between the two is further sustained by the fact, that in both cases the ground is a pure limestone, and the yellow veins are dolomite.

From Esquimaux Island, Mingan group.—Specimens of drab marble.—This drab coloured marble occurs in great quantity on Esquimaux Island, of the Mingan group, where the stone might be easily loaded on board of small vessels. It cuts with great facility, and takes a uniform polish.

From St. Lin, Que.—Polished slab of red marble.—At St. Lin about thirty miles from Montreal, there are massive beds of limestone, portions of which are of a red colour, and afford a good marble.

From St. Joseph, Beauce, Que.—Polished slab of red marble veined with white.—This handsome marble occurs near the River Guillaume, associated with red shales and sandstones, resembling those of Sillery, near Quebec. The bed is from ten to forty feet thick, and in a distance of half a mile on its strike is exposed in four places. The marble takes a fair polish, and could be obtained in large blocks. The locality is forty-five miles south of Quebec.

From Hull, Que.—Polished slabs, spotted green and white.

From Arnprior, Ont.—Polished slab and ten inch cube of marble striped, light and dark grey.—Near the mouth of the Madawaska, in the township of McNab, a large band of crystalline limestone is exposed. The rock contains dark bands, which are sometimes narrow and sometimes wide, producing, where there are no corrugations in the layers, a regularly barred or striped pattern. The colours are various shades of light and dark grey intermingled with white. The dark colours are due to a greater or less amount of graphite, which is intimately mixed with the limestone. The texture of the stone is somewhat coarse, but it takes a good polish. Considerable quantities were employed in the decorative work of the Houses of Parliament at Ottawa.

From Horton, Ont.—Polished slab of grey crystalline marble.—This stone has been largely employed for monuments. Blocks from a few inches to several feet thick can be easily obtained.

From Texada Island, Strait of Georgia, B. C.—Polished slab of grey marble with black spots and veins; polished slab of greyish-white marble with brownish veins.—A quarry has been worked to some extent on the shore of Malaspina Strait near the north end of the island. Marbles like those exhibited form low cliffs along the shore for several miles.

NOTES.

In the N. B. Section were shown some handsome granite monuments, exhibited by Messrs. Epps, Dodds & Co., Milne Coutts & Co., St. George; Tate Meeting & Co., St. George, also exhibited polished granites.

One large block of sandstone, dressed, was shown by C. E. Fish, Newcastle, N. B.

In the Nova Scotia section was a collection of dressed cubes of sandstone and granite exhibited by the Government of Nova Scotia.

The North West Territories supplied some dressed cubes of sandstone, exhibited by Leonard Gaetz, Red Deer River, J. G. McCallum, Calgary, A. McKay, Indian Head.

In the Quebec Court were some dressed cubes of granite, gneiss and limestone from different places in the province exceptionally fine limestone from Bryson and Dudswell was also shown, the latter constituting a very handsome marble.

The New Rockland Slate Co., Rockland, Que., exhibited a large block of slate, together with manufactured articles, such as sinks, wash-troughs, blackboards, roofing slates, etc.

When papering on white-washed walls it is necessary to first size the surface. Use good glue size and add a pint of malt vinegar to the gallon of the size. The vinegar acts upon the whiting and causes the paper to adhere strongly and permanently.

BRITISH COLUMBIA INSTITUTE OF ARCHITECTS.

THE third annual meeting of the British Columbia Institute of Architects took place in Victoria on the 2nd of December, 1893. The society comprises twenty-four members, of whom the following were elected as officers and Council for the ensuing year:

President—C. O. Wickenden, Vancouver.
1st Vice-President—R. B. Bayne, Victoria.
2nd Vice-President—C. J. Soule, Victoria.
Hon. Treasurer—E. Mallandaine, Victoria.
Council—C. E. Sharp, New Westminster; Thos. Hooper, R. E. Day, J. G. Tiarks, S. A. McClure, Victoria; A. E. McCartney, Vancouver; Thos. Honeyman, Nanaimo.
Hon. Secretary—C. E. Sharp.

The business transacted was, excepting one subject, of the usual ordinary routine kind.

The question as to whether the "Architects' Registration Bill" was to be brought before the Legislature in the coming session was discussed, and the outcome of the discussion was that it was the opinion of the meeting that it would probably best further the object to be attained, to place the society in communication with the eastern societies to ascertain what if anything was being done by them, and to consider the question as a Dominion one. With this object, the Secretary of the society will be instructed by the Council to communicate with the eastern societies on the subject.

The competition question has been unfortunately of the too frequent heart-burning and unsatisfactory character, and on a motion before the meeting it was determined to communicate with the Ontario society, obtain copies of their particulars of competitions, and if considered suitable to our wants, adopt them.

The question of the recent competition in Victoria for ward schools occupied considerable attention of the meeting. It was the opinion of the meeting that after a public competition had been called for, faith was broken with the competitors in the action of some of the members of the School Board in the selection of an inferior plan for one of the wards. A circumstance that lends additional force to this professional opinion is, that the ratepayers of the North Ward petitioned against this selection for a school building being carried out on such a design for that ward.

The report of the Council for the closing year was accepted and passed, and the meeting closed with the following address from the vice-president occupying the chair:

VICE-PRESIDENT'S ADDRESS.

In the unavoidable absence of our President, the duty of making your presidential address devolves upon me as your senior vice-president. I regret it to some extent, as the action I have lately taken in your Council may be looked upon as likely to prejudice me in my remarks when touching on the vexed question of competitions.

Since our last meeting in Vancouver, a period of unexampled dullness has prevailed in our profession—we have not a single new member to welcome; at the same time, so far, we have not a single new resignation to record, and I think with brighter times and more doing that we might count upon several new men who have not yet joined us. I hope that the seeming indifference in lack of attendance of many of our members does not foreshadow dissolution. Busier times may perhaps bring with it a little more enthusiasm and interest; if such improvement does come, I venture to express the hope that we may in the coming year meet more frequently than we have done in the past one, and that our meetings may be, as they should, the means of stimulating energy and enthusiasm amongst us, and I would urge upon all to make some little effort to a better attendance (to-day half our members are not present), and to make occasionally if required some self-sacrifice in order to attend, and to contribute from your individual stores of experience and knowledge for our mutual benefit. In Victoria we inaugurated at the beginning of this season a series of bi monthly meetings for the reading of and discussion after of matters professional, but this for lack of attendance fell through at the fourth meeting.

You all know the fate of our "Architects' Bill," more badly beaten than its predecessor. We have already discussed this question, and our decision is quite in accord with my own feelings that we should wait, as decided on Mr. Soule's proposition, and put ourselves in communication with our eastern brethren.

Since our last annual meeting, at which we patted ourselves on the back at our success in regulating, or being in a fair way to regulate, public competitions, we have passed through three. In the first—the Government Official Buildings, which fell to the lot of a Vancouver architect—happy proof of the honesty of Victoria architects and freedom from undue influence—and a happy instance of the satisfaction following the selection of professional arbitrators. Mr. Sorby, of our city, secured one of the five honors, with, to my way of thinking, a charming bit of design, most artistically executed, thoroughly English in character, the work of an artist. Next we have to record the competition for the Protestant Orphan Asylum, under conditions more or less framed by ourselves, and carrying a clause prohibiting any canvassing of the committee—a work brought to coapletion and recently opened—a competition that carried with it so far as I have heard no dissatisfaction. Of the third competition, the least said the better; it goes to show that all our self-congratulations last year were premature. I hope our action will prevent repetition.

About this time last year, at a Council meeting, some of your members formed themselves into a self-constituted committee, to frame by-laws for this city, and after some five or six meetings had been held, this too fell through—not because we were too busy to devote the time, but I fancy from an unexpressed feeling that our work, while voluntary, was superorogatory, and perhaps if completed would have been a thankless task; it certainly would have been valuable if worked out. It also, I think, grew so in magnitude as we worked at it that, without admitting it to each other, we shirked it.

In occupying this chair to-night, I am going to indulge in a little criticism of the past year's work in the buildings of this city. Of course, you can form your own opinion of my remarks, and after I have finished criticize them at your will.

There are few completed buildings in Victoria of the past year that will call for much more than a passing notice. A departure from the general run is seen in the Temple building offices of Messrs. Ward & Co., a red brick and terra cotta building that suffers from its close juxtaposition with its high neighbor, and is dwarfed by it. I would more like to feel with reference to it that the well designed and treated terra cotta detail was made for it, and not its façade for the detail. There is in some grilles to the ground floor windows some very good iron work.

The Davie block is another new block I would make a passing reference to. Some of you will remember the *Times*' criticisms, and the criticisms on such criticisms that followed, and the amusing reference to "Dog Latin" styles—Romanesque. To one who has studied Romanesque art in its native country such references will certainly be amusing. The term Romanesque as applied out here is a misnomer in every sense. The Five Sisters block was so called by the same authority when the designs for it were first seen. I do not like the trabeated architecture affected here by some of our architects in the use of roughly hewn stone; it looks coarse, especially when used in a third and fourth story; and the zinc shams, such as find place in this block, are I think to be condemned as untruthful and unconstructive. Better put up with plainer and simpler forms if economy has to be taken into account.

The new Protestant Orphans' Home, perched as it is on a hill, might have had a more effective outline than it has, and the money spent on brick decoration, which is not seen until close under the building, might have been devoted to carrying up the roof of the semi-circular portions of the front.

It remains to be seen what the two new ward school buildings will be when completed. There is a breadth of treatment about the North ward building that shows up effectually at present, if it is not going to be crushed in appearance by the roof.

I think that I may include the Board of Trade new building in this year's completion. I do not like it in hardly a single feature. I do not like to see a building, standing as it does, the end and flank to the sea approach to Victoria, as factory-like in its want of treatment as this is, and there are bits of eccentricity in the façade that seem to be simple indulgences as freaks of design—objectless. It is an error, I think, to put at such a height as is done here minute detail, and in the crowning feature of the cornice grotesqueness culminates in the intersecting ornaments—of tin—at the corners. The middle stage is decidedly weak in design, and the plan seems to me more of a puzzle than an economical arrangement, in its broken stairs and crooked passages, and is badly lighted in many places.

I was one of the Victoria members of our Association who attended last year's meeting in Vancouver, and in the company of your other vice-president made the most of our time in seeing that city—grown out of all recognition to me since taking it in my visit from India in the latter part of 1888. We paid considerable attention and went over some new buildings under construction—and this period of construction is, as you all know, the time when shams stand unveiled, and when true construction can be seen. We were both forcibly impressed with the difference in character of the work done in Victoria and that done in Vancouver. In Vancouver the buildings have a degree of solidity and truth in them that is sadly wanting in buildings in our Capital City; ours are only too often what I look on as mere match-box constructions. I think our architects should kick against it. I know where the difficulty comes in. Architect A, inclined to go in for something better than mere lath and plaster partition walls, goes in for brick in accordance with good by-law construction and the credit of his profession; he would soon be put out of the field by Z, perhaps a needy self-styled architect, who, creeping in behind A, informs A's client that he, Z, can save at least $1000 of cost, said client being left entirely in the dark as to where and how the so-called saving comes in. To my mind A should carefully and thoroughly urge upon his client the question of stability and solidity as against "jerry work," and then only on his client accepting responsibility, go in in opposition to Z, and fight him with his own weapons. I fear, though, that some of our clients, if reports are true, play you off one against the other and then take the cheapest; some of you sell your work Dutch auction bidding. In my three years of residence in Victoria, I have seen such construction as I would not have ventured on, and yet in my work and practice in India I have done work in construction much bolder than my peers. The work I refer to as done in Victoria is not healthy work of construction, and I think it regrettable that in the Capital of the province our architects should feel impelled to do such work—that such work should be looked on as a necessity. Men as owners of such work cannot, I think, have had them built as investments—only to sell—and even then false economy.

I was very much surprised only the other day to learn that the Building Inspector in Victoria has it in his power to alter a detail of construction in an architect's design. I should protest against such interference in the construction details in a competent architect's work; I mean one who may be reasonably credited with possessing sufficient knowledge of construction. I think that with good by-laws and a good Inspector to see them honestly carried out, interference with an architect's construction would not be called for, and with good by-laws, not restrictive ones, and a resolute enforcement of them, such buildings as I have commented on would not be perpetrated.

It is within my province to-day to enter my protest against the recent action of the bricklayers of this city in their striking against the appointment of a clerk of works not belonging to their organization, appointed for the municipal supervision of their work by the municipal authorities, and I anticipate that you are all of one mind. If such action and claim as they made were once acceded to, on such a plaint as was theirs, it would place us architects quite at their dictation.

Before we meet again, gentlemen, let us hope that things may improve with us all, and that we will be all busy men as now too many of us are idle men.

The next annual meeting of the society was fixed for New Westminster, on the first Friday in November, 1894.

Red slate is of recent discovery. The most beautiful of its class, it ranks among the costliest material in use for constructional purposes. In the northern part of Washington County, N. Y., within a circle less than fifteen miles in diameter, are said to be the only red slate quarries ever found. There are two parallel veins about five miles apart; the one known as the Granville vein being best adapted for roofing purposes; the other, in Hatch district, and of softer quality, can be sawed into floor tiles and house trimmings.

A discovery for hanging paper on damp walls is being put to a practical test in Germany. It consists of coating a lining-paper on one side with a solution of shellac spirit, of somewhat greater consistency than the ordinary French polish, and then hanging it with the side thus treated to the damp wall. The paper-hanging is then performed in the usual manner with paste. Any other resin that is equally soluble in spirits may be used in place of the shellac. According to the representations, this process is found equally effective in preventing the penetration of dampness.

CANADIAN CITY ENGINEERS.

VII.

ROBERT SURTEES, City Engineer of Ottawa, Ont., was born at Ravensworth, Yorkshire, England, March 3rd, 1835. He served his apprenticeship with the late George Mason, a well known civil engineer in Darlington. At the age of 21 he came to Canada, and first settled in the city of Hamilton, where he acted as Assistant City Engineer for four years, when he removed to New Edinburgh, a village now embraced within the city of Ottawa, where he established himself as an Engineer and Architect.

During his fifteen years residence there he designed and had charge of many important public works, amongst them the Protestant Hospital and the Carleton County Court House in the city of Ottawa. He was engineer of the town of Peterboro', Ont., and city of Hull, P. Q., waterworks, and acted as consulting engineer for a number of municipal corporation drainage and water works schemes.

In 1875 he accepted the position of engineer for the city of Ottawa, and under his direction and supervision some important works were carried out, such as the construction of the main sewer, and the enlargement of the water works system, the former costing half a million dollars and three years labor to complete, and the latter work entailing the expenditure of a similar amount. These works may be classed as amongst the finest in the Dominion.

Mr. Surtees is a member of the Canadian and American Society of Civil Engineers, as well of the American Water Works Association.

Politically he has always been a Conservative. In religion he is a member of the Church of England and is thoroughly evangelical in his views. He married in Hamilton and has a grown up family of two daughters and four sons.

ROBERT SURTEES, CITY ENGINEER, OTTAWA.

A STUDY IN LIME.

LIME constitutes so large a portion of the building material used in this country, says V. B. Grinnell, in the *Painters' Magazine*, that it seems to me that every builder and decorator should be familiar with its nature, composition, impurities and reaction upon the elements of organized substances coming in contact with it. "Lime is ranked with the alkaline earths, and is never found pure in its native state, but combined with carbonic acid in marble, calcerous spar, limestone and shells, and with sulphuric acid in gypsum, and phosphoric acid in the bones of animals." When lime is made by burning the native carbonate or limestone in kilns it is usually impure, containing alumina, silica, sesquioxide of iron, magnesia, oxide of manganese, clay, &c. The carbonic acid is expelled by the heat in the kiln, but when cool and exposed to the air it absorbs moisture and carbonic acid, and crumbles into powder, and becomes air-slacked lime. When water is added to the fresh lime heat is evolved, the stone cracks and powders, forming hydrate of lime. Lime is so sparingly soluble in water that it takes 700 times its weight in water to completely dissolve it. It acts upon vegetable colors like an alkali. Lime has many incompatibles, among which we may name: "All acids, all metallic acidulous and ammoniacal salts, borates, alkaline carbonates, and astringent vegetable infusions." In other words, they cannot exist together in solution without natural decomposition, and combining their acids, forming calcium salts.

The painter and decorator finds a large portion of his work upon plastered walls, and to do it intelligently he must understand the composition of the wall and the nature of the materials used in its construction, and the effect which they may have upon the various materials which he may be called upon to use in the course of his work. If he is not posted in this respect, he goes at his task in the dark, and must not be surprised if he meets with occasional disappointment and failure. We know that the lime in the well may contain impurities, and that the sand mixed with it may contain clay, and that clay may contain sulphur. The sand may be mixed with iron pyrites, sulphate of lime, sulphate of barytes, magnesia, &c. In the great crushing process which ground the mighty rocks to sand, all the minerals which they contained went in. Who can tell what they were or what has been added since the sand has been drifting from place to place? Who knows what salts will be formed when the impurities are set free and brought together by the water used in mixing the lime and sand into mortar? The heat in the lime in drying may prevent much that would otherwise happen: but in after years, when the plaster has been long or frequently wet, the sulphur and magnesia coming in contact may produce sulphate of magnesia (espom salt). This salt contains more than 51 per cent. of the water of crystalization, and often has very much to do keeping walls damp and in forming crystaline incrustations upon the surface, especially upon brick walls. This salt is completely decomposed by fresh lime, but the lime in plaster, which has been long water-soaked, seems to have become sufficiently inert to admit of the formation of the salt in question. This salt is also decomposed by "potassa and soda, and their carbonates by baryta and stronia, and their soluble salts;" but the trouble is to apply any of these decomposing agents to the source of supply in the interior of the brick or mortar of a brick or plastered wall. We may decompose the crystal upon the surface, but the dampness inside will continue to throw out more of the salt. We sometimes sufficiently decompose it near the surface, to make it possible to check its further advance. First soak the wall with the decomposing agent, and after it is dry apply a coat of waterproof paint or gum. For the outside the dry hot weather of summer is the best, because the hot weather will dry the surface after the decomposing agent has been applied.

An example of the rapid formation of the crystals of this salt came under my observation two years ago in a basement. A bank of clay had been cut down and a plastered wall made near to it. Subsequently the basement was flooded with water, which stood for several days, thoroughly soaking the wall. Within a few weeks I discovered crystals upon the surface of the wall; they continued to increase until several square yards of the wall were covered, in places half an inch in thickness. The product was unmistakably epsom salts. I found, upon examination, that the wall was still wet, and that the space between the wall and the bank had been filled with earth, which had been washed from the top of the bank, which I found still damp. As an experiment, a small portion of the wall was dried by artificial heat, and then kept wet for a day by frequent applications of a strong solution of carbonate of soda. The plaster was then dried and given two coats of orange shellac. At the end of eighteen months no more crystal had formed upon the place which had been treated. The crystals of this salt upon brick walls are frequently called saltpetre; but I am at a loss to know why, because the taste and form of crystals in the two salts are so much unlike. Saltpeter is found in old plaster rubbish, in combination with lime and common salt; but in this combination it seems to be inert. Saltpetre has a sharp, cooling, and slightly bitterish taste, and its crystals are long, striated, semi-transparent six-sided prisms. Epsom salt crystalizes in four-sided prisms, is colorless and transparent, of bitter, nauceous, saline taste.

The Engineering Society of the School of Practical Science, Toronto, has decided to establish a monthly paper.

The new high school building recently erected at Niagara Falls, Ont., was formally opened on the 8th inst. by the Minister of Education. The building is erected in Wesley Park, and is surrounded by seven acres of ground. The building and site cost about $30,000.

A representative of the National Wall Paper Company of America was in Ottawa recently for the purpose of inducing the Customs Department, in making valuation of imported wall papers, to allow for a discount of 20 per cent. which the company offers to all dealers who use its goods exclusively.

The new hotel Frontenac, erected by the Canadian Pacific Railway at Quebec, was opened to the public on the 18th of December. The building contains 170 bed rooms, some of which are 310 feet above the level of the St. Lawrence. The building occupies a magnificent site, affording views up and down the river, of the Isle of Orleans, and of the Laurentian range of mountains. It is designed in the old chateau style, the decorations and furniture being of 16th century character. Mr Bruce Price, of New York, was the architect.

THE BUILDINGS OF THE DOMINION.

By G. F. Stalker.

To what extent and in what manner the government is justified in encouraging by substantial aid, the development of art depends upon a variety of circumstances. The possession, however, of galleries of art treasures and of fine buildings is an unmistakeable evidence of national culture and progress; and no country having any pretension to greatness can afford to be without them. The balance sheet of the finance minister is, after all, only a temporary index of national solvency. We must look into a different ledger for the indelible marks which show the onward or backward movement of the people. But the finance minister and every other minister, can do a vast amount to foster and develop such thoughts and feelings as will ineffably impress themselves on the national character, and find expression in works of art which will be an indication to future generations of our standing as a people.

The ministers of the crown in this country are the chosen leaders of the people, and they like to be spoken of as such. But they are, in many instances, only the followers of public sentiment. Ideas and schemes, which on the face of them have the stamp of necessity (sometimes of urgency), are put on one side because there has been no public demand for them and so much valuable time is wasted in weary waiting for the great unwieldy mass of the people to meet together, formulate their ideas, and submit their wishes to those in authority. All this seems just the reverse of what it ought to be. The wise leaders, whose names have come down to us, have been men who, being in advance of their time, have educated the people up to their ideas, and legislated and acted without the necessity of ever-recurring agitation and turmoil.

At present we want one or more of the ministers to strike out and take the lead in national art matters. The course is perfectly clear, and whoever steps into it will have the satisfaction of knowing that the laurels which he will gain will not be plucked from the brow of any of his contemporaries, nor from the chaplet of any of his predecessors.

It is, of course, freely admitted that there are difficulties in the way, the chief one being that we belong to a somewhat utilitarian race. The British people have never been too lavish in expending money on "mere works of art," and it has taken a long time to bring them to acknowledge the refining influences of the beautiful and pure in art, upon the national character. But this is admitted now, and leading men throughout the empire lose no opportunity of impressing this truth upon us. In fact, if we look at the matter fairly, the encouragement of art by the national government is really utilitarian in its effect. The national advancement and refinement are a *quid pro quo* for the national expenditure.

A slight indication of the way the wind is blowing was given during the last session of the Dominion Parliament. While the estimates were being discussed the Minister of Interior asked for a beggarly sum of one or two thousand dollars for the annual expenses of the National Gallery, when from an unexpected quarter a loud complaint was raised because the sum asked was not twenty or thirty thousand, which would have been as readily granted as the smaller sum. The fact that the complaint met with the general approval of the House is sufficient to show that the time has gone by when ministers need be afraid to ask for the expenditure of public money for art purposes; and it must be with satisfaction that every man of education and good sense will regard this fact.

But it must not be supposed in speaking of art, that painting and sculpture only are referred to. Architects need not take a second place to their brothers of the brush and chisel in the beneficient effects on the public mind which are produced by their own branch of art. On the contrary its place in the trio of the fine arts has always been, and will ever be the first. And while, as an art, it exercises its refining and ennobling influences on the mind, it is practically interwoven with every phase of human existence.

On this account and because it would be impossible to conduct the business of the country without necessary and adequate building accommodation, architecture has received a fair amount of encouragement at the hands of the government. No fault can be found with the different governments so far as providing buildings when and where they have been found necessary. But the system which was adopted at the birth of the Dominion and which was both necessary and suitable for that time has nothing to recommend its continuance at the present. When the Dominion came into existence there were very few architects in the country and comparatively no very great demand for them. Since then, however, the country has made rapid strides and has developed in every direction to an abnormal extent. With this growth has come the demand for a better class of building, and architects have come into the country and grown up in it to supply the demand; so that the larger cities particularly are well provided with buildings of a high order, and give unmistakeable evidence that we have in our Dominion as capable a body of architects as are to be found in any other country at the present day.

The government has no need, therefore, to restrict itself for its architecture to the abilities and services of one man, as was necessary and suitable thirty years ago. The system which we followed at Confederation was the best system for a young country; but we shall be doing a wise thing when we follow the example of Britain and other countries, and give opportunities to more than one architect to display their architectural abilities.

In quite recent times there have been a great many large public buildings erected in England, such as the Foreign Offices, the Law Courts, the Natural History Museum, the Admiralty Offices, etc., etc. In every case the designs for these buildings were chosen either by public or limited competitions. The object the British Government had in view in these competitions was, not only to obtain the best designs, but to give to architects generally an incentive to put forth their best efforts and to bring into prominence the talents of some who would otherwise have remained unknown.

It is impossible to overestimate the benefits to the profession and to architecture in England, which have resulted from these competitions. The influence of the designs that were submitted and that remained for many weeks on public exhibition has completely revolutionized architecture in England. At the beginning of the present century and until about fifty years ago architecture in England was at a very low ebb. Now there is no country in which buildings are erected on a grander scale, of more beautiful design, or where so much attention is given to architectural principles and detail.

To say that this has been brought about by the system of having competitive designs for government and other buildings would be to claim a great deal too much. But no one can deny that this has been one of the most potent factors in producing the change. If such a system were to be adopted in Canada there is no doubt that the effect upon the architecture of the country would be beneficial, but it would give national encouragement to architecture without incurring any further charge upon the Dominion exchequer than is incurred now. The cost of maintaining the architects department in connection with the government amounts to more that five per cent. of the annual value of the buildings erected. The change would therefore involve no financial loss, but rather a gain to the country. It is not, however, for this reason that the question is here raised. Neither is it from any desire to find fault with the present government architect or to speak disparaingly of his ability. If the present system is to remain unchanged it would be no easy matter to find, in the whole Dominion, a man better qualified for his position. But the circumstances which rendered such an office necessary no longer exist.

The buildings erected by the Dominion Government are chiefly post offices, custom houses, government offices and drill halls, and though there is not much variety in the classes of buildings, the location and local requirements introduce elements sufficient to require considerable variety of treatment. But the most versatile architect becomes in the course of time liable to repeat himself; he may even become stereotyped in his versatility. We cannot therefore, look for much progress in the architecture of our national buildings, when we continue through a long series of years to engage the services of only one man. But we are certainly running the risk of remaining at a standstill in this respect; and to do so is to retrograde.

But if it be a wise thing for the government to secure by competition the best designs from the best architects in the country for our public buildings, it would be equally unwise to abolish absolutely the office of government architect, and here again we might imitate the practice of the motherland. In all public buildings there are changes made as time goes on. And so, when any building has been completed according to the architects design, the plans are deposited with the government architect, who, with a sufficient staff of capable assistants, will look after any future changes which may be found necessary.

As already stated, the course is open for any Minister of the Crown to distinguish himself by lifting our national art up to a higher level than it occupies now. And the foregoing is humbly submitted as an outline of a system which could easily be adopted in regard to our public buildings, and one which would give great satisfaction to the profession generally, as well as being of inestimable and lasting benefit to the country at large.

NEW YORK CITY HALL COMPETITION.

On the 20th of December, the Advisory Board of Architects in the above competition presented their report, in which they announced the selection from 134 designs submitted of numbers 13, 23, 28, 35, 107 and 113 as the six which most nearly meet the requirements. The final selection will be made from these six selected designs at the close of the present month, and the names of the successful competitors announced.

The oldest school building in Montreal, situated at the corner of Cote and Lagauchetiere streets, has been sold for the sum of $20,000, for manufacturing purposes.

The Arts and Crafts Association of Hamilton, has been organized at Hamilton, Ont., local artists and architects being among the chief promoters. The object sought to be attained is to foster local talent and assist in bringing the work of artists before the public. The organization meeting in the Hamilton Art School was well attended. Mr. E. W. Morrison was appointed secretary of the Association, the election of officers being deferred to a subsequent meeting.

CANADIAN vs. FOREIGN CEMENT.

— Quebec, December 23, 1893.

Editor Canadian Architect and Builder.

Sir,—In your last issue, Dec., '93, page 121, you say in relation to Canadian cement, alluding to the Soulanges Canal: "This is the first instance as far as we are aware in which imported cement has been used in Canadian public works of this character."

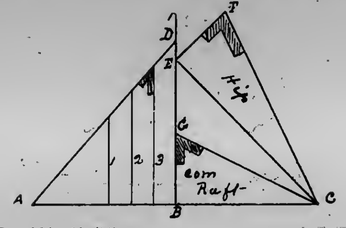
I would inform you that some $80,000 worth of imported Portland cement is said to have been used in the new docks, Quebec, and you are perfectly right in deploring the ignoring of our Canadian industries.

C. Baillairgé,
City Engineer, Quebec.

ROOF DIAGRAM.

Editor Canadian Architect and Builder.

Sir,—I herewith enclose you a practical diagram on hip roofing which you may be pleased to publish for the benefit of your readers:



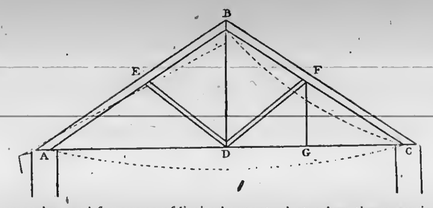
A C—width of building.
C G and B D—length of common rafter.
E F and B G—rise of roof.
B C and B E—run of common rafter.
A D and C F—length of hip.
1 2 and 3—exact length and bevels of jack rafters.

A. B. Campbell,
Brandon, Man.

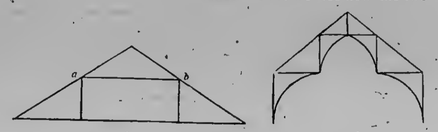
ROOF TRUSSES.

The action of trusses on walls, and their weight and thrust, is one of the important matters in building that should be carefully studied and understood by all builders. In designing a truss for any kind of building there are several factors to be provided for, which the following article by Mr. I. P. Hicks, in the *National Builder*, fully illustrates:

Let A B, C B (Fig. 1) be two rafters, placed on walls at A and C, and meeting in a ridge B. Even by their own weight, and much more when loaded, these rafters would have a tendency to spread outward at A and C, and to sink at B. If this tendency be restrained by a tie established betwixt A and C, and if A B, B C be perfectly rigid, and the tie A C incapable of extension, B will become a fixed point. This, then, is the ordinary couple-roof, in which the tie A C is a third piece of timber; and which



may be used for spans of limited extent; but when the span is so great that the tie A C tends to bend downwards or sag, by reason of its length, then the conditions of stability obviously become impaired. Now, if from the point B a string or tie be let down and attached to the middle D, of A C, it will evidently be impossible for A C to bend downwards so long as A B, B C remain of the same length; D, therefore, like B, will become a fixed point, if the tie B D be incapable of extension. But the span may be increased, or the size of the rafters A B, C D be diminished, until the latter also have a tendency to sag; and to prevent this, pieces D F, D F are introduced, extending from the fixed point D to the middle of each rafter, and establishing F and E as fixed points also, so long as D E, D F remain unaltered in length. Adopting the ordinary meaning of the verb "to truss," as expressing to tie up (and there seems to be no reason why we should seek further for the etymology), we truss or tie up the point D, and the frame A B C is a trussed frame. In like manner, F being established as a fixed point, G is trussed to it. In every trussed frame there must obviously be one series of the component parts in a state of compression, and the other in a state of extension. The functions of the former can only be filled by pieces which are rigid, while the place of the latter may be supplied by strings. In the diameter, the pieces A B, C B are compressed, and A C, D B are extended; yet in general the tie D B is called a *king-post*, a term which conveys an altogether erroneous idea of its duties. Thus we see how the two



principal rafters, by their being incapable of extension, serve, through the means of the king-post, to establish a fixed point in the center of the void spanned by the roof, which again becomes the *point d'appui* of the struts, which at the same time prevent the rafters from bending, and serve in the establishing of other fixed points; and the combination of these pieces is called a king-post roof.

It is sometimes, however, inconvenient to have the center of the space occupied by this king-post, especially where it is necessary to have apartments in the roof. In such a case recourse is had to a different manner of trussing. Two suspending posts are used, and a forth element is introduced, namely, the *straining beam a b* (Fig. 2), extending between the posts. The principle of trussing is the same. The rafters are compressed, the straining beam is compressed, and the tie-beam and posts, the latter now called *queen posts*, are in a state of tension.

In some roofs, for the sake of effect, the tie-beam does not stretch across between the feet of the principals, but is interrupted. In point of fact, although occupying the place of it, it does not fill the office of a tie-beam, but acts merely as a bracket attached to the wall (Fig. 3). It is then called a *hammer-beam*.

MANUFACTURES AND MATERIALS

The firm of Lomer & Rose, metal merchants, Montreal, has been dissolved.

A quarry of black granite of good quality, is reported to have been discovered at Bocabec, N. S.

A Canadian patent, No. 44,650, has been granted to H. W. Kincaid, of Athens, Ont., for a metallic shingle.

The stone which is to be used in the construction of the Soulanges Canal will be obtained from quarries at Rockland, Que.

The Canadian Cut Nail Association decided at a recent meeting, not to make any change in prices. The Wire Nail Manufacturers decided to make a five per cent. reduction in the discount allowed the trade.

A vitrified brick manufactured by the Hamilton and Toronto Sewer Pipe Co., was recently tested, and after having been immersed in water for three days, showed an increase in weight of only 4-9ths. of an ounce, the original weight being 7 pounds.

Awards were granted to exhibits at the World's Fair by the following Canadian firms: New Rockland Quarry Co., Rockland, Que., for slate sink, etc.; P. W. Ellis & Co., Toronto, veined marble; the Rathbun Co., Deseronto, cements; J. R. Ward, Grenville, Que., marbles.

The St. Johns Stone Chinaware Company, of St. Johns, Que., has been reorganized with Messrs. Laviolette and Leduc of Montreal, as president and vice-president and Mr. Alex. Maedonald as managing director. The re-building of the company's factory at St. Johns is being rapidly pushed forward.

Messrs. Wm. Gibson, Benton, N. B., Robert A. Stuart and J. M. Hanson, of St. Andrews, N. B., have entered into partnership to quarry, manufacture and deal in granite and stone, the firm name being Gibson, Stuart & Hanson. The term of partnership is from the first of December, 1893, to the first of December, 1903.

It is reported that under the management of T. F. Pharoah, the slate quarry near Danville, Que., is being successfully operated, upwards of 50 men being employed. There are some benches of pure slate 30 feet thick, and single pieces of seven to twelve tons weight are quarried. The material is worked into blackboards, flooring, roofing, etc.

The first annual meeting of the shareholders of the LaPrairie Press Brick and Terra Cotta Company, was held at the offices of the company, 118 Peter street, Montreal, on the 16th of December, when a very satisfactory statement of affairs was presented, and satisfaction was expressed with the result of the manufacturing thus far done. It has been decided to invest some $25,000 in additional plant, the intention being to manufacture during the present year about 10,000,000 common and pressed bricks. The following board of directors have been appointed:—A. A. Ayer, J. W. R. Brunnett, Peter Lyall, John McKergow, J. W. Tester, A. D. Taylor and Hugh Cameron. At a meeting of the directors, A. A. Ayer, was elected president, J. W. R. Brunnett, vice-president, and T. A. Morrison, secretary-treasurer.

THE WINTER CARNIVAL.
THE ICE PALACE.

QUEBEC IN 1894.

By Chas. Baillairge.

THE old-fashioned city of over 25 years ago has put off many of its characteristic traits and donned quite a new and comparatively modern physiognomy.

The six city gates have either disappeared *in toto*, as with the three facing on the St. Charles and the St. Lawrence, where, on account of the precipitousness of the cliff, the unnecessary walls have been lowered to allow of being seen over; thus giving to tourists on entering the city from the C.P.R. a splendid view of the port—one of the finest and most extensive in the world—or have been remodelled, rebuilt in a way to be less offensive to the outlying wards, which had come to view the barriers as lines of social distinction between themselves and the would-be aristos within.

The stratagetic curves of the old approaches to the city walls having lost their prestige under the high and far flying missiles of war of modern times, the sinuosities outside of the city gates are now replaced by straight and unbroken lines of streets, while the crenelated tops of the new gates are there to remind us of our ancient military glory.

The "Grande Allée," extending a mile beyond the city proper, has had its width not less than doubled, and along its southern side we have the splendid new "Drill Hall," built after the designs of M. M. Taché & Fuller, architects, but laid at a level fully five feet lower than it should have been to be properly seen from the St. Louis road.

Nearly opposite the Drill Hall is the Short and Wallick monument, designed and executed by our talented Canadian artist, Hebert, who also carved the "Indian Group" over the fountain opposite the tower of the Parliament buildings, but which is singularly marred in its effect by being set at a level about three feet lower than it should be. The new Government architect, Mr. Charest, should see to this, and that there be erected without further delay, and as much more pressing than the enclosure walls around the grounds, a porchway such that a carriage may drive under and persons be thus enabled to enter the building under cover, instead of, as in the case of the last bill, having to hold an umbrella over every gentleman's and lady's head as they successively entered the buildings with garments thoroughly drenched by the storm.

The portico alluded to could be most easily and æsthetically erected opposite the main or central tower by making each of the two angle piers of the porch a group of four columns like those on the opposite side, bringing forward the present entablature and completing the sides.

The most ungainly facade along the river side of the Grande Allée is that of the skating rink which architect Staveley had made quite a fine feature of when on the opposite side of the street, but which from motives of economy, he was prevented from having carried out on its previous lines when moved to its present site to clear the ground fronting on the new Parliament Buildings. Ranges of fine dwelling houses have sprung up all along the thoroughfare, and of various design, under architects Raymond, Berlinguet, Peachy, Tanguay, Bussieres, Bernier, Talbot, and others, with, further on, Stent and Laver's Female (old military) Orphan Asylum, Le Court's Protestant Home, with the St. Bridget's Asylum and many fine residences on the opposite side, including the so-called Langélier block by Berlinguet, but where the site is far too straitened for the size of edifice—too many trumpery finials about its roof, and too much crowding of the bays and oriels on the central corps and portico. Dr. Verge's dwelling is amongst others worthy of remark.

The principal architectural feature along this thoroughfare is, of course, the Parliament Buildings already incidentally alluded to, the architects of which were M. M. Gauvreau, Taché, Derome, Cousin, Gauvin and Lesage; but that an article like the present, published in such a journal, may have its full utility, as a lesson to all concerned and to architects and the public in general to prevent the repetition of such a costly blunder, it will be seen that the building all around the 300 feet quadrangle should have been 60 feet in depth instead of 50 feet, making rooms instead of guts of the spaces on either side the central corridor, and adding 33 per cent. to the available depth for stairs instead of the break-neck things they are.

The building, of which the exterior is well enough proportioned and the architectural features not unæsthetic, though no building can be truly grand which, like this, has not a central feature—a dome for instance, a spire or a tower rising from a structure in its midst, and around which the outer portions of the edifice may cluster and rise the one above the other ("pyramider") an expression which can hardly be rendered in the sister language except by the word 'to tower,' but which is exemplified in our new Frontenac Hotel, by Bruce Price, of New-York, architect, with the exception that the roof over the entrance gate should have been made just one storey higher, and thus have hidden at the same time the upper rear corner of the main building not intended to be seen, and which protrudes itself most ungraciously into sight.

Now it will hardly be credited that while the splendid cut stone enclosure wall and lofty ornamental wrought and cast iron railing around the Marine Hospital, Quebec, designed by the writer, costs but $13.00 per foot lineal complete *in situ*, the mere coping alone of the more than 6,000 feet lineal of walls surrounding the Parliament grounds, with its underlying plinth course and dwarf foundation to the rock, and exclusive of cement, has been paid for at the enormous rate of $29.50 per foot lineal, exclusive of iron work, thus swelling its cost to four times the price of the wall alluded to, and amounting to the astounding sum of $200,000 or more.

The workmanship, it is necessary to say, is very fine, and the 12-foot granite monoliths superb; but I do not know at whose door the fault is to be laid of giving the separating pillars a projection on all sides of only 1½ in., which should have been at least from 3 to 4½ inches to render the work architecturally effective, making it deeply to be regretted that so much of the public money has been expended on a work which in proper hands could have been rendered an acceptable feature of the general design at much less than half the cost.

Persons who have not visited the city within the last fifteen years must be reminded that we have a terrace which is well worth seeing, and of which Princess Louise and the Marquis of Lorne, while performing the ceremony of throwing it open to the public in 1879, said to Mr. Baillairgé, engineer of the structure, while cordially congratulating him and shaking him by the hand, "this is the finest promenade in the world," and so I believe it may be considered, not only on account of its length, though less than that of St. Germain in France, but hanging as it does, so to say, from the face of the cliff at the sensational height of 182 feet above mean tide level of the St. Lawrence.

This terrace, erected by the city entirely of wood at the time, and at a cost of only $20,000, from motives of economy, has since been walled in on the river side at the expense of the Federal Government at a cost of over $60,000, said wall forming portions of the enceinte fortification of the city, and which had been destroyed by the landslide of 1841; and what it will now behove us soon to do, is to replace the perishable structure by stone and iron, brick and asphalt: cross walls at distances of sixty feet apart being necessary not only for floor supporting purposes, but to counteract the ever-present, ever-active tendency of all such side-hill structures to move forward and downward by the effect of earth and frost pressure from the rear. The space from wall to wall would be spanned by sixty ft. built plate girders with intervening supporting columns; iron joists laid across these at say three ft. centres, ½ brick archings between them, and concrete and asphalt over all, estimated to cost another $60,000.

The new Post Office, but which can hardly be called so now, should evidently have had a proper architectural facade towards the St. Lawrence, and had its upper floor windows been made of proper height, the extra course or two of masonry taken from the space above would have corrected the top heaviness of the structure.

The new Court House is of course a great improvement in size and style as compared with the old building, but the combined areas of openings is considerably beyond what it should be in relation to that of walls. The architects of these two buildings were, of course, some one or more of the Government quintet already named.

I have alluded incidentally to the new hotel, and would state that the architect, Mr. Bruce Price, of the United States, has, in my opinion, been guilty of a serious omission in not providing in any way for escape in case of fire, nor for a few outside iron balconies where one could sit and smoke and have a cup of coffee while enjoying the view and music. In other respects the building is a fine structure, and its architecture, its plan, its site, well suited to the fortress-like surroundings.

We have designs at hand for a new City Hall on the Jesuits' lot, and this is the lot it should be built on; as, though it may not appear to be quite centrally situated, since St. Sauveur has been annexed, there is no doubt that any extension of the city will now occur towards Hedlyville, and make it in reality the central site required.

St. John suburbs, under architect Peachy, has erected a spacious and costly (say $200,000) new cathedral instead of that destroyed by fire in 1881, but the diameter of its spire is by several feet less than it should have been.

In the lower town Hon. P. Garneau has erected, under Contractor Parent, a splendid new $100,000 stone structure, but my friend Tanguay, the architect, has been guilty of a freak, which cannot be called a license, and would not be tolerated anywhere—that of running his mullion or dividing column right up to the very keystone of the upper or attic window instead of cutting it short at the impost level and throwing the space above into two sub arches and a central panel or spandrel.

St. Roch's has now become, so to say, the commercial portion of the city, and the merchants and citizens of that locality have erected some very fine buildings under Mr. Raymond at the corner of Crown and St. Joseph streets, others by architects Talbot, Bussieres, Bernier, Vallée and Dussault—one of the finest by Peachy, for Labibertee, the furrier. The stateliest of all, some six tall stories in height, and of solid monolithic granite piers, and polished granite columns for Paquet, under his architects and builders, M. M. Charest and Bertrand.

New streets have been opened in the lower town, as Dalhousie and St. André, facing on the St. Lawrence and harbor works of the River St. Charles. Others have been widened; some prolonged, as St. Paul street to St. André, St. John 'St. Within, Fabrique. Ann in the upper town have been widened, St. Claire and Salaberry in St. John Ward.

D'Youville street, by Kent Gate, eases off the grade from St. Lewis to St. John's wards, and Negresse Hill, that from John to Jacques Cartier wards, while a new grade is being run from Grande Allée to the Citadel Heights at the old French fortifications, where a splendid view of the harbor can be had, and of a dozen parishes around and the main road reached again by a loop line without leaving one's carriage.

It is only lately we have enacted that henceforth all streets be at least 66 ft. in width, and lots 100 ft. deep, after my showing on the occasion of each of our monster fires of 1845, 1866 and 1881, etc., that their extent was due to nothing but want of depth in our heretofore 60 ft. lots, where if you build a house 30 ft. in depth, stables or an outhouse another 20 ft., there remains but 10 ft. between the two, with 30 feet streets between the blocks.

We now have in addition to the St. Louis and Frontenac hotels, the Royal Albion; and the Florence House under B. Trudelle, is also one of the most central and best patronized hotels in the city, with lines of busses to drive you any and everywhere; and the city having just opened a new line of communication by Mount Pleasant into St. Ours street, I would advise tourists wishing to enjoy a splendid view of the valley of the St. Charles to go out by Grande Allée, down Salaberry, get out at the steep part of the new hill, enjoying the view as you go down, resume your carriage at Arago street level, and then do St. Sauveur and St. Rochs, returning to the Frontenac or Florence by Abraham Hill and St. John street within or without.

The old wooden stairways between the upper and lower wards of the city have been replaced by elegant and costly new structures of cast and wrought iron, as at St. Claire and St. Augustin streets, and more recently at Buade and Champlain streets, with others to follow, as from the St. Charles battery to St. James street, and maybe from the remote extremity of Dufferin Terrace to Champlain street, while a new hill is contemplated from the Cove field to Cap. Blanc, thus saving a two miles' circuit to reach it by the brigade in case of fire.

Other alterations have obtained by which we have rechristened many of our streets, which bore duplicate, triplicate, and even quadruplicate names. We had, for instance, not less than four "St. Peter's," four "St. Francis'," three "St. Joseph's," etc., which were fruitful of many errors and inconveniences. They are now called by names dear to memories gone by: De Brébœuf, Garneau, Ferland, Christie, McMahon, O'Connell, Colbert, Chenier, *et al*, while a host of St. Sauveur saints have kindly stepped aside and been replaced by names less suggestive of prayers, pilgrims and poverty, and more of battles, bacon and business, as Kiroue, Fiset, Durocher, Racine, Charest, Charlevoix, Elgin, d'Youville, Hebert, Lalemant, Lansdowne, Colomb, Cartier, Montcalm, Wolfe and others.

Quebec is admittedly the best electro-lit city in America. It has a fine water power both for fire and domestic purposes under a head of 486 ft. from Lorette to mean tide level of the St. Lawrence. We have just completed under architect Peachy a splendid new fire station in Dorchester street; another new one in St. Sauveur by architect Cousin, is also under way, while still another is having its foundation laid in Lower Town near the Custom House—nine in all—and while danger from fire is thereby combatted on the one hand, all anxiety as to proper sanitation is fully provided against by our new quarantine system at the Palais, our costly steam disinfecting apparatus and our splendid new Hotel Dieu Hospital just erected under architect Tanguay, at a cost of a third of a million of dollars in Palace ward.

There is, however, one important thing we can not as yet boast of, and that is of the improved character of many of our streets. A million of dollars would be necessary to pave our hills and business thoroughfares with solid granite, and we can not afford such an outlay; though I call it false economy.

Our places of worship for all denominations are numerous and spacious, St. Mathews having recently been rebuilt by Staveley, and the Seminary Chapel by Peachy, but of which the inner galleries must be lowered in front or the interior made a failure.

Our educational status is high, with Laval in our midst; our poor well cared for by the Grey Nuns (Sisters of Charity); our too loving ones by the Asylum of the Good Shepherd; the waifs at the Sacre Cœur; and close at hand is the Beauport Asylum for all our mentally afflicted.

In addition to the Grand Trunk and Intercolonial railways, we now have communication with the remainder of the world around us by the Quebec Central, the C.P.R., the Q. & L. S. J. Railway, and the Quebec, Montmorency and Charlevoix; and the six companies should agree during our proposed carnival of February next to bring the people of our sister cities here to see the progress we have made. The new Frontenac Hotel, costing nearly a million of dollars, and of which the dining-room tapestry alone is valued at over $3,000, will be opened for the occasion, and a splendid reception tendered our guests in the new palace, and what between sleighing, coasting, snow-shoeing, curling, skating and other fun, a drive to the source of electric light supply at Montmorency Falls and mammoth ice cones of the Montmorency, a view of our ice palaces and statues and of the proposed 150 ft. pyramid of beauty over the illuminated fountain at the Place d'Armes, together with other attractions, such as ice-boating on the St. Lawrence and St. Charles, a good time may be anticipated by all our visitors, whom our mayor, Mr. Fremont, M.P., Senator Hearn and other city aldermen and councillors, and in a word all our citizens, will right royally welcome and endeavor to amuse and make happy to the fullest extent of their power. The new Palace Hotel of itself is well worth the trouble and expense of coming to see, and old Stadacona, even without the additional fun and attractions of a winter carnival, in which Montreal is to join us with several thousand of its snow-shoers, skaters, curlers and the crowds of other athletes who have promised to add to the festivities of the occasion.

And should the St. Lawrence be frozen over for the occasion, and our trees be decked as they generally are at such a season in snow crystals reflecting the component colors of the sunbeam and electric light, the millions of ruby, emerald, sapphire, topaz and diamond hues will enhance the fairy-like nature of the scene.

CANADIAN CONTRACTOR'S HAND-BOOK

Our attention has recently been called to errors in the above book. In the wages table on page 71, $14.96 is given as the wages for 66½ hours work at 21 cents per hour; the amount should be $13.96. On the same page $13.07 is given as the amount of wages for 67 hours at 21 cents per hour; the amount should be $14.07. The algebraic formulae on page 49 is in part incorrect; it should appear as follows:

4. $(a+b)\ (a^2+ab+b^2)=a^3+2a_2b+2ab\ +b^3$.
7. $(a-b)^3=a^3-3a_2b+3ab^2-b^3$
8. $\frac{x^3-y^3}{x-y}=x^2+xy+y^2$
9. $\frac{x^3+y^3}{x+y}=x^2-xy+y^2$

The attention of persons having copies of the 2nd edition of the book is called to these errors, which will be corrected in copies which may be sold in future.

There has lately been found the original contract used in the erection of St. James Cathedral, Toronto, in the year 1839, together with elevations and floor and gallery plans.

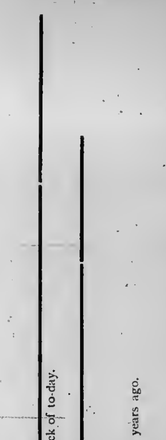
A new Methodist church has just been built at Kingsville, Ont., at a cost of $15,000, from designs by Mr. James Wilson, architect, of Chatham, Ont. The construction work was done by Mr. Thomas Jenner, of Kingsville. The building is said to be one of the best adapted in Western Ontario.

EARLY ENGLISH MOULDINGS.

The exquisite skill, taste and patient labor invariably evinced in the working of early English mouldings are truly admirable, says a foreign exchange. The ingenuity that was never at a loss in any difficulty of finish or constructive irregularity, and the minuteness with which even the most concealed and darkened parts were executed, are circumstances of much interest, and show a love for the art above the sordid considerations of minimum cost. The deepest hollows are all as cleanly and perfectly cut as the most prominent and conspicuous details; and in the village church as much so as in the most glorious cathedral. An early English doorway is often a wonderful piece of art, however little it may attract the attention of ordinary observers. It is most pleasing to notice the long train of dog-tooth lurking in the dark furrow of a label or channeled recess; to see the end of some inconvenient member got rid of by throwing a flower across the point where it suddenly stops or dies into the wall; to admire the floriated boss and the foliaged capital intruding their luxuriance upon the mouldings and hollows, as if they had overgrown their original and proper limits. How beautifully, too, the knots of pierced and hanging leaves extend like some petrified garland or bower of filigree-work round the arch, dividing the plainer moldings into groups, and almost imparting life and vegetation to the very stones. There is an abundance of doorways of this style which exhibit the most delightful varieties in their forms and groupings; always, yet never, the same. Some examples occur at Bolton and Furness abbeys, whose arch moldings extend five or six feet in width. The west fronts of several of our cathedrals have Early English doorways of amazing magnificence. The entrance doorway of the chapter house at Lichfield is a very fine example of the moulding of this style. But almost every cathedral and every ruined abbey will supply good specimens.

THE STRENGTH OF BRICK.

Here is a graphic illustration of the statement made by Mr. Williams in his paper on Vitrified Brick, read before the 7th Annual Convention of the National Brick Manufacturer's Association of the United Stores Touching on the progress of brickmaking in the United States, he quotes from Trautwine, the statement that a column of brick six hundred feet high would crush itself. He takes a test of the crushing strength of annealed brick, and shows that a column ten thousand feet high is required to crush itself; while a column of granite of similar dimensions would crush itself at a height of eighty-one hundred feet. Verily this is a striking illustration of the superiority of the machine made brick of to-day over those made in former years, and is proof that the craft is progressing. What industrial art can show an equal advance in the quality of manufactured products? This illustration of the relative height that a column of certain dimensions may be built of the materials named will give a better idea of the superiority of vitrified or annealed brick than is generally prevalent, even among those who are informed on the subject.



LEGAL DECISIONS.

In the case of Sieyes versus Cure Sentenne *et al*, recently decided at Montreal, plaintiff was leased the premises now occupied by the Compagnie Generale des Bazars, but he was not allowed to enter on the date fixed. He sued and was awarded $1497.84 as damages. Cure Sentenne then sued the contractors in warranty and they were condemned to pay this amount, together with the sum of $525 costs.

DAMAGE FROM DROPPING OF MORTAR.—Where a person sustains damage by the dropping of mortar and bricks during the erection of a wall next to the premises occupied by her, the party for whom the wall was being erected is not liable for such damage, but the contractor would be, if any one, if it was not a necessary result of the building of the wall, but was caused by the negligence of the contractor or of his servants. The injury caused by dust arising from the dumping of loads of brick near a person's residence might be so trifling as not to be actionable, or there might be evidence of such excessive and long-continued annoyance therefrom as to warrant the submission of the question of damage caused thereby to the jury. Pye v. Faxon, Supreme Judicial Court of Massachusetts, 31 N. E. Rep., 640.

PAGE V. DEFOE; BROWN V. DEFOE; ASHDOWN V. DEFOE.—Judgment on motion by the defendant in all three cases, which were tried together before MacMahon, J., and a jury, at Toronto, to set aside the judgment for the plaintiffs and to enter judgment for the defendant; or for a new trial of the action. The defendant was the owner of a storage warehouse in the city of Toronto which collapsed and destroyed the plaintiffs' goods therein stored. The defendant contended that the collapse was not due to any negligence on his part, but, as the evidence showed, to the dry rot in a portion of the timber, for which he was not responsible, having exercised due care in converting the building from its former use as a billiard table factory and in the selection of the material for that purpose. The court held that the collapse was duets dry rot unknown to the defendant, and that there was no negligence on his part. Motinn granted and actions dismissed with costs. Leave given to carry all the cases to the Court of Appeal together, if one of them is appealed, and if the amount in question in any is too small for an appeal, leave granted to appeal.

SMITH V. FORT-WILLIAM SCHOOL BOARD.—Judgment in Chancery Court, Toronto, in action tried at Port Arthur. Action by a resident freeholder, ratepayer and elector, and a supporter ot the Public Schools in the town of Fort William, on behalf of himself and all other ratepayers of Fort William except the ratepayers, against the Public School Board of the town, certain individual members of the board, and Robertson & Ross, contractors, for an injunction to restrain the defendants from proceeding with the erection of a school building in the town, and to compel the repayment to the school corporation of certain sums of money paid by the individual members of the board to the contractors for the work. The learned judge holds that the school board of a city, town, or incorporated village have no power to enter into any contract for the building of a school house until the necessary funds have been provided under section 116 of the Act of 1891, and that if a certain sum has been provided under that section for the purpose of building a school-house they cannot be allowed to enter into any contract or undertake any work involving the expenditure of any greater sum, and theretore that the contract into which the School Board in this case entered was beyond their powers, and not binding upon them. Injunction made perpetual as prayed. If the work done is of some value to the board as the foundation of a smaller building or otherwise, they are to make an allowance for it, to be ascertained by the local judge at Port Arthur. The defendants other than the School Board to pay back to the School Board the whole of the $2,625 paid on account of the contract, with interest from the time of payment, less such sum, if any as the referee shall find for the allowance as above. The defendants other than the School Board to pay the plaintiff's costs of the action.

ENGLISH AND ITALIAN BRICKWORK.

Early English brickwork is now rare. Little Wenham Hall, Suffolk, of the latter part of the 13th century, shows, says the *Clay Record*, different sizes of brick; these are mixed with stone and flint in parts. The brick are of Flemish shape, though some resemble Roman brick or tiles, and the color varies. We must turn to the Eastern counties for examples of English brickwork. In many of these flint is introduced in the form of panels, and this kind of walling is known as "flush work." Nearly every important church is of this mixture of brick or stone and flint. Layer Marney Hall, Essex, is a noted example of brickwork. The great gatehouse of three stories, flanked by octagonal turrets, with battlements and parapets, and window mullions, exhibits an advanced stage of brickmaking and workmanship. Respecting the size of English bricks, those at Little Wenham Hall measure 9¾ inches in length by 4¾ inches wide and 2¼ inches thick. Those made in Edward II.'s time measure 10 and 12 inches long by 5 and 6 inches wide. The "great brick" of 1374, measured 12 inches long, 6 inches wide, and 3 inches thick. Portions of Hampton Court Palace show some beautiful examples of English brickwork, to which the attention of the student may be directed.

The late Mr. Street, a great authority upon Italian brickwork, points out in his work on "Brick and Marble Architecture" to what a large extent red brick is used with stone. Italian brick are rather larger than ours, but not of better quality; the joints are wide, generally not less than half an inch. The brick used for windows, doorways, and other ornamental features are of finer quality and moulding.

Those who know Italian examples of brick arches and tracery are aware that the cusping of arches is of brick, set in the same radiating lines as the arch, and cut and rubbed to the outline required. He says: "In nearly all cases where brick is used for tracery, it is in the shape of plate tracery. The tympanum of the arch is filled in with a mass of brickwork, through which are pierced the arches over the several lights of the window, and these are supported on marble or stone shafts, with carved capitals instead of monials; and above these sometimes, as in the windows of St. Andrea, Mantua, are three cuspid circles, sometimes only one; or else as in the cathedral of Cremona, the plain brick tampanum is relieved by the introduction of a panel of terra-cotta, bearing the cross on a shield, whilst round its outer circumference delicately treated though large cusping defines the outline of the arch." Outside the arch sometimes a red brick label 2½ inches wide is introduced. In Mantua and Asti these narrow bricks are set between rings of brick and stone voussoirs.

THE "EMPIRE" SCROLL SAW.

This machine is designed for carpenters, builders, cabinet makers and general workshop use; it is thoroughly practical, strong and durable, will cut up to 3 inches thick, and swing 24 inches.

It has wooden arms operating upon an entirely new principle being pivoted in such a manner as to do away with any side-motion, and in connection with the self adjusting saw clamps gives a straight up-and-down motion of the saw blade.

It is arranged to use regularly, 8-inch saw blades, but can be adjusted to use 5-inch blades for very light work, if desired. It has an iron tilting table turned true and polished, which can be changed to any angle for sawing inlaid work. It has an adjustable upright drilling attachment, provided with an "Empire" drill chuck, which will hold from No. 60 to 3-16 inch twist drills. The driving wheel is 24 inches in diameter and the driving belt being the patent V shape, strong power is obtained without any slipping or lost motion.

The foot power has a walking motion, by which much power can be obtained with little fatigue, and it enables the operator to run the machine with both feet, sitting; or one foot, standing, as desired.

The average rate of speed when sawing is about 800 strokes per minute. The height from floor to top of table is 40 inches.

For steam power, tight and loose pulleys, arranged to connect with the driving wheel shaft, are furnished.

The Victor lathe can be used on this machine. Weight of machine, 155 pounds. Boxed for shipment, 240 pounds. This machine is manufactured by the Seneca Falls Mfg. Co., of Seneca Falls, N. Y., from whom any further information may be obtained.

THE "EMPIRE" SCROLL SAW.

CASTING PLATE GLASS.

The casting tables, the most important pieces of apparatus in a plate-glass works, are nineteen feet long, fourteen feet wide and seven inches thick. Each is provided with an iron roller, thirty inches in diameter and fifteen long. Strips of iron on each side of the table afford a bearing for the rollers, and determine the thickness of the plate of glass to be cast. The rough plate is commonly nine-sixteenths of an inch in thickness; after polishing it is reduced to six or seven sixteenths. The casting-tables are mounted on wheels, and run on a track that reaches every furnace and annealing oven in the building. The table having been wheeled as near as possible to the melting-furnace, the pot of molten glass is lifted by means of a crane, and its contents quickly poured on the table. The heavy iron roller is then passed from end to end spreading the glass into a layer of uniform thickness. The whole operation of casting scarcely occupies more time than it takes to describe it Each movement is made with almost nervous rapidity. Few industries offer such fine scenic display as the pouring of molten glass. One feels like crying "encore!" it is so very brilliant. In contact with the cold metal of the table the glass cools rapidly. As soon as possible the door of the annealing-oven is opened, and the plate of glass introduced. The floor of the oven is on the same level as the casting-table so that the transfer can be conveniently and quickly made. When, after several days the glass is taken out of the oven, its surface is found to be decidedly rough and uneven. A small quantity is used in this condition for skylights and other purposes where strength is required without transparency. It is known in the market as rough plate. The greater part of the glass, however, is ground, smoothed and polished before it leaves the establishment.

FIREPROOF CONSTRUCTION.*

In a thoroughly fireproof building it is not alone necessary that the materials of construction should be incombustible and covered with burned clay. (1) The clay used in the manufacture of the fireproofing material must be of a certain kind. (2) The forms of the pieces and the method of putting it together and securing it in place must be based on scientific principles and the experience of those who have studied the subject.

The clay must be of the refractory kind. That is, it must be either a plastic fireclay, a semi-fireclay, or a fireclay mixed with a plastic clay or shale. The best fireclays are too "short" for this purpose and too brittle if highly burned. In the manufacture of porous terra-cotta very few clays have been found that are both practicable for making a good article and reliable to resist fire when in use. So far as I know they have only been found in three places—Brazil, Indiana; Chaska, Minnesota, near Minneapolis, St. Paul; and in some parts of eastern New Jersey. For the manufacture of hard fireclay material, proper clay can be found in many localities. The best I know of are in Utica and Ottawa, Illinois; St. Louis, Missouri; and the eastern clay belt of Ohio, where they exist in the greatest quantities. They are all white and buff clays—the buff clays being preferable on account of their toughness. No clay that burns red or salmon color is fit for a fireproof building material. Of this I am positive. The greatest errors of American architects have been in the acceptance of so-called fireproof materials made of inferior clays.

The form and method of assembling and securing the fire-proof clay materials are the next essential considerations. They involve many principles of construction and provision against expansion, a description of which the limits of this paper will not admit. In securing the material to constructive steel and iron-work many mechanical expedients must be resorted to. The avoidance of these expedients rather than their too extensive use is to be sought. This can be obtained by forms of material that are to a certain extent interlocking, and a special study is often required in new cases constantly arising. I have often seen in specifications the requirements of mechanical expedients or fastenings, with iron straps and bolts where they might best be avoided, and too much of the same in practice. It is too often forgotten that it is useless to employ for fastenings the same material that we are trying to protect. As a general principle where metallic fastenings or hangers are necessary they should always be either concealed within the fireclay or covered with mortar. All suspended fireproofing should be secured from the back or edges. As an illustration, the common form of roofing with T-irons and book tyles is not a fireproof construction, and will sag and fall from slight exposure to fire on the other side, though thoroughly fireproof on the upper surface. It should not be used unless protected by a suspended fireproof ceilnig, all communication with the intervening space being permanently cut off. As a further illustration, all girder covering supported by straps or bands on the outside is useless, and all wooden blocks built into fireproof materials should be avoided.

*From a paper by J. B. Wright, Consulting Architect, Chicago.

The Toronto Steel Clad Bath Co. have issued a supplement to their catalogue in which they call attention to their steel clad bath No. 2, and to the fact that after the 1st of May next they will decorate all steel clad baths in light green enamel, with the standard relieved in gold, without extra charge.

USEFUL HINTS.

The follow ng collection of recipes will be found useful for cleaning various kinds of materials:—

Brass or Copper, to Clean—Mix together 1 oz. oxalic acid, 6 oz. rotten-stone and ½ oz. gum arabic pounded finely. Add 1 oz. sweet oil and sufficient water to form a paste. Apply and rub dry with flannel or wash-leather.

Brass, to Clean.—(1.) Wash with rock alum boiled in strong lye, in the proportion of 1 oz. to a pint; polished with dry tripoli. (2.) Coat the part to be cleaned with a piece of rag moistened with nitric acid; as soon as it turns a light vellow, rub dry.

Bronze, to Clean.—Fly specks, etc., may be removed by means of a mixture of lavender oil, one drachm; alcohol, one ounce; water, one and one-half ounce. Use soft sponge, rubbing as little as possible.

Bronze Statuary, to Clean.—Use weak soapsuds or aqua ammonia.

Brushes, Hair, to Clean.—Dissolve a piece of soda the size of a walnut in a quart of water. After combing out the hair from the brushes, dip them, bristles downward, in and out of this solution, keeping the backs and handles as free from the water as possible. Repeat this until the brushes look clean. Then rinse in cold water, shake well and wipe the backs and handles with a towel, but not the bristles, as it makes them soft as does also the use of soft soap. Set the brushes in the sun or near a gentle fire.

Brushes, Paint, to Clean.—(1.) Clean with turpentine, pressing out all particles of color upon a marble slab, and then suspend in jars of water not allowing them to touch the bottom. Change the water twice a week. (2.) To clean old paint brushes which have become hard with paint, soak the brushes twenty-four hours in raw linseed oil; then rinse in hot turpentine, repeating the process until clean.

Emery, to Clean After Using.—Boil with caustic potash, stirring constantly, then wash with dilute acid, and dry.

Files, to Cleanse.—Rub with a scratch brush moistened with a few drops of benzole.

Floors, to Extract Paraffin Oil from.—Apply a strong, hot solution of oxalic acid, and afterwards use the scrubbing brush.

Glass, to Clean.—For glass that has been run onto with colors while doing the frames; first take a sharp edged putty knife, but one which has no nicks on the edge, cut the paint off as low as you can without scratching the glass. Rub with a mixture of turps, oil and pumice stone. Clean off with a rag and soap. Wash and polish with a cotton rag.

Granite, Removal of Stains from.—(1.) A paste of 1 oz. oxgall, 1 gill of strong solution of caustic soda, 1½ tablespoonfuls of turpentine, with enough pipe clay to make it thick, scour well. (2.) Use strong lye or make a hot solution of 3 lbs. of common washing soda dissolved in 1 gal. of water. Lay it on the granite with a paint brush.

Grease Spots, to Kill before Painting.—Give the surface a wash with saltpeter in solution or very thin line whitewash. Soapsuds if used, must be well rinsed off or the paint will not dry over.

Grease, to Remove from Stone Steps.—Pour strong soda or boiling hot water over the spot; lay on it a little fuller's earth made in a thin paste with boiling water; let it remain over night and if the grease be not removed repeat the process. Grease may sometimes be removed by rubbing with a hard stone, using sand and very hot water with soap and soda.

Hair Pencils, to Clean.—Rinse with turpentine; work the brush in fine ashes, and shake the hair out well.

Hands, to Clean.—To remove paint use linseed oil and if necessary turpentine also. Use a nail brush instead of a knife for cleaning around the nails. Do not brush too often. After the hands are well brushed, washed and *rinsed*, dry on a soft towel and apply the following, pulverized borax three drachms, dissolved in two tablespoonfuls hot water, add to this glycerine, ounce, bay rum one ounce, a few drops perfume. A few drops after cleansing the hands and before going to bed will keep them soft and white, and remove the dry and uncomfortable feeling of which so many painters and paper hangers complain. (2.) Take a wine glass full of eau de cologne and another of lemon juice; then scrape two cakes brown Windsor soap to a powder and mix well in a mould.

Iron and Steel to Clean and Polish.—Saturate a spongy piece of fig tree wood with a mixture of sweet oil, and finely powdered emery and with this well rub all the rusty parts. This both cleans and polishes, rendering the use of whiting unnecessary.

Iron and Steel, Fine, to Clean from Rust.—Cleanse first with a paste made of ten parts tin putty, eight of prepared buck's-horn, and twenty-five of spirit of wine. Then rub with soft blotting paper.

Mahogany, to Remove Spots from.—Apply a little aqua fortis and water or oxalic acid and water, rubbing the part with a cork till the colour is restored, being careful afterward to wash the wood with water, and to dry and polish as usual.

Marble, to Clean.—Mix soda, pumice stone and finely powdered chalk in proportion of two parts of the former to one of the latter; pass through a sieve and mix with water to form a paste of same consistency. Rub well into the marble and rinse with water.

Marble Busts, to Clean.—(1.) Remove dust and wash with very weak solution of hydrochloric acid. Soap injures the color of the marble. (2.) Brush the marble with a clean paint brush dipped in a solution containing

---

Mr. H. E. Burnett, manager of the building firm of Wm. J. Davis & Co., Chicago, has recently visited Canada with the object, it is said, of establishing a branch of the firm's business in this country.

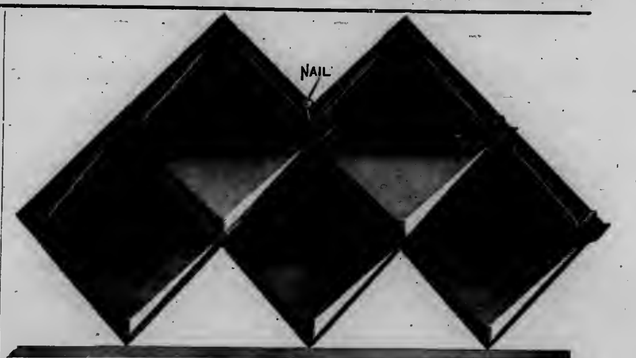
The Carpenters' and Joiners' unions of Montreal are said to have recently made arrangements with most of the contractors of that city whereby in future 9 hours shall constitute a day's work. The unions are also said to have determined a standard day's pay for all carpenters, the enforcement of which will be attempted after the first of May next.

Room Mouldings

New goods just opened. Rich and effective designs specially coloured to match our **Wall Papers** and Ingrains; also **Chair Rails, Ceiling** and **Panel Beads, Coves,** etc., in **Gold** and shaded effects, **Natural Oaks,** etc.

We colour mouldings to match any paper.

M. STAUNTON & CO.
6 KING STREET WEST.



DIAMOND TILES

"Empire" Patent Shingles

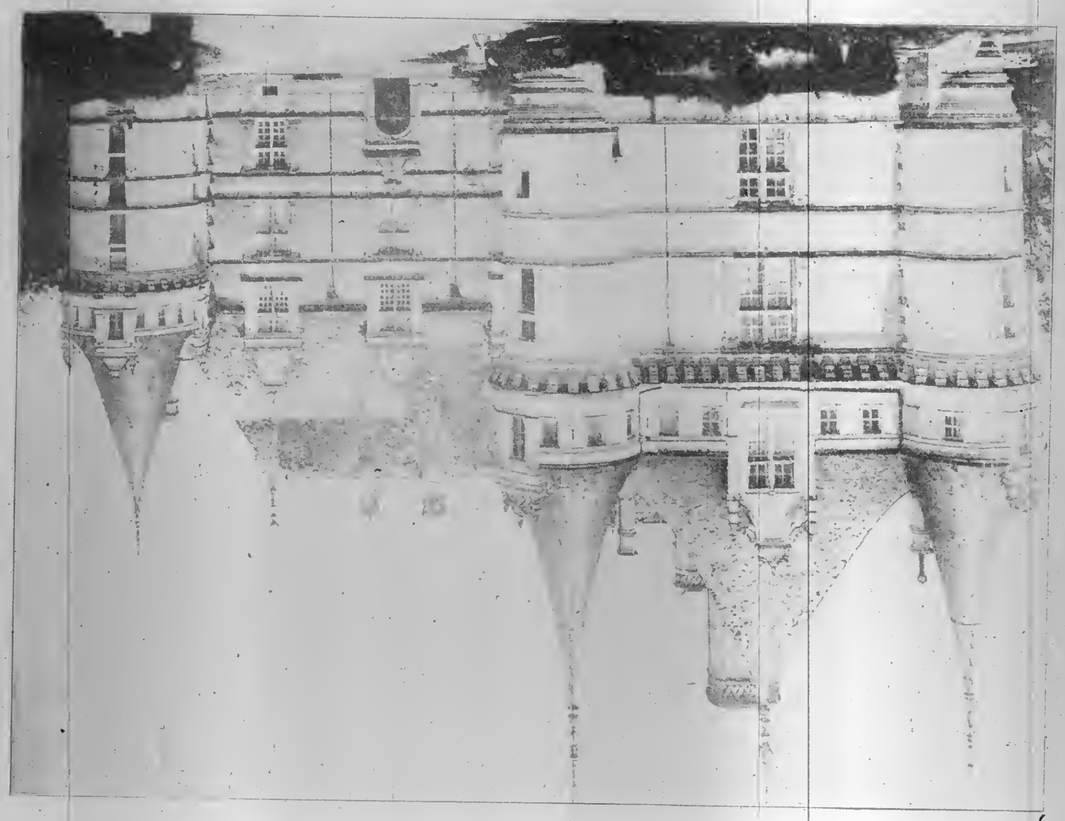
CORRUGATED IRON.
V CRIMPED AND PRESSED
STANDING SEAM ROOFING
for all classes of buildings.

Hayes' Patent Steel Lath

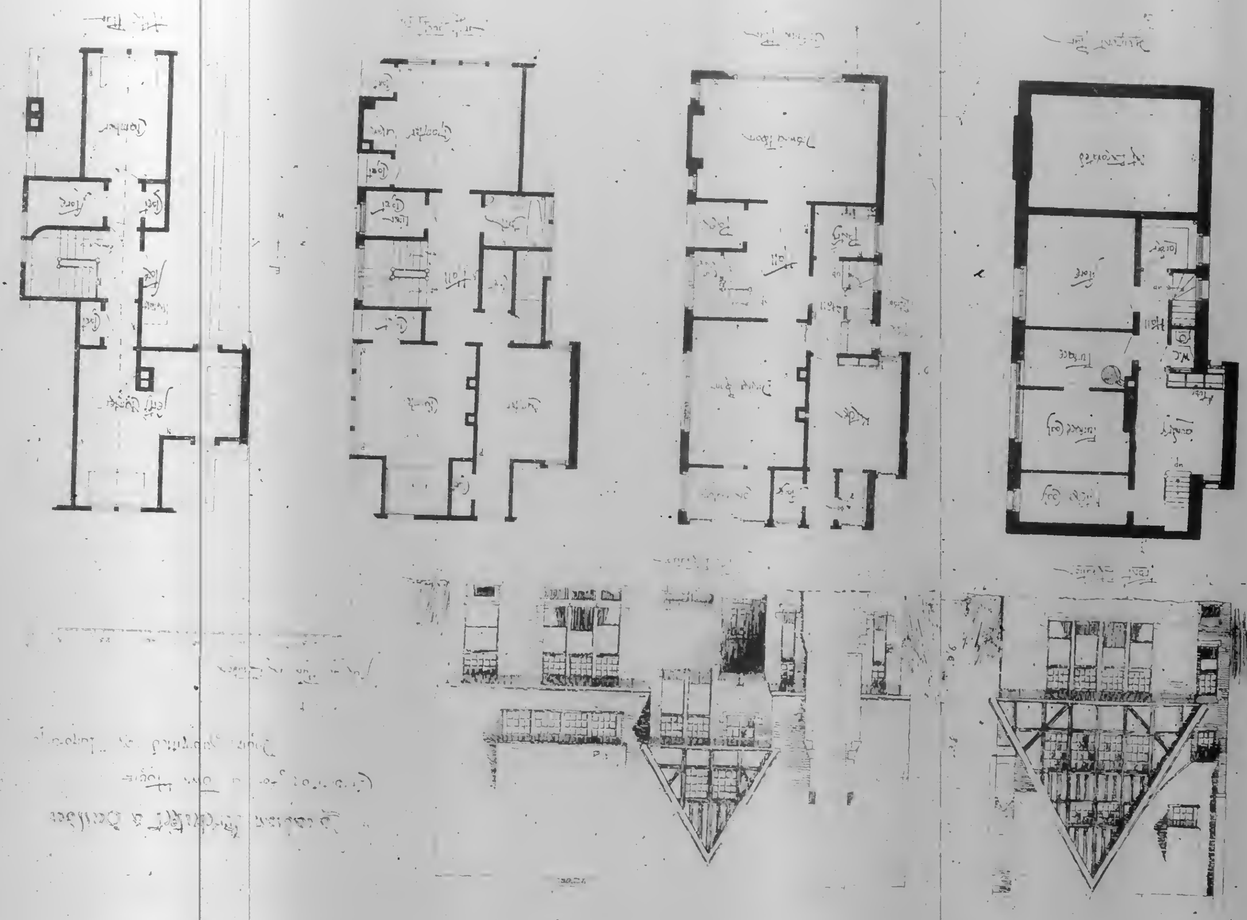
WRITE FOR PRICES.

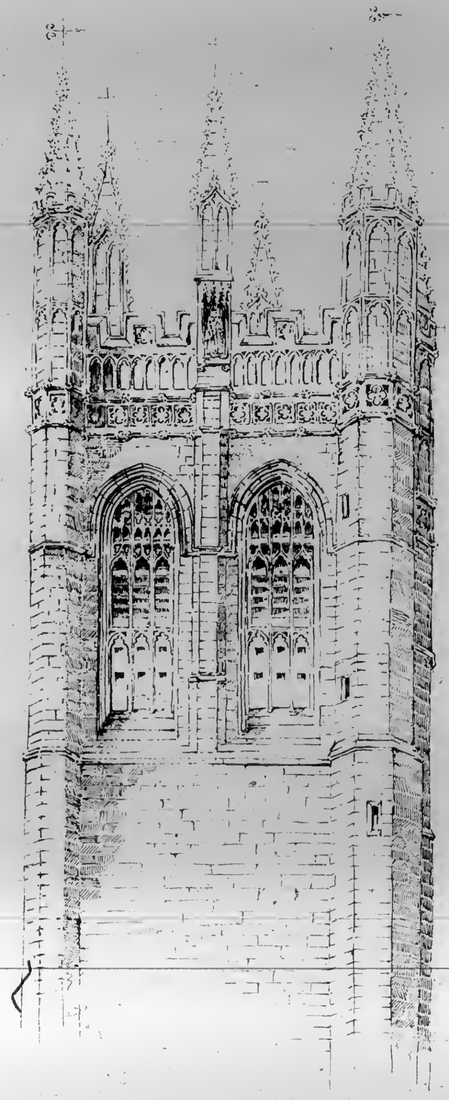
Eastlake Patent Shingles

METALLIC ROOFING CO., LIMITED.
MANUFACTURERS
706 Craig Street, MONTREAL. 82 Yonge Street, TORONTO.

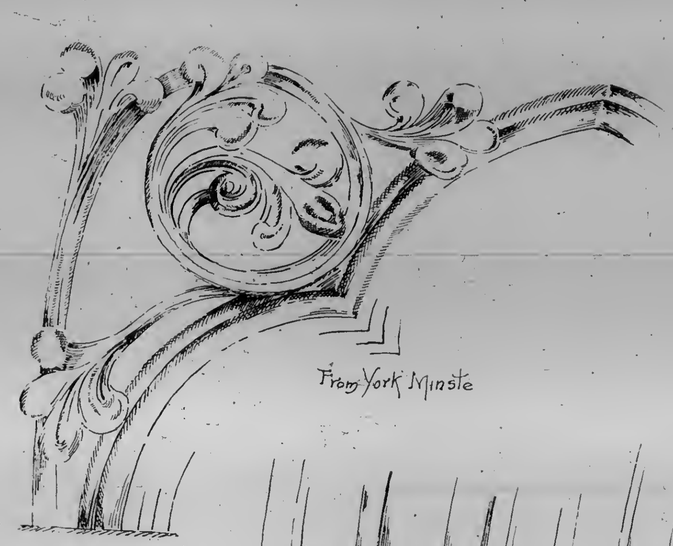


E. Wilby
Wells Cathedral
25/9/91





Magdalen Tower
from the Cloister's
Oxford - Eng
Eastlake Mad
Jeff '92

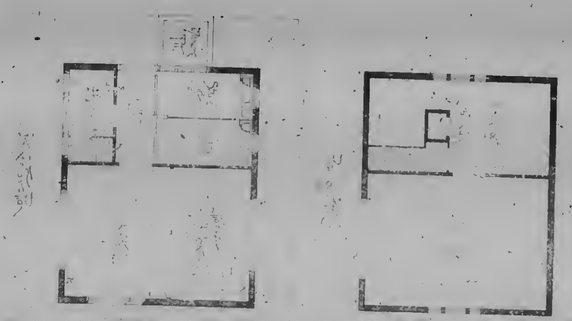


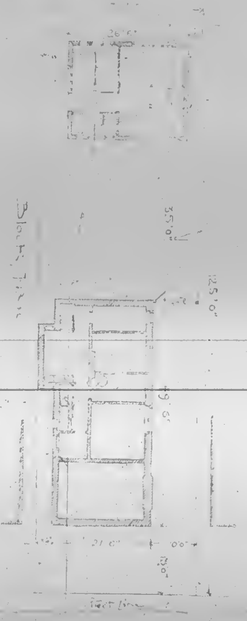
From York Minste

Cap from
Lincoln
Cathedral

Gargoyle
Lincoln

Bits from my Sketch book
Eastlake Mad -
Aug 93





CERTOSA DI PAVIA, FINESTA SULLA, FACCIATA DELLA CHIESA, ITALY.

Towers and Steeples of Sir Christopher Wren, Architect.

CANADIAN ARCHITECT AND BUILDER.

VOL. VII.—NO. 2. FEBRUARY, 1894 PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
64 TEMPLE BUILDING, - - MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 15th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	EDMUND BURKE, Toronto.
1ST VICE-PRESIDENT	J. E. BELCHER, Peterboro'.
2ND VICE-PRESIDENT	W. A. EDWARDS, Hamilton.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI	Ottawa.
FRANK DARLING	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:
W. A. LANGTON - - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	J. NELSON, Montreal.
1ST VICE-PRESIDENT	CHAS. BAILLAIRGE, Quebec.
2ND VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
SECRETARY	JOSEPH HAYNES, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. GENDRON,	Montreal.
J. B. BERTRAND	Quebec.
ERIC MANN	Montreal.
J. VENNE	Montreal.
G. F. TANGUAY	Quebec.

AUDITORS—THEO. DAOUST, J. F. PEACHY.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
WM. PARK, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. J. HILL.
JOHN ALDRIDGE.
JAS. CRANG.
J. LISTER NICHOLLS.
WM. BOOTH.
JAS. ISAAC.
JOHN LOGAN.
JAS. THOMSON
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of advertisers, a copy of this Journal is mailed each week to persons mentioned in the CONTRACT RECORD'S reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

As we go to press the annual convention of the National Association of Builders of the United States is being held at Boston, Mass. The convention will continue for three days. An important feature of the programme is an address by the Hon. Carroll D. Wright, Commissioner for the Department of Labor for the United States, on "The Relations of the Employer and Workman." A discussion will follow the address, with the view of taking action toward the improvement of the Association's form of permanent arbitration.

THIS number of the CANADIAN ARCHITECT AND BUILDER is largely devoted to a report of the proceedings of the annual convention of the Ontario Association of Architects. Notwithstanding that the number of our pages has been increased it has been found necessary to hold over the publication of several interesting papers read at the convention. In point of interest the meeting was unquestionably one of the best in the history of the Association. The proposal to form a collection of photographs at the School of Science of the work of Canadian architects, and submit the work represented by the photographs to the criticism of the members of the Association, should serve to awaken interest in the Association and increase the attendance at future conventions.

WE wish to call the attention of our readers, especially the students, to the new "Students' Department," which will be found henceforth in every issue of this journal. It is our intention to devote this space to the use and advantage of students, although the "Intercommunication Column" will be open to all readers. This column with the questions and answers given this month, speaks for itself, and we invite the co-operation of all able to supply the required information, to make this a valuable department. Questions will be published in the next issue after they are received, and all answers received in the following issue, but when a question is received requiring *an immediate* answer, we will endeavor to supply it in the first issue. We invite additional answers to those given this month. This department will contain a large amount of information, which it will be well for students to keep on file. In this department this month will be found particulars of another competition for students. To students in the employ of architects who are subscribers to the CANADIAN ARCHITECT AND BUILDER, the MONTHLY EDITION of this journal will be delivered postage free for ONE DOLLAR per year. The order for subscription must be accompanied by one dollar and the certificate of the architect in whose office the student is employed. This offer is made with the object of enabling every student to have in his own possession, and accessible when required, the information supplied through this and other departments, and that none may be debarred from entering our students' competitions.

AS will be seen in the report of the proceedings of the Ontario Association of Architects, the CANADIAN ARCHITECT AND BUILDER comes in for some rather rough handling for an editorial note in the issue of November, 1893, which was read in the Convention and which will be found reprinted in the report of proceedings where read. The burden of the strictures upon the comment in question was that it was not proper criticism. Why it should be so classed is hard to say. There was nothing underhanded in the statement, nor was it unbacked by argument, although from the nature of the passage in which the question was treated—a brief editorial note—it was necessary that the argument should be terse and suggestive rather than explanatory. The President of the Association was quite right in repudiating the note as an Association utterance, and might very properly have gone farther and ruled the introduction and discussion of the subject out of order at the outset, for the CANADIAN ARCHITECT AND BUILDER is not published by the

Association, but we think he cannot have caught the meaning of the article when he denounced it as unfair criticism because, as he said, it condemned the Canadian Building at the World's Fair, without stating the reasons for such condemnation, and questioned (as he said) the capability of a Government architect to design work before he has had an opportunity of showing what he can do. As to the first point, it is only necessary to say that the article was not about the World's Fair Building, but about a proposed Governor General's mansion, and the doubtful capability of the Public Works Department to deal with a problem of that kind. That the Canadian Building at the World's Fair is an acknowledged failure was pointed to as a case in point to illustrate the inelasticity of the Department. But it was not the intention of the CANADIAN ARCHITECT AND BUILDER to rest the argument on this example; indeed we were somewhat surprised to find the Association speaking of the building as if the ability of the Department to design were to be tested by this result. In doing so they were—though we may be sure they had not that intention—making a reflection upon the Department more severe than the CANADIAN ARCHITECT AND BUILDER had implied in its note. We had not at all intended to convey the idea that the chief architect's own ability to design was represented by this building. In speaking of the "departmental designer" of the World's Fair pavilion we supposed we were alluding to a subordinate to whom had been intrusted the carrying out of the plan, and in his work we saw an indication of the difficulty which would be experienced by the Department in carrying out the innumerable and unfamiliar details of a large and ornate domestic building. Here is the point. It is not new, and it is not untrue. Whether or not the genius of Mr. Fuller would enable him to surmount the difficulties of the situation is properly a question to consider beforehand, and it was eminently the business of the CANADIAN ARCHITECT AND BUILDER, being as the President said, the only architectural paper in Canada, to raise the question upon the first suggestion that there might be a new residence built for the Governor General. Of Mr. Fuller's talent and ability there is fortunately for the country no question. It has been shown not only in the Parliament Buildings at Ottawa —which were, however, designed when he was a private architect —but in the numerous Dominion buildings which have been built under his control all over the country, and of which the new drill shed now being finished in Toronto is a striking and successful example. We may congratulate ourselves upon the certainty that while Mr. Fuller is the Government Architect the public buildings, small and large, which are scattered over the country and do so much to form the public taste and to influence the prevailing manner of building, will have a merit that will make them an influence for good. But, as was said in the editorial note in question, the forte of his office is organization to secure the thorough design and execution of the types of public buildings which are thus constantly multiplied. Each may be a new case but is referable to a type, and so easily and quickly handled by a band of subordinates trained to that end. Domestic work, and particularly an elaborate piece of domestic work such as the Governor General's residence ought to be, would find the tradition and organization of the office unprepared for it, and we think it is most likely not going too far to say that there would be something in the old training to be overcome as well as something new to be added to it, and could the Chief Architect find time to enter into all this personally? A private architect on the other hand—one carefully chosen by competition, of course—would be more able to give his undivided personal attention to the work; and what assistance he employed would be accustomed to dealing with problems similar in kind. That is the case as stated by the CANADIAN ARCHITECT AND BUILDER. Whether the view taken is right or not may be open to question, but not its fairness nor our right to take it. The article was perhaps too epigrammatic, and so has appeared to have more edge to it than it really had, and has given offence which we regret, but we cannot help fancying that the chief architect himself would be the first to admit that if under the conditions in which a public architect does his work, he succeeds in doing domestic work better than that of the best private architect that can be selected, it will be a great triumph.

MR. EDMUND BURKE,
President Ontario Association of Architects.

MR. EDMUND BURKE.

WE present herewith a portrait of Mr. Edmund Burke, the newly-elected President of the Ontario Association of Architects. Mr. Burke is well qualified to fill this important office with credit to himself and the Association. As a member of the Council for several years, he manifested the deepest interest in the welfare of the Association and performed such valuable service in its behalf as entitle him to the honor which has now been conferred upon him.

Mr. Burke, who is now in middle life, is a native of the Emerald Isle, but has spent the greater part of his life in Toronto, receiving his education at the public schools and Upper Canada College, in that city. On leaving college he entered upon the study of architecture in the office of Messrs. Gundry & Langley, and subsequently, upon the death of Mr. Gundry, formed a partnership with Mr. Langley, which continued until August, 1892, when he assumed the business of the late W. G. Storm. Among the notable buildings with the designing of which his name stands identified, are: McMaster University, Jarvis Street Baptist Church, Trinity Methodist Church, Walmer Road Baptist Church, the warehouse of Messrs. John Macdonald & Co., Union Loan and Building and Loan office buildings, and the residence of Messrs. Robt. Simpson, Henry Darling and D. E. Thomson.

ONTARIO ASSOCIATION OF ARCHITECTS.

The annual examinations of the Association will be held at the School of Practical Science, Toronto, on Tuesday, March 6th, and will continue until Saturday, March 10th.

There will be a public Association lecture at the School of Practical Science on the evening of Thursday, March 8th, beginning at 8.30. The lecturer will be Mr. Grant Helliwell and the subject "Architectural Styles in Use To-day." The lecture will be illustrated by means of the electric light magic lantern of the School of Practical Science, under the management of Mr. Wright. The public are invited to be present.

HAMILTON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The inaugural meeting of the Arts and Crafts Association of Hamilton, Ont., was held in the Art School on the 17th ultimo. About 50 active working members were present. Mr. S. John Ireland, principal of the Hamilton Art School, was elected president. The three vice-presidents are each chairman of sub sections: Mr. Stark Jordan, "Fine Arts;" Mr. John S. Gordon, "Craftsmen;" Mr. W. A. Edwards, "Architecure," Miss Baine, Sec.-Treas., with others form a Council. A strong Probation Committee is appointed, who will decide what to admit or reject from entering the exhibitions; they will also superintend the arrangement of exhibits.

The aims and objects of the society are:—

(*a*) To facilitate the exhibiting of fine art work, architecture and handicraft, done by members of the Association, who shall be residents in or natives of Hamilton or its immediate vicinity, and thereby cultivate the public taste for fine art and the products of the crafts which depend on some display of artistic skill to become saleable.

(*b*) To bring selections of the best works of artists, architects and craftsmen, prominently before the public notice so that some of such works at least may find purchasers, which, if left to individual enterprise, would remain unsold.

(*c*) To bring the works of young artists and craftsmen before the notice of those requiring skilled labor.

(*d*) To encourage individual effort among art workers to produce better work, by associating the name of every worker with his or her work, particularly with factory-produced articles which bear the direct impress of the individual thought, skill, or taste of one or more workers, as well as the name of the firm producing such articles.

(*e*) To admit work of other artists, not resident in Hamilton, as long as there is space for the same without overcrowding local work; this is intended to prevent, somewhat, the members of the Association from becoming narrow minded or purely local in their ideas. No distinction will be made between so-called professionals and amateurs.

(*f*) To purchase works of art with any profits derived from exhibitions, after all expenses incurred in holding such are paid, the work so purchased to form a nucleus of a collection for a public art gallery, such purchases to be located temporarily by the council of this association.

(*g*) To hold exhibitions of Hamilton work in other places in Ontario, where such exhibitions are deemed advisable by at least two-thirds of the members of the association.

(*h*) To further cultivate artistic taste, patrons will be enrolled as well as working members by paying $5 per annum or $25 for a life patronage, the money so obtained to be expended in the purchase of works of art to form the nucleus of an art gallery. The first exhibition will be held early in May next.

The partnership existing between Messrs. W. B. Malcolm, of Toronto, and E. Bowler, of St. Johns, Que., under the name of the Dominion Sanitary Pottery Co., has been renewed.

STUDENTS' DEPARTMENT.

NOTICE TO STUDENTS.

TO students in the employ of architects who are subscribers to the CANADIAN ARCHITECT AND BUILDER the MONTHLY EDITION of this journal will be delivered postage free for ONE DLOAR per year. This offer does not apply to draughtsmen whose term of studentship has expired.

The order for subscription must be accompanied by one dollar and the certificate of the architect in whose office the student is employed. This offer is made with the object of enabling every student to have in his own possession and accessible when required the information supplied through this and other Departments, and to enter our competitions.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION.

The publisher of the CANADIAN ARCHITECT AND BUILDER invites competitive designs for a Drug Store, situated at the corner of a street, to cost not more than $3,000. *In this competition a new departure will be made in awarding the premiums.* A selection will be made of six or eight designs, which will be published together and all students employed in the offices of architects in Canada will be invited to vote on them, filling up a form for this purpose which will be supplied in our advertisement pages. Every vote must be accompanied by a short written reason for the choice made, and each voter must give the name of his employer. The design receiving the highest number of votes, with good and practical reasons, will be awarded the first premium, and so on.

This competition is restricted to students who are at present subscribers to the CANADIAN ARCHITECT AND BUILDER, or who shall become subscribers previous to the close of this competition, in accordance with the notice printed above regarding special subscription price to students.

The store is to be placed at the sunny corner of the street, built on the street lines and having a frontage of 22 feet. The Drug Store *itself* is to be 25 feet deep. Over the store is to be provided a residence of two stories and attic for the druggist.

Drawings are required of a front elevation to ¼" scale and a plan of the store to a reduced scale, drawn below the elevation. Each competitor must give a short, concise description of his design, and he is left free to include any conveniences of arrangement that may suggest themselves as suitable for the purpose of the building. The first considerations should be convenience and architectural effect.

The first premium will be $15.00, and the second $5, the third, one year's subscription to the CANADIAN ARCHITECT AND BUILDER.

Drawings must be made on sheets of heavy white paper or bristol board 7x14 inches in size (the seven inches being the bottom of the sheet), and must be sufficiently coarse to allow of their being reduced to *one-half* the above size. Drawings must be made in *firm strong lines* with *pen* and *black ink. No color or brush work will be allowed.* Each drawing must be marked with the *nom de plume* of its author, and the author's name and full address enclosed in a sealed envelope bearing the *nom de plume* outside, must be sent in with the drawing.

Drawings must reach the office of the CANADIAN ARCHITECT AND BUILDER, 107 Confederation Life Building, Toronto, not later than the 7th day of March, 1894.

All designs will be returned to the authors within a reasonable time after the competition is decided.

Students entering this competition must be careful to comply with all of the above conditions.

All practising architects are debarred from this competition.

TORONTO ARCHITECTURAL CLUB.

WE have received through Mr. Fred. P Kelley, who was the Secretary of the Toronto Architectural Club, a letter from the T-square Club of Philadelphia, which is endeavoring to form a permanent organization for the purpose of holding annually or as often as possible, exhibitions of the work of the various architectural sketch clubs in America.

Accompanying the letter is a copy of a suggested constitution for the proposed organization, the government of which is to be vested in a Board of Representatives composed of one member from each club in good standing. An executive committee selected by the Board, is to have full power to direct the entire work, interests, and all legislation governing the exhibitions, not provided for by the constitution. Any architectural sketch club to be eligible to membership on payment of $10.00, and membership to be maintained by payment of a pro rata tax of 25 cents on its membership. The drawings for the exhibitions to include those receiving special mention at the individual club competitions, and can be exhibited but once. The drawings to be judged by a jury consisting of an architect, artist and sculptor, who are to be non-members, and one gold and one silver medal to be awarded to the clubs whose work shall be adjudged to be the best and second best respectively. The writer of the letter requests the co-operation of the Toronto Club for the carrying out of the scheme.

In fowarding to us the letter Mr. Kelley suggests that we should bring it before the eyes of those interested, in the hope of reviving interest in Architectural Club matters in Toronto, in view of the fact that not a few of the former members of the Club who were away in the United States and England, have returned, and the possibility that they might be induced to renew their interest in the Club, and assist in its re-organization. We very gladly give the matter publicity, in the hope that this result may follow.

INTERCOMMUNICATION COLUMN.

This column is intended to afford a means of correspondence for students, builders, and all our readers desiring information they cannot otherwise obtain. Questions for which an immediate reply is required should be marked "Urgent." Names and addresses of correspondents must be sent with their communications, but these may be signed with initials or otherwise for publication.

QUESTIONS.

[1.] Will some reader kindly tell me in what book I can find good examples of Elizabethan details? A. C. B.

[2.] Opinions seem to vary as to the advisability of constructing hollow walls for houses. I should be glad of any authentic information on the subject? Yours, H. W.

[3.] I am very glad to hear of the proposed Intercommunication Column. It will prove an immense boon to many of us. I have a question to ask which will be of interest to a number of students. I want an unbiassed opinion about going up for the O. A. A. examinations. I do not want to go up for them unless it is absolutely necessary to pass them before I can set up for myself in the province. Kindly let me have an answer at once, as I believe the next examinations are coming off soon. STUDENT X.

[4.] As I understand your Intercommunication Column is open to builders as well as all your other readers, I should like to ask a question. The architect of a building just finished has given me a final certificate for my work on it. The owner says he intends to hold the certificate for six months at least to ascertain the soundness of the work. The contract does not state definitely anything about the time for final payment. I want the money, and don't see why I should wait, as the architect has passed it. Has the owner any right to keep me waiting? BUILDER.

[5.] I am serving under a written agreement with an architect, which is supposed to bind me to him for three years, during which time I get no pay. We had a good deal of work for the first year but have had none for the last three months, and I have nothing to do but kick my heels. As the prospect for the spring does not look promising I have asked him to let me go, that I may go somewhere where I shall see more work, for I am anxious to learn, but he says he will not free me at present. If necessary can I get free by invoking the aid of the law?—QUEBECER.

[6.] I should like to get the opinion of fellow students in country places as to forming a club, of say a dozen members, who would unite for the purpose of subscribing to about four leading architectural papers to be circulated among them. I would make the following suggestions: A dozen of us might pay enough for four papers. Someone would act as secretary and buy the papers and start them out to four members. Each member keep each paper three days and send it on; the last man to return it to the secretary, who would be allowed to keep the papers as payment for his services, or they might be sold and the price realized go towards reducing the expenses for the next year.—G.

[7.] Can any one tell me of a way to mount tracings on drawing paper, so that they can be rolled up without injury?—JACK.

[8.] What is the simplest way of telling good cement from bad? In the country we are very much in the power of the builders in this respect, and I have sometimes been badly treated.—ARCHITECT.

REPLIES.

[3.] STUDENT X.—The probability is that by the time you want to set up for yourself the present O. A. A. Act will have been so amended that it will be necessary for you to pass the examinations and you would very much regret, then, not having passed. Under any circumstances you would never regret having been examined. An examination is an excellent goal towards which studies may be directed, and it enables a student to ascertain how much he really knows. We would strongly advise you not to lose the opportunity that is now presented.—ED. "INT. COL."

[2.] In reply to "H. W." I have made it a practice, whenever the expenses would admit of hollow walls, to use them, and though I have often heard objections made to their use, I have never found any disadvantage arise from their use in my work. —N. G. M.

[6.] The suggestion by "G" is a good one, and we would commend it to his fellow students. We shall be glad to help in the formation of such a "Club" if we hear from others about it. —ED. "INT. COL."

ONTARIO ASSOCIATION OF ARCHITECTS.

THE fifth annual convention of the Ontario Association of Architects was held at the School of Practical Science, Queen's Park, Toronto, on Tuesday and Wednesday, January the 16th and 17th. The first session was called for 2 p.m. on Tuesday afternoon, and shortly after that hour the following members had assembled:

David G. Baxter, Stratford; G. R. Harper, Toronto; H. B. Gordon, Toronto; J. W. Power, Kingston; Thomas Kennedy, Barrie; A. E. Paull, Toronto; F. Darling, Toronto; W. A. Edwards, Hamilton; D. B. Dick (President), Toronto; J. Gemmell, Toronto; W. R. Gregg, Toronto; G. W. Gouinlock, Toronto; W. R. Billings, Ottawa; Mark Hall, Toronto; M. B. Aylsworth, Toronto; R. W. Gambier-Bousfield, Toronto; J. W. Gray, Toronto; S. G. Curry, Port Hope; S. G. Kinsey, Port Elgin; E. Burke, Toronto; S. H. Townsend, Toronto; E. B. Jarvis, Toronto; and W. A. Langton (Registrar), Toronto.

The President called the convention to order at 3 o'clock, and the minutes of the last convention were then read and confirmed.

The President then read his address as follows:—

PRESIDENT'S ADDRESS.

We are now assembled in the fourth convention since the incorporation of the Association. This convention marks a critical period in its history, the most critical in fact, which has yet been reached. The past year has been one of great depression in business throughout the world. The United States have passed through a financial crisis of almost unexampled duration if not of unparalleled severity, and the effects of it have been felt in Canada in almost every department of business. This is a kind of reciprocity which no tariff wall, however high, can keep from coming into operation. There has been a universal cry of "hard times." Less money than usual has been available for building purposes. Consequently fewer buildings have been erected, and there has been less work for architects to do. The last similar period of depression occurred after the financial panic of 1873. That flurry was of shorter duration, and its effects on building were not so disastrous, for several reasons. The cost of building was much lower then than it is now. Buildings were fewer in proportion to population, and those who had money to invest exercised a judicious foresight, and took advantage of the low prices to make provision for the needs of the future. The case is different now. Owing to the advance in wages and the increase in the price of materials, the cost of building has increased enormously. But rents have not increased in the same proportion. The cities, too, are more built up in proportion to population. There is therefore not the same inducement offered to those who are in a position to command money, to invest it in buildings. In Toronto these circumstances are aggravated by the fact that she was suffering from a period of severe depression, following naturally on the cessation of the boom which had been going on for some years previously. This is a local matter, but I may be permitted to mention it in consideration of the fact that so large a proportion of the members of the association reside in Toronto. But the depression has been felt in all parts of the country. The decrease in the amount for which building permits have issued in the cities and towns is conclusive evidence of this. And it is probable that the depression has affected, to a greater or less extent, the business of almost every member of the association. In times of prosperity, even a busy man will give more freely, both of his time and means for the advancement of his profession, or any other object that appeals to his public spirit, than he will be likely to do when he is anxious, and perhaps harassed about his own private affairs. It would therefore be too much to expect that this association should not have suffered somewhat from the general depression.

There are also special circumstances connected with the association itself which make this a critical period in its history—circumstances which may have a grave bearing on its future, and which therefore demand our most earnest consideration. I refer especially to the question of the amending of our act of incorporation, and the present position of that question. We did not propose to ask for much—only the elimination of that one little word "Registered." But under the circumstances even that little proved to be too much. Observe, however, that the boon was not refused; because as soon as it became apparent that "discretion was the better part of valour," the bill was withdrawn. One important factor in bringing about this result was the fact that—notwithstanding the accusations that have been freely made against us of an extreme desire to be exclusive—we, unfortunately, got into bad company. We could not, however, help ourselves in this, and were not to blame for it. "Misfortune makes strange bedfellows," and so we found ourselves, however unwillingly on our part, classed with druggists, undertakers, and (save the mark) milkmen—all of whom came asking for special privileges. We need not concern ourselves with the justice or otherwise of the demands of these different bodies. But the result was, as the Premier informed us at an interview with the Cabinet, at which we were most courteously received, that the temper of the House at that time was such, that any proposal which seemed even to point in the direction of increasing the number of close corporations would certainly be voted down. Under these circumstances the only course open to us was to withdraw the bill for the time being. To have persevered and pushed it to a decision would have been to court disaster. Had we done so, and the bill been rejected by, as it is probable, a very large majority, there would have been no hope of its being favourably considered for years to come. Members of the House who had once placed themselves publicly on record as opposed to the granting of our petition, would feel themselves not only free, but bound to oppose it on the next occasion on which it might be brought forward. We should thus have been now in a much less hopeful position than that in which we stand to-day. Practically we are very much in the same position as at the date of the last convention. We have undoubtedly made some friends. So far as I know we have made no enemies, and we have gained a great deal of experience that will be useful in the future. The work that was done last winter has not been thrown away. A good deal of it will not have to be done over again, but rather supplemented by further efforts on the same lines. We have no reason to feel hopeless or even discouraged. When we consider how many similar associations in different countries have failed in their efforts to obtain such legislation as we have been striving after, it seems as if we were perhaps too sanguine in hoping that we should reach our goal at the very first attempt. You are doubtless all aware that the Quebec Association stands in precisely the same position as we do in regard to this question, the work "Registered" having been inserted by the Government in their act in the same way as it was in ours.

A great deal of work was done last winter, not only by the council or the Toronto members of the association, but by many members in different parts of the Province. The work should not be confined to the time when the legislature is in session; it should be going on all the time. Each member of the association should keep it on his mind, and whenever an opportunity offers, he should take advantage of it to set before influential persons in the community, and more especially members present or prospective of the Legislative Assembly, correct views of what our objects and aims are. This can best be done by those who are personally acquainted with the persons whom they wish to influence. Each member should therefore make it his business to persuade the representative of his own district in the House that the granting of our request would be in the public interest. It is only in this way that the desired end can be attained. It is not the members of the Ministry who have to be convinced that our claims are just, but the people and their representatives. This question has been discussed until you are so familiar with the arguments pro and con, that it would only weary you were I to enlarge upon them now. We should not, however, allow ourselves to talk or feel as if this were the sole end and object of our existence as an association. It is only one of our objects. Indeed it is not properly in itself an object at all, but only the means to an end.

It is declared in the original constitution that the objects of the association are "To unite in fellowship the architects of the province of Ontario, to combine their efforts so as to promote the artistic, scientific and practical efficiency of the profession, and to cultivate and encourage the study of kindred arts," as well to obtain legislation. What has the association done to promote these objects? It has certainly done a great deal to accomplish the first named, that of uniting the architects of the province. Before the organization of the association, the architects of the Province were practically unknown to each other. Those who lived in the same place might happen to be acquainted with each other just as other residents might; but if so it was only by chance, and as individuals, not as brother architects. No one could depend upon getting any advice or assistance in a professional difficulty, from any other architect unless he could claim it on the ground of personal friendship, and it is to be feared that professional rivalry was much more frequent than professional friendship. Such a thing as generous emulation was not to be expected. There was no feeling of esprit de corps because there was nothing to call it into existence. There was no rallying point. Each man fought his own battle for his own hand, but not, it is to be hoped, without endeavouring so far as lay in his power to elevate the character of architectural design, and the tone of professional life in his district. But there could not be the same stimulus to exertion in this direction when each man felt himself entirely alone, as there should be now when each can regard himself as one of a large brotherhood, all of whom are striving to advance a common cause and are united in the bond of a common sympathy. A man can carry himself with more confidence when he feels that in any just cause, he has the influence of practically the whole of his profession in the province at his back.

There is something too in the mere feeling of association that compels a man to put forth all his power, and so to do better work than he could do without this stimulating influence. "Iron sharpeneth iron, so a man sharpeneth the countenance of his friend." There is more in this than perhaps may appear at the first glance. Even if it is somewhat indefinable, it is there. If it were not so why should it be a fact that in all ages, men whose aspirations and tastes were similar have sought to associate themselves together in guilds, or companies, or societies? What but this was the origin of Freemasonry, of the old trade guilds, of associations of artists, whether painters, sculptors or musicians? It is by no means solely to advance their material interests that legal and medical practitioners associate themselves together, but also for mutual encouragement and assistance in the advancement of their respective sciences.

An association can make its influence felt in a way that would be impossible for the same number of separate individuals, even if it were possible to get them to combine on occasion for a special purpose. The very machinery for calling them together would be wanting. Take for instance the question of the proper regulation of competitions. The influence of this association has been most distinctly and beneficially felt in regard to this. It is not too much to hope that the Conditions of Competition prepared by this association will soon be the conditions of every competition taking place in the province. All that is required to bring about this result is that the members should be loyal to each other. A gratifying instance of the good which has already been done was the case of the competition for new legislative buildings for British Columbia, when the council of this association was requested by the government of that province to select and send out two experts to assist them in deciding on the respective merits of the different designs submitted, which duty was, I believe, satisfactorily accomplished by our representatives.

It may be necessary on occasion for this association to watch the course of legislation and perhaps to offer active interference; and to do this effectively an association must be so strong as to be able to speak authoritatively on behalf of those whom it professes to represent. It must also be possessed of the sinews of war; and for this reason it is most desirable that the surplus which has been accumulated should not be trenched upon for ordinary purposes to the extent of one dollar more than circumstances render absolutely unavoidable. Again, builders and tradesmen of all sorts are handled together for mutual protection, and where the relations are so intimate as between the builders and the architects, it is impossible but that cases must frequently arise in which negotiation between the two bodies becomes necessary. How are these negotiations to be carried on if the architects are not associated together as well as the builders? The principal reason, however, why we should maintain and seek to strengthen the association is, as it appears to my mind, that it enables us to do something to advance the cause of architectural education. If we cannot do much directly, we can do a great deal indirectly. If we can do nothing more than organize and conduct a complete system of examinations, it be well worth while to have the association even for that purpose alone. If this association is seen to be doing all it can do, that fact will bring to the notice of those who have more in their power, the urgent need for more being done in this direction. After all it is the young who will derive the most benefit from any increase of facilities for architectural education, and it is one of the functions of this association to make such arrangements as will induce or compel the young men to take advantage of them. I venture to say that unless there is a strong association which recognizes as one of the principal reasons for its existence, the duty of promoting the cause of architectural education, no complete or thoroughly comprehensive scheme will ever be formulated by any educational or other body. It is said that a work well begun is half ended. Our most hearty gratitude is therefore due to the legislature of this province, and especially to the Hon. Minister of Education, for that admirable beginning which has been made in this very School of Practical Science in which we are now assembled. Although the number of students taking the architectural course is not so large as we could desire, it is gratifying to see that the number is increasing. There were twelve students during the last session, and seven of these were in the first year, as compared with three in the third; it shows that the number is increasing. There were also a few special students taking partial courses.

It may be said without exaggeration that, with the single exception perhaps of pure literature, there is no calling for which it is so difficult completely to train a student as that of architecture. I mean so to train him that he will be competent immediately to begin practice for himself. The reason is this, that the art of architecture consists in *building beautifully*, not in making even good designs on paper; and no school ever has or will have the

opportunity to erect year by year complete buildings merely to teach students how it is done. It is different with other professions. Take medicine for instance. In that case the student does in the hospital under experienced men, precisely the same work that he will afterwards have to do on his own responsibility. A large part of the students' education must necessarily be obtained in an architect's office, and one of the chief practical difficulties is to combine the school and the office education in such a space of time as students can be got to give to it; which should precede the other is an open question, on both sides of which much may be said. It appears to me that the true solution of the difficulty is to have the two carried on simultaneously, and I do not think that the difficulties in the way of this are insuperable.

The tendency of the age is to do away with a regular apprenticeship, or to make the period of it too short to thoroughly train a youth. How many of the younger mechanics for instance, have served a regular apprenticeship, or have thoroughly learned their trades? Seven years used to be thought not too long a time to serve in learning a trade or business. Has the average youth now-a-days the capacity to learn as much in two or three years as the youth of a former generation could in seven? No! but he is is content with a much more superficial training. Whatever may be the reason for it, I think it is a fact that the sons of our well-to-do people often reach almost to manhood before completing their ordinary school education or beginning the special training for their future business or profession, and that without having taken a university course. The result is that an attempt is made to cram altogether too much into a short time, which is not true education. It neither trains the mind for its future work, nor furnishes it with a permanent store of knowledge. There will be scope enough for the energies of this association in endeavouring to overcome these difficulties, and so to send forth our young men well fitted for their arduous life work.

The principal architectural event of the year has been the World's Fair. It has been an architectural event to a greater degree than any previous international exhibition. The erection of the buildings has excited far more interest in the architectural world than on any former occasion. It was known that a number of the best architects in the country were pitted against each other, not in competition as we are accustomed to see it, but in generous rivalry, under circumstances calculated to make each endeavour to surpass, if possible, his best previous achievements. The plan adopted for securing variety with harmony and a high standard of architectural design, and that in the shortest possible time, was a bold one, and has been amply justified by its success. You all know the story—how a staff of executive officers was appointed with a construction bureau under one chief who was responsible for the construction of all the buildings—how a number of architects were invited to co-operate with them and each other, and with the landscape gradening artists, in designing the different buildings; how they all met together and determined the general ground plan and the main features that were to characterize it: Court of Honour, lagoons, buildings, terraces, bridges, fountains, statuary—how they decided on the architectural style, and adopted a modulus of height for all the principal buildings; how the work was apportioned amongst them, and each went his own way to study out his design; how they met again in conference, each bringing his sketches with him; how the work of each was submitted to the friendly criticism of all until the designs were finally approved of; how they separated again each to work out his design in detail; how, in less than two years from the time when the first spadeful of soil was turned up, some 600 acres of waste and desolate sand marsh were converted into a veritable garden of delight; how the artistic dream of the enthusiastic co-workers became a reality, as the colossal buildings rose by the magic of modern skill and science, and the White City stood on the shores of lake Michigan ready to receive all the nations of the world, and to brave their criticism. It was a magnificent feat, and Chicago has good reason to be proud of it. It speaks volumes, too, for the high sense of public duty, and the self-abnegation of the local artists, that out of the six buildings surrounding the Court of Honour, only one, and that one of the smallest, was reserved for a Chicago architect.

The Centennial Exhibition at Philadelphia, in 1876, has often been spoken of as the beginning of a new era in American art. The Columbian Exhibition of 1893 will be equally far-reaching in its educational influence. It is not too much to say that millions have, for the first time in their lives, been brought face to face with real architecture, and under such favourable circumstances that even the dullest imagination could not fail to be impressed. The eyes of many a visitor must have been opened to the true character of the abortions that do duty for architecture in his own particular locality; and recollections of what was seen at the World's Fair may prevent the perpetration of at least some others like them in the future. An exhibition of views and a discussion on this subject are to form one of the features of this convention. I shall not therefore take up your time by enlarging upon it now.

Another interesting event which has taken place during the year, illustrates the advance which the art of architecture has made on this side of the Atlantic within the last generation. I refer to the presentation by the R. I. B. A. of the Royal gold medal to Mr. R. M. Hunt. This is the first instance in which the medal has been awarded to any but a European. When Fergusson wrote his History of Modern Architecture, that of the United States was hardly considered worthy of notice at all—so little, indeed, that even in that voluminous work, his criticism of the architecture of the whole of North America, from New York to Salt Lake City, occupied only six pages of letter-press. The history was published in 1862, and the following sentences convey a fair idea of the author's opinion of the state of American architecture at that time:—"The perfection of art in an American's eyes would be attained by the invention of a self-acting machine which should produce plans of cities, and designs for Gothic churches or Classic municipal buildings at so much per foot superficial, and so save all further trouble or thought." "Notwithstanding the defects of their system, the Americans have lately shown a great desire to display their wealth in architectural magnificence, and to rival the old world in this respect; and have produced some very showy buildings, but certainly not one which can be seriously commended as an artistic design, and still less any one which can be quoted as a well thought out expression of a mind imbued with architectural taste and knowledge." Were he writing that history now, one would be curious to see what he would have to say about American architecture. There would of course be criticism some of it no doubt severe, but it would be admitted that there was something worthy of criticism. This great change is chiefly due to the efforts of a band of capable and well trained men, of whom Mr. Hunt is one of the foremost, who have for years been stamping their individuality on the architecture of their country. These men are fortunate in that most of them have been in the zenith of their powers at that period in the development of their country when vast opportunities were afforded for the exercise of architectural talent. Several of these men have proved themselves equal to the occasion, and none more conspicuously so than Mr. Hunt. We are all less or more familiar with his works, and perhaps more particularly with that which has brought him most prominently into the eye of the public, the Administration Building at the Chicago exhibition; and there will be no difference of opinion that Mr. Hunt has fairly earned the high honour which has been conferred upon him. It is gratifying to observe from the whole tone of the proceedings at the presentation ceremony, that Mr. Hunt was not regarded as in any sense provincial, but as a man of high artistic attainments who could meet on equal terms the leading architects of the world, and hold his own amongst them.

It is of special interest to us to note that while Mr. Hunt is undoubtedly gifted with the natural faculty for design, he has also had unusually good opportunities for cultivating it, and of these he has taken full advantage. It happens not infrequently, especially in this country, that a young man will enter an architect's office, without having previously made any special study of subjects bearing on the profession, and after spending three or four years in the office, will start in practice on his own account, being enabled to do so through the influence of unwise friends who can put work in his way. In such a case the chances are that he will never do anything worth looking at, or worthy of being perpetuated in enduring materials. Mr. Hunt's training was very different, as the result is also. An American by birth, he received first a good general education, partly in his native country and partly in Europe. He then spent some time in the office of an architect in Geneva, and afterwards went to Paris, where he studied under an eminent architect and entered the Ecole des Beaux Arts, where he studied for some years. After leaving it, he travelled for a time, seeing the best architectural examples of Europe, Asia Minor and Egypt. Returning to Paris, he was employed for a time under his former master in making the drawings and details for the Pavillion de la Bibliotheque of the Louvre. About ten years were thus spent in study and preparatory work, after which he returned to America, where he first spent six months in assisting the late Thomas U. Walter at the Capitol at Washington, after which he went to New York and began practice on his own account. He was by that time about twenty-eight years of age. Unfortunately few young men who have to earn their own living have either the opportunity or the disposition to pursue such a course of training and preparation as Mr. Hunt did. If it were otherwise, a greater number might rise to something like the eminence in their profession which he has attained.

It appears strange, and is certainly lamentable, that when such men as this are to be found in the country, the United States government should not take advantage of their skill and talent in the erection of their public buildings. These are the last to which an American would call the attention of a foreigner as typical examples of the best architecture of the day. This is not because they are cheap, for they are said to cost almost exactly double what the same buildings would cost if erected by private persons. It is also said that the cost for architectural service amounts also to almost exactly double what the fees would amount to if the work were done by private architects. This is startling but not surprising under the system that has hitherto been followed. One supervising architect, employed at a salary utterly inadequate to procure the services of a first-rate man, has been expected, with the assistance of an army of clerks—draughtsmen, tracing clerks, computing clerks, and so on—to design and supervise every year buildings costing many millions of dollars, and to see to the expenditure of millions more in repairs. It is physically impossible that any man could be found equal to such a task. Chiefly through the efforts of the American Institute of Architects, a bill has now been passed, providing that in future the design and construction of important public buildings will be entrusted to capable architects in private practice. The necessity for the change is illustrated by the condition of the Chicago post office, which was erected only a few years ago, but which a competent board of experts has now declared to be so unsafe that it is liable to fall at any moment on the heads of its occupants. It may be mentioned here that the principle which has now been adopted by the United States government has to some extent been put in practice by our own Dominion government. And it would no doubt be followed to a still greater extent if the development of the country were such as to require the erection of public buildings at such a rate as to outstrip the capacity of the Department of Public Works.

Another interesting architectural event during the year was the Congress of Architects in connection with the World's Fair. The advisory board consisted of leading architects from the United States, England, France, Germany, Italy, Spain, Hungary, and even Japan. This was the first world's congress of the kind that ever was held. While the attendance was not, apparently, as large as might have been desired; it cannot but have had a beneficial effect in broadening the views and enlarging the artistic sympathies of those who took part in it; and the sphere of its influence will be vastly increased by the publication of the full report of its proceedings. If it had not been for the existence of architectural societies in all parts of the civilized world, the labor of getting up such a congress, and reaching the representative men amongst all the scattered units of the profession, would have been so enormous, that probably it would never have been attempted.

During last year a committee of the council have considered the advisability of adopting a tariff of fees. You will observe that their report does not enter into the general question of the desirability of having a tariff or not, but merely deals with that of the expediency of adopting one at this particular time. Much may be said on both sides of the question, and it would be well for members to take it into their consideration, and look at it from every point of view so that they may be prepared to deal wisely with it when it comes up at a future time. A tariff is generally desired with the idea that it can be used as a lever to keep the rate of fees up to the scale fixed by the tariff. That is one side. The other is that it can also be used to keep the rate down to the tariff scale. No tariff can provide for every contingency, and cases constantly arise in which the tariff apparently applies, but yet in which the scale of remuneration fixed by it would be utterly inadequate. Many cases may arise in which an architect may fairly consider his services worth more than the tariff rates, cases for instance in which he has made a special study of some particular class of buildings, which does not often occur in the course of ordinary practice, say, by way of example, theatres. It is obvious that the services of an expert would be worth more to one building a theatre than those of an architect who had never designed a theatre before; and yet in the face of a hard and fast tariff it might be difficult for the expert to obtain that higher remuneration to which his greater skill would fairly entitle him. This aspect of the question should at least be taken into consideration. In this connection I commend to your attention the report in the CANADIAN ARCHITECT AND BUILDER for October last of the banquet of the Quebec Association of Architects, on which occasion two of the members of the government were present as guests, and gave entirely opposite advice on this question. The Attorney-General congratulated the association on having no tariff, and strongly advised them never to have one; while his confrere, the Commissioner of Public Works, on the other hand, was equally positive that they ought to have one, and promised the assistance of the government in carrying it through.

There is one other matter to which I should like to refer. During the last session of the Ontario Legislature an act was passed entitled "An act to facilitate the enforcement of the just rights of wage earners and sub-contractors." This act is an amendment to the Mechanics' Lien Act and contains some provisions which it is necessary for architects to bear in mind in case of having to do with a contractor whose solvency or honesty is doubtful. Under the act as it stood previously to this amendment, every one who did any work about a building, including sub-contractors, sub-sub-contractors, mechanics, labourers, and supply men of all sorts, had the right of lien on the building and land on which it stood unless he signed an agreement to the contrary. Under the amendment no such an agreement is valid. The wage earners' claim to the extent of 30 days wages is given

priority over all other claims, and any device adopted by owner or contractor in order to defeat that priority is declared to be null and void. The owner, however, is entitled under the act to retain for 30 days after the completion of the work, or delivery of the materials, an amount equal to 15% of the value when it is less than $1,000, 12½% when from $1,000 to $5,000, and 10% when over $5,000. He is also entitled to pay any just claims for wages or materials, and to charge the amounts to the contractor, provided he can pay the claim without reducing the amount of the drawback below the amount of the above named percentage, but he must notify the contractor of such payment within 3 days. Further, he is entitled to refuse payment to a contractor of any amount exceeding $100 unless the contractor leaves with him an affidavit or statutory declaration that all wages have been paid up to and including the 14th day previously. If the owner makes any payment without getting such an affidavit, he does so at his own risk, and is still liable for unpaid wages. In the event of a contractor failing to complete his contract, the drawback cannot be used to complete the work, so long as any wages are unpaid. Strictly speaking, an architect is not safe under this act in giving a certificate for $100 or upwards at any time without demanding from the contractor such an affidavit as has been described. Practically it would be impossible to carry on business on these terms, because, notwithstanding that it is the law, any respectable contractor would consider himself insulted if asked to bring such an affidavit whenever he came for a certificate. The law throws the responsibility on the owner, but as he may know nothing whatever either about the law in the matter or the financial standing of the contractor, he will naturally look to his architect to protect him in such a case. The moral therefore is, to have if possible nothing to do with doubtful contractors, but if one should happen to get involved with any such, then not to be too delicate to demand the necessary affidavit. If this course were constantly pursued by all architects, their offices would soon be relieved from the unwelcome presence of the shady contractor—the man who from education and habit is incapable of doing good honest work, but whom a short sighted owner will sometimes insist should "get a chance to tender," with the result that a few dollars are saved in the amount of the contract, and hundreds perhaps lost in the quality of the work. It is simply impossible with any amount of supervision to get the same standard of workmanship from a man whose aim is constantly to increase his profits by scamping his work, as from a man who honestly tries to live up to his agreement, or who at least values his reputation and future business connection more than the immediate gain of a few dollars. This is a point which it is difficult to get some owners to recognize, and if this act helps to open the eyes of such to the risks they run in insisting on the employment of doubtful contractors, it will certainly save many an architect from much unnecessary worry and trouble, whether or not it benefits the class in whose interests it has been framed. I may mention incidentally that under this act an architect has also the right of lien, but curiously enough, some of the United States courts have held that he only has that right if he supervises the erection of the building as well as prepares the plans and specifications.

Now, gentlemen, I shall not detain you longer from the business of the Convention, which is the one occasion in each year on which we can meet together to exchange views and opinions, and stimulate each other to do what in us lies to raise the standard of architectural practice in this province. It is a matter for regret that every member of the Association cannot be present with us. I am sure, however, that those who are absent regret this as much as we who are present do. I trust that the fifth year of the Incorporated Association will see us growing in unanimity and strength, and so prove that the labor which has been expended in organizing and building it up will not have been spent in vain.

The conclusion of the address was received with loud and prolonged applause.

The Treasurer, Mr. Edmund Burke, then read his report as follows :—

THE TREASURER IN ACCOUNT WITH THE ONTARIO ASSOCIATION OF ARCHITECTS.

Dr.

1893.			
Jan. 1	To balance from 1892		$2,285 35
"	Cheque from Registrar, collections, fees, prior to February 2nd, 1893		225 25
"	Interest on Registrar's bank deposit		4 02
"	Library fines		1 75
"	Members' fees after February 2nd		346 00
"	Students' registration fees		42 00
"	Students' examination fees		23 00
"	Students' examination papers sold		50
"	Transfer student's articles		1 00
"	Weber Printing Co., refund, over pay		4 00
Dec. 31	" Bank interest		80 65
			$3,013 52
	To balance forward to 1894		$1,930 50

Cr.

1893.			
By W. A. Langton, one year's salary as Librarian			$ 100 00
" " " " " Registrar			200 00
" " " disbursements			71 71
" " " refund, overcheque			25 00
" R. M. Williams, engrossing minutes			6 50
" Nelson R. Butcher, typewriting, re legislation			8 65
" W. G. McWilliams, fees			50 00
" Curry & Gunther, solicitors' fees " "			64 68
" Travelling and hotel expenses, members of Council			91 25
" Examiners' fees			150 00
" W. J. Graham, attendant at Examination Hall			10 00
" Webber Printing Co			20 00
" Curry Bros., printing examination papers			25 00
" " " list of members			17 00
" " " by-laws			28 00
" C. H. Mortimer, printing account, April, 1892, to July, 1893			109 25
" " " pamphlets re stone tests			57 00
" " " circular re annual fees			1 35
" " " subscription CANADIAN ARCHITECT for 3 English architectural societies			7 50
" Hart & Riddell, stationery			20 65
" Brown Brothers, binding			1 25
" Refund portion of fee to non-practising member			3 00
" St. Lawrence Foundry, for columns for testing			12 34
" Reid & Co., for timbers for testing			2 89
			$1,083 02
Balance on hand			1,930 50
			$3,013 62

EDMUND BURKE,
Treasurer O. A. A.

We have examined the books, vouchers, etc., of the Association, and certify that the above is a correct statement thereof.

(Signed) HENRY LANGLEY, JOHN GEMMELL. } Auditors.

NOTE—

The income for 1892, excluding bank interest, was	$1,199 10
And the expenditure	1,152 81
The income for 1893, excluding bank interest, was	643 50
And the expenditure	1,083 02

On motion by Mr. Burke, seconded by Mr. Gray, the report of the Treasurer was adopted.

The Registrar and Librarian, Mr. W. A. Langton, then read the following report :—

REPORT OF THE REGISTRAR AND LIBRARIAN AT THE ANNUAL MEETING ON JANUARY 16TH, 1894.

Members.

The following is the state of the roll of membership of the Association :—

Membership on January 1st, 1893—		
Resident members	62	
Non-resident members	71	
Total		133
Registrations during 1893—		
Resident members	3	
Non-resident members	3	
Total	6	
Membership on January 1st, 1894		139
Of these there were—		
In good standing		50
Honorary		1
In arrears for 1893		61
" " " " and 1892		18
" " " " " and 1891		9
		139

Students.

There are 87 students on the list. Of these many have gone away for study or in search of work. Some are I think engaged in other pursuits, but I have received no communication from them renouncing their connection with the Association.

Classified according to the examination required from them the roll of students is subdivided thus :—

For first intermediate examination	13
" second intermediate examination	26
" final examination	48
	87

At the examinations of this year there were 19 candidates, classified as follows :—

First intermediate examination	5
Second intermediate examination	8
Final examination	6
	19
Of these the following members passed :—	
First intermediate examination	2
Second intermediate examination	3
Final examination	2
	7
The following were conditioned :—	
First intermediate	1
Second intermediate	1
Final examination	2
	4

These form came up for examination in September, and all passed but one of the candidates for the final examination. Thus, of the 19 candidates for examination in this year 10 have passed, and of these there are three thus made eligible for registration as members of the Association.

The register for students seeking employment, which was opened at the office of the Registrar in 1892, has been little used by students. Architects on the other hand have often made enquiries about draughtsmen, and some of the students who did give their names to the Registrar have thus procured employment.

Proceedings of the Council.

Besides the meeting on the day after convention for the purpose of electing officers and dealing with matters referred by the convention to the Council, the Council met on May 2nd to consider the report of the examiners, and on June 1st, to consider the report of the legislation committee.

Matters dealt with at these meetings, other than administrative details, were as follows :—

Copies of the Conditions of Competition approved by the convention of 1892 were ordered to be printed, and five copies sent to each member.

The fees for 1893 were fixed, as desired by the convention, according to a a graded schedule based upon the plan defined in the president's address at the convention. This schedule was afterwards reduced as stated below.

The following gentlemen were appointed examiners for 1893, and after the examinations were re appointed for 1894 : Messrs. C. H. C. Wright, S. G. Curry, S. H. Townsend, R. W. Gambier-Bousfield, F. Darling and E. Burke.

As Mr. F. J. Rastrick proposed to retire from the Association upon the completion of his period of service as a member of the Council, it was thought proper to ask him to become an honorary member of the Association.

The principal work of the Council was the endeavor to procure an amendment to the Act of Incorporation such as would make the title Architect the exclusive right of members of the Association in place of the title Registered Architect. The Toronto members of the Council had been appointed by the Council as a committee to procure legislation amending the Act, and were called the Legislation Committee. At the meeting of the Council on Feb. 9th, the following non-resident members were added to the legislation committee : Messrs. Jas. Adams, F. J. Alexander, Jas. Balfour, F. Bartlett, A. Bell, Jos. Connolly, T. Cuthbertson, John Day, J. C. Forster, Fred. Henry, John Kay, Thos. Kennedy, J. W. Kenney, J. Z. Long, J. A. Maycock, A. A. Post, Jos. Powell, Jos. W. Power, F. J. Rastrick, W. Stewart, A. White and J. L. Wilson. By letter and circular the president and local members of the legislation committee communicated with the non-resident members so as to secure concerted action. The committee in Toronto held 13 meetings and were assisted by the solicitor of the Association and the solicitor who had successfully assisted the Provincial Land Surveyors in procuring legislation in the previous year. The bill of amendment was finally withdrawn on May 16th by the advice of its principal supporters in the House. A meeting of the Council was called on June 1st, and the action of the committee in withdrawing the bill was endorsed by the Council.

It was decided at this meeting to keep the cost of the working of the Association as low as possible and to reduce the rate of fees until the time when the question of legislation could be brought up again.

A second schedule of fees was drafted and sent out on June 13th along with the President's circular letter dated June 6th, in which was given an account of the work of the legislation committee and the decision of the Council with regard to fees.

It was intended to introduce, when the Bill amending the Act was in committee, an amendment to the Act providing for the election of the President of the Association by the convention, as desired by the convention of 1893. Failure to accomplish this amendment was involved in the withdrawal of the Bill.

The Library.

The number of loans made from the library during 1893 has been 152, or five less than in 1892. Of the borrowers 41 were architects and 111 students.

All of which is respectfully submitted.

W. A. LANGTON,
Registrar and Librarian.

The Registrar, after reading his report, said that at the last convention instructions had been given the Council to push the question of having customs dues collected properly upon plans coming in from foreign countries. In pursuance of that instruction the Toronto members of the Council had been directed to confer with the Manufacturers' Association (a deputation of which body had been of assistance at Ottawa before on a similar occasion and had promised assistance again), as to organizing another deputation to go to Ottawa. The Council had sought and secured an appointment with that Association, but the proposed meeting was adjourned for the purpose of attending the funeral of the late W. H. Howland. Since then it had not been possible to have another meeting, and the matter was consequently referred to the new Council. Another question was the fixing of a tariff of fees, alluded to by the President, which was brought up in the Council. A committee consisting of the President and Messrs. Townsend and Darling had considered the question and presented a report at the Council meeting that morning, which might be appended to the Registrar's report. The following is the report as read :—

The committee appointed to "consider the advisability of adopting a tariff of fees," beg to report that, having given the subject careful consideration, they are of opinion that at the present time—when the Association has been working for and is looking forward to an important amendment to the Act of Incorporation—it would be inexpedient to do anything that might have a tendency to increase the difficulties in the way of obtaining that amendment. There is no doubt that the principal difficulty in the way of obtaining the desired amendment is the feeling prevailing amongst a large number of members of the Legislative Assembly that the Association is of the nature of a Trades Union, and as the ultimate object of these organizations is almost invariably the increase of the rate of wages, your committee are satisfied that if the Association were at this time to adopt a tariff, it would be misinterpreted as a move in the same direction. If we had once obtained the amendment to the Act for which we are seeking, the question would naturally come up as a logical consequence of the enlarged powers which that amendment would confer, and could then be dealt with effectively without injury to the Association. In the meantime, there is no need for any uncertainty as to what is a fair scale of charges, because the tariffs which have been adopted by almost all associations of architects in this country and in Europe are practically identical, and have again and again been recognized by courts of law as proper and reasonable and as a fair basis on which to settle disputed accounts. Any tariff which we might adopt would undoubtedly be similar in its provisions, as it would be useless to attempt to obtain sanction to a tariff higher than that of all similar bodies, and assuredly the members of this Association would not desire that it should be lower. The scale of charges thus fixed is accessible to all architects and can be as readily appealed to as if formally adopted by the Association. The Architectural Guild of Toronto some time ago prepared and adopted a tariff on the above basis, and copies of it can be procured by any member of the Association on payment of a nominal charge. An excellent plan is for individual members or firms to have the scale of charges printed in some convenient form, as for instance on a corner of their letter paper, where clients could not fail to see it, or elsewhere as they might deem expedient. In conclusion, your committee desire to remind the members that any tariff which the Association may adopt must be sanctioned by the Government, and it will be necessary to show that the proposed tariff is in harmony with the custom and the precedent of our ordinary practice. It is therefore apparent that in the meantime it is of the utmost consequence that all members of the Association should conform their practice to the universally recognized existing tariff.

S. H. TOWNSEND.
FRANK DARLING.
D. B. DICK.

On motion by Mr. Townsend, seconded by Mr. Gouinlock, the report of the Registrar was received and adopted.

DISCUSSION.

Mr. Gambier Bousfield asked if something could not be done by the Association to bring and keep itself more prominently before the public from year to year? Between the annual meetings the public heard nothing of the Association. He would suggest occasional meetings at which papers could be read, and reports of which would appear in the press, and in that way the public would not be allowed to lose sight of the fact that such a body was in existence working for the advantage of the community in general.

Mr. Aylsworth said he could not remember having seen during the year any reference to the Association in the public press, but he had observed a reference to the Architects' Guild of Toronto. That body, he believed, had been asked to select representatives on the Technical School Board. He had no doubt the members of the Guild—of which he was not himself a member—had the interests of the Association at heart, and he thought if a similar case occurred again, it would help the Association if the Guild would turn over to it a matter of that kind, by which means the Association would be brought into prominence and become better known to the public. The Guild had been longer in existence and had a handier name, and he had the impression that in the minds of the public throughout the province it was more prominent than the Association. If such a case should arise during the year it was in the power of the Guild to do something for the Association in that way.

Mr. Gregg thought Mr. Bousfield's suggestion was in line with his own of a year ago, regarding the formation of chapters or branches of the Association. He thought the lack of such a branch in Toronto was apparent, and that such a matter as that regarding the appointment of representatives to the Technical School Board, referred to by Mr. Aylsworth, should go before that branch, as the Association as a whole was probably a better body to appoint those representatives than the Guild.

The President said that so far as he could recollect the matter of the appointment of the representatives on the Technical School Board was the only instance for a number of years in which the Guild had been brought before public notice, and he thought that had been allowed to remain in the Guild's hands to avoid making any change. It had been the policy of the Guild not to interfere with matters that were within the province of the Association. He thought he could safely say that since the Association had been in existence, with the exception of the instance mentioned, no mention had been made in the newspapers of the Guild. In regard to Mr. Gregg's suggestion as to chapters, there would be no difficulty in establishing one in Toronto, but there might be in other parts of the province, and he would like to hear from some of the outside members regarding that.

Mr. Billings (Ottawa,) said that Ottawa was supposed to have an Institute now, but they had never had more than five or six meetings, and he believed the secretary of four or five years ago was still secretary. He could not say whether it had been properly run, but it was not a success. There were not more than one or two other cities outside Toronto that had as many architects as Ottawa, and if it could not be made a success there it could hardly be expected elsewhere. They had had one or two pretty good meetings—one when Mr. Curry came down to explain the working of the Association, but as a general thing there was a great deal of apathy. Even when members did attend they didn't know what they came for. There was nothing to do except to sit down and smoke and read a paper. Even in a large Association like the present, there were but few architects who could find in their experience anything sufficiently novel on which to spend their time and give a paper to the Association. However that might be in Toronto, he felt sure that in Ottawa if meetings were held only when some member had a paper of sufficient novelty and interest to hold the attention of those present, the meetings would not be very numerous.

There was a matter to which, although at present he might be slightly out of order, he desired to draw attention, as it had a bearing upon Ottawa architects. There had appeared in the CANADIAN ARCHITECT AND BUILDER, a paper published in Toronto, the following article :—

"Lord Aberdeen's request for an addition to Rideau Hall has excited comments from the daily press varying according to the political bias of the paper. One paper is for leaving Rideau Hall as it is and forcing our Governor Generals to conform their manner of living to the ideas of our farmers who, the leader writer asserts, are coming to the front in public affairs and will be found on the side of a policy of 'democratic simplicity'. Another paper is for pulling down Rideau Hall and replacing it by a 'respectable looking mansion.' It is, as it has turned out, a pity that this course was not adopted at first, for according to the figures quoted, Rideau Hall, which cost $82,000 to purchase, has cost $553,000 for repairs and alterations. Whether the need of $15,000 worth of more room is sufficient provocation to pull down what has been done and build the respectable looking mansion now, is a question. It would not be an exact response to the request of the Earl, who has not asked for a new mansion bye and bye, but for a few more rooms now. It hardly seems likely that the old Hall with its additions will be pulled down before it has had a life reasonably proportioned to the money which has been spent upon it. When the time does come for it to be replaced it is to be hoped that some steps will be taken to have the work well designed. It is not the class of building that is likely to be well handled by the Public Works Department. The forte of the Chief Architect's office is in its organization for the multiplication of buildings of a similar class. An order for such an unprecedented and (unless the farmer forbids) elaborate piece of work as a new residence for the Governor General would sweep the office like a cyclone. The pavilion representing Canada at the World's Fair has already proved too much for the elasticity of the departmental designer. If a new residence for the Governor-General should get into the hands which produced that work, it is impossible to avoid the conviction that however capacious the mansion might be it would not be 'respectable looking.'"

The portion to which he more particularly called attention was that in which it stated "It is not a class of work that is likely to be well handled by the Public Works Department, etc." Certainly that was not complimentary. He felt sure that no person who sneered in that manner at so distinguished an architect as Mr. Fuller was a member of the Association, or even an architect of this or any other province. The paper in question was supposed to be the organ of the Association, and he did not think the organ of the Association should make statements of that character, and he wished to call attention to the way in

which it was edited. He did not think there was in the mind of any member of the Association any question as to Mr Fuller's ability. In adverting to this matter he desired to say that he was acting entirely upon his own responsibility, and not at the wish or suggestion of any member of the staff reflected upon. He would like to hear the opinions of members of the Association in regard to this question.

Mr. Aylsworth said that after what had been said regarding the establishment of chapters in places outside of Toronto, it was hardly to be expected that it could be done elsewhere. He thought in Toronto the Council might take the place of the suggested chapter and hold meetings whenever occasion offered, which would be noticed in the papers and have the desired effect, while the Guild might still afford the means of social and mutual improvement. It might be a matter of consideration whether some means could not be found by which the Guild would be incorporated with the Association in such a way as to take the place of a local chapter.

The President thought one reason why Mr. Aylsworth's suggestion had not been acted upon was the fact, that the time of the council had hitherto been so fully taken up by the matter of legislation that no time was left for anything else, but he thought the present an opportune time for taking it up, and if possible carrying it into effect. So far as the Guild was concerned, he looked upon that organization as having to a certain extent fulfilled its design, though he would not say it had survived its usefulness. The Association of Architects was largely the outcome of ideas expressed in the Guild. He thought if the Guild was maintained it should be simply as a social organization. The difficulty in regard to the appointment of representatives to the Technical School might be got over by having a meeting of the Council of the Association in Toronto, as it would be a little difficult for the Association as a whole to select those representatives for the Toronto Technical School. In regard to the matter brought up by Mr. Billings, he felt sure all present would regard the publication of such sentiments with regret. It had been said the paper in question was the organ of the Association. There was no other paper which it could make its organ. He would venture to say on behalf of the Association that as an Association they entirely repudiated the publication of the paragraph referred to.

Mr. Gregg said that in order to keep the matter of the formation of branches before the Association he would move that during the coming year the Council consider the advisability of calling occasional meetings of the Toronto members, or of forming a branch in Toronto.

Mr. Burke said that while the wisdom of continuing any discussion of the subject introduced by Mr. Billings might be doubtful, he would point out that all the buildings at the World's Fair on which there was any room for criticism had been very severely criticized. He did not see himself that there was any particular venom in the paragraph referred to; it was written in just the same spirit as the criticism of the other buildings. He did not think it was well to be too thin skinned, for criticism was a good thing sometimes.

Mr. Darling thought Mr. Fuller would not object to any criticism of a work he had executed, but the paragraph referred to was not of that character, but rather an insinuation against his ability to do something for which he had not even had the opportunity of submitting a design.

The President agreed that no one should object to fair criticism, but as had been pointed out by Mr. Darling, the paragraph in question was not a criticism; it did not point out what the defects were, which was the first function of a criticism.

Mr. Bousfield, reverting to the original subject under discussion, suggested the advisability of endeavoring to give a little more publicity to the doings of the Association. The results of the examinations and similar matters might be inserted in the daily press.

Mr. Gouinlock coincided with Mr. Bousfield's views, and thought the meetings of the Council should form the subject of paragraphs in the newspapers.

Mr. Gregg read his motion as follows: "That the Council consider the advisability of calling occasional meetings of the Toronto members for encouraging the formation of a local branch.

Mr. Bousfield seconded the motion.

Mr. Power expressed an apprehension that such a course as was suggested might have a detrimental effect on the Association as a whole.

Mr. Gregg thought the motion was quite harmless; the Council had a majority of outside members, and if they foresaw any danger of hurting outside places the matter would certainly be allowed to drop. He did not think it was going too far to ask the Council to consider the matter, and it put the whole question off for another year.

Mr. Billings thought such occasional meetings as had been suggested might be held by the Association as a whole in Toronto, and any outside members who happened to be here or within reach might avail themselves of them.

Mr. Power described the "Institute of Building Arts" carried on under the auspices of the Illinois Chapter of the Association of Architects in Chicago. They had a large flat which was sustained in this way. The floor space was rented to manufacturers and others having building appliances for sale, who made a display there. This brought in a revenues ufficient to pay the rent of the flat. They had monthly meetings at this room, at which architects from other places could drop in, and a special meeting every three months. He thought a similar arrangement ought to be feasible in Toronto, and would be beneficial to both the architects and those making the display.

Mr. Curry called attention to the difficulty there was even in Toronto in getting members to attend a meeting, pointing to the small attendance at the Convention as an illustration. If the members themselves would not do something to help along it was no use calling upon the Council to call meetings. The Guild which had been spoken of had had very strict rules to prevent this lack of attendance, to which it owed very largely its success. If a reasonable attendance could be depended upon, such meetings as suggested would be all very well, but it was no use attempting it if out of the forty men in Toronto only four or five attended. A man who had spent some hours, perhaps days, in preparing a paper to be read at such a meeting, would think it a very poor return for his labor to have to read it to an empty room. There was too much of a feeling abroad among the members that somebody else should do something to make a success of these meetings. If anything was to be expected it must be through individual action. If it could be shown that there was any desire on the part of members to attend such meetings, as suggested, the resolution was a good thing, if not, nothing could be expected from it.

The President, in order to meet Mr. Power's objection, suggested that the resolution be amended by saying, "Occasional meetings of the members in Toronto," instead of occasional meetings of the Toronto members.

Mr. Gregg expressed his willingness to make the amendment, and the resolution, so amended, was carried.

Mr. Gregg then read the following paper:—

ESTIMATING THE COST OF BUILDINGS FROM CALCULATION OF THEIR CUBICAL CONTENTS.

An architect often finds it necessary to estimate the cost of a proposed building before more than an outline sketch has been prepared and before specifications have been written.

In such a case he naturally brings to mind a building of the same class, which has already been erected, and of which he knows the exact cost. If such a one can be thought of, and if it is of the same general dimensions, he has simply to make allowance for changes that may have taken place in the prices of labor and materials, and has little trouble in arriving at the required estimate. If, however, the Building which seems most suitable for the purpose is somewhat larger or smaller than the one proposed, he finds that by taking its cubical bulk or contents and that of the proposed building as a ratio, he may find the proportionate cost with a great deal of certainty, especially if the difference in size is not great. This experience has led to a system, more or less common, of keeping, for reference, a record of the cost per cubic foot of buildings which have been erected, or upon which tenders have been received, and such a record, although often an imperfect guide, is worth the small amount of trouble required in its preparation, and with the entries made from time to time its value will increase.

Within the past few days I have seen a few of the Toronto architects and they have kindly compared notes with me upon this subject and contributed some information used in this paper, which is written with the object of leading to a further interchange of ideas in the discussion which should follow.

I would recommend the following simple method of keeping a record of cubic contents and cost, and would say that the information an architect has of this kind from his own buildings is the best for him, as it is probable that no other architect is quite similar in his style of work and finish.

A book or a number of sheets of paper should be ruled in suitable widths for the following columns: 1st, date, (year); 2nd, name of building, (or owner); 3rd, where erected; 4th, short description; 5th, cubical contents in feet; 6th, cost of building; 7th, cost per cubic foot; 8th, remarks. The kinds of buildings should be classified so that prices of one class may be seen and compared at a glance in one column. Examples were here shown similar to the following:

Date	Name.	Where Built.	Description.	Cubic Feet	Cost $ c.	Cts. per c. ft.	Remarks.
			13 18.				

In computing the cubical contents the rule most commonly used is to measure the building as a whole or in parts from the bottom of the footings to a point half way up the slope of roof, this being done in parts where there are different heights of roofs, towers, etc. In measuring brick or stone buildings, light wooden porticos or verandas are usually omitted. There should be a uniform system of omitting or including such items as heating, mantels, grates and tiles, electric wiring, or of using two rates, one omitting and the other including these.

Supposing that cubing our public schools would give nearly uniform results, I saw Mr. C. H. Bishop, the Superintendent of Toronto School Buildings, and he kindly made out a list of the cost of twelve buildings recently erected with the rate per cubic foot, and this varied by half and quarter cents all the way from 5 to 7½ cents, the variation not being governed by the number of class rooms. This shows that the system is not perfect, and that for very correct results, other methods must be used.

I shall close with a list of the most common classes of buildings, giving a price for each per cubic foot, simply as an opinion which may be altered upon further observation. It is intended for Toronto, and is probably higher than in other places in Ontario.

Plain stables, brick, not including complete iron fittings	7c.
Plain brick dwellings, detached or semi-detached, pine finish, furnaces and mantels	8c.
Detached brick dwellings with plain stone trimmings, hardwood finish on ground floor, hot water heating and mantels	10c.
Detached dwellings, brick or stone, with more elaborate cut stone work, hardwood finish throughout, best plumbing fixtures, hot water or steam heating, elaborate mantels, electric wiring, etc.	15c.
School houses, brick, including furnace heating	6½c.
Churches, plain brick, furnaces and pews included	7½c.
Churches, stone, steam heated, including pews and electric wiring	9½c.
Shops, with dwellings over, plain brick	7c.
Foundries or warehouses with earth floor, one story	3c.
Plain one story warehouse, floored	4c.
Wholesale warehouses, five or six story, brick fronts, with cut stone dressings, heated, office only finished	6½c.
Plain brick office buildings, heated	9½c.
Bank buildings, brick, with cut stone dressing, 2 fronts (on corner)	20c.
Hospitals, brick, steam heating included	8½c.

Mr. Burke said he was unable to agree with Mr. Gregg's opinion that cubing is not much use and is rather inclined to be incorrect. He thought in practice it was found to be just as correct as the builder's estimate, and that the very difference in the cubing of schools showed it. Probably the reason for the great margin in the different schools was to be found in the builder's estimates, not in the principle of cubing.

Mr. Gregg said he looked at the question as it came before an architect in connection with preliminary sketches. The architect is given an order for a building and wants to give an estimate of the cost. How was the architect to know that in that particular case the builders would go away down below the value?

Mr. Jarvis thought from his experience that Mr. Gregg was pretty nearly right.

Mr. Bousfield thought another column might with advantage be added to what was already given by Mr. Gregg. That was the cost per head for schools or churches. Hospitals, too, were very often tabulated at so much per bed. All these were important helps for getting at the actual cost of a building, because, as Mr. Gregg had said, every building varies considerably. Hospitals must of necessity vary according to their character, whether for general purposes, for children, or for infectious diseases. All were regulated according to certain hygienic rules, some requiring more air space than others, and so on. The information that hospitals cost so much per cubic foot gave very little guide to anyone else unless it was known what class of hospital it was, and the cost per bed as well as per cubic foot. Then, with regard to bow windows, cupolas and that sort of thing, they were very easily overlooked in estimating by the cubic foot. In carrying out a design such things were frequently added, and they knocked all calculations by the cubic foot on the head, because they are in themselves expensive additions. His experience had been that everything of that kind had to be very carefully calculated.

Mr. Gregg quite agreed with Mr. Bousfield; he thought every oriel window, tower, etc., should be taken. He thought the ideal way of finding the cubic contents was to find out exactly what amount of space taken out of the atmosphere was filled by the building. He had heard a story of the origin of the word Eureka to the following effect: A man who had been seeking to find the cubical contents of his body was taking a bath one day, and noticed that when he entered the bath the water rose to a certain height. It struck him then that if he measured the size of the bath between the point the water had been at before he got in and the point to which it rose he would be able to arrive at the cubical contents of his own body, and he was so delighted at his discovery that he jumped out of the bath and ran naked through the streets, shouting, "Eureka." (Laughter). If that plan could be adopted with a building it would give it with exactitude; it had to be done somewhat roughly, but the nearer you could get to exactitude the better.

Mr. Townsend disagreed with Mr. Gregg on the same point taken by Mr. Burke. He thought the cubic contents based upon a building of the same sort was far more likely to be right than a builder's estimate. In a case in court not long ago the Judge had taken his cubic contents in preference to the builder's estimate. He thought Mr. Gregg's suggestion that architects should confer together on this point a very valuable one, for if they could agree upon some uniform method in their calculations of cubical contents it would be very helpful.

Mr. Jarvis said the class of work an architect did varied so much that the accurate way to find out what your own work would cost was to refer back. Some architects could get work done cheaper than others, who were regarded by builders as pernicketty, and that for that reason charged 30 per cent. more when working under them. Each man therefore was the best judge, as to the cubical contents, of the cost.

Mr. Gregg said that was exactly what he had found in comparing notes with a few architects, and it seemed to him that it would be quite impossible to make a table of the cost of buildings in Toronto based on the prices given by a number of architects, and that was why he had closed his paper in the way it did. His object in giving the prices was not as a guide, but merely as a beginning or essay for each class mentioned.

Mr. Gouinlock supposed the prices given by Mr. Gregg would be altered according to the varying prices of the building trades.

Mr. Gregg said his figures were principally based upon the prices of the last three or four years.

Mr. Gouinlock said he had made a calculation of one or two buildings, and he found only a cent per cubic foot on factory buildings and half a cent per cubic foot on residences of difference between Mr. Gregg's figures and the cost of work actually done this year.

Mr. Aylsworth interpreted Mr. Gregg's tables to be more as a suggestion that each architect might utilize in his own way, and as such he thought it very useful, but he did not think it was adapted to be used as a hard and fast rule. It might, as had been suggested, be used in law courts, but he thought that would depend to a very large extent on the amount of confidence the presiding judge had in the architect's ability. He did not understand it was intended as a rule for all to adopt, but each architect in his own practice could make it very useful and valuable.

The President said he thought the members were very much indebted to Mr. Gregg for his paper. There was no question about the value of the method of arriving at an approximation by cubing. He did not think, however, that Mr. Gregg intended the figures he had given to be sent forth for the guidance of architects as an infallible rule. He supposed most of those present used the cubing system more or less, and he thought it was really valuable if used with proper discretion, but it ought to be used with a great deal of care, because it was very easy to get different results from different systems. Each man must work out his own system, and by keeping a record of the cost of his own buildings he would be enabled to get better results. A point to be borne in mind was that the comparative size of a building made a great difference in regard to the cost, especially in the case of buildings which may be divided into large or small rooms, schools for example. There would be a great difference between a school divided into rooms holding say twenty pupils and one divided into rooms holding fifty. The same would apply to dwellings. He thought the members were very much indebted to Mr. Gregg for his valuable contribution. (Hear, Hear.)

The convention adjourned at 5 o'clock p. m., until 10 o'clock on Wednesday morning.

SECOND DAY.

The proceedings of the convention were resumed at 10:30 on Wednesday, when Mr. Gambier Bousfield spoke from notes on the subject of "The Construction of Shop-Fronts During the Next Decade." A problem was being presented to architects, (an extension of the old question of the architecture of the shop front), which required considerable study and was a field worthy of earnest consideration by the profession. The requirements of trade necessitated in a good many branches the exhibition of wares and stock on every floor. The show window was not now confined to the ground floor, but every floor had to present a show window to the street. All the space that could possibly be spared from the necessities of construction was required for an area of glass on every floor, so that it would seem as if the only construction admissible was that of iron or steel and glass —the lightest and most economical as regards space. He did not think, judging from many buildings recently constructed in the city, that construction generally tended in the direction of economizing space. Buildings such as the Court House, Athletic Club, the Drill Hall, the Freehold Loan Offices and others were of very heavy construction, and the area occupied by the walls and piers very much limited the floor space within and the window space in the walls. No doubt some buildings required such massive construction; window space was not the absolute requisite that it is in shop fronts; but while we were practising such heavy construction the lighter kinds were likely to be overlooked. So far as existing examples were concerned, and there were many in the city to-day, there seemed to be but two methods of arranging such shop fronts of several stories as he was discussing. The general way was the rectangular method —upright and horizontal beams—and the other was a semi-circular arch thrown over the second story window. The problem that presents itself is how to adapt architecture to these requirements of trade. Formerly this question concerned only the ground floor; now every floor has to be similarly treated. Must we forever follow the lines of the Romanesque or be confined by way of variety to the round arch? Would it not be worth while to attempt some departure from these, which are becoming stereotyped forms, and in danger of endless repetition? The difficulties in the way of the application of gothic principles were well known; the point he wished to bring out was the necessity, not of adopting any period of architecture as a fixed rule for shop fronts, but of modifying the art to suit the requirements of the times.

Mr. Burke thought the problem presented by Mr. Bousfield's paper was one of the most difficult with which the architect had to contend, the combining of proper architecture with what was demanded by the requirements of modern trade; in fact it seemed to him an almost hopeless task if one desired to follow ancient models. He thought from the business standpoint the Chicago men had solved it as nearly as it was possible to do, having resolved their supports into simply iron stanchions with sufficient masonry to protect the iron from damage in case of fire. His experience with proprietors of retail establishments led him to almost dread any attempted solution of a problem of that kind. He had introduced one little window on Yonge St., which had pleased the proprietor very much, because it afforded the public a view into the basement as well as the ground floor, so that they could see the merchant's wares in the cellar. This

proprietor had told him that the basement was more valuable than the first floor, owing to the predilection of customers to go prowling down below rather than to go up, expecting to get bargains in the cellar that they would not find on the first floor.

Mr. Townsend said there was one point in the paper which he was inclined, though not very strongly, to object to. He referred to the suggestion that an attempt should be made to follow existing examples in work of this kind. He thought if the architect would look at the question more as a business problem, more as a practical question of putting up a building which, while it should not be positively ugly, would at the same time properly fulfil the requirements of the situation, he would arrive at better results on the whole than could be obtained by any attempt to work in a style that was formulated or that grew out of a different set of conditions.

Mr. Simpson asked if the difficulty Mr. Bousfield found was in the fact that business men wanted to make a show of their goods on windows above the ground floor. If it was desirable to get the lights above the ground floor as large as possible he thought it must be only because the architect's taste ran in that way. If it was desired to have the openings above the ground floor as large as possible it would be better to choose a style which lent itself to that treatment. If business men did not require to show their goods above the ground floor, and he could not see why they should, he did not think there should be much difficulty in getting sufficient light for displaying his goods in almost any style.

Mr. Langton said it seemed very much as if for commercial buildings pure and simple this was the problem of iron construction. It is being worked out in the United States by the aid of iron, but not as a problem in iron design. If the entire building is to be devoted to one purpose, and that a purpose requiring abundance of light, while as is usual the exterior wall area is so small that none can be well spared, he thought the architect would be judicious and would act most in the interests of his client if he seriously considered the question as an occasion for designing in iron. Where the upper part of the building was devoted to another purpose, such as offices, where very large windows are a discomfort rather than a gain, the problem became a complicated one for which he was not prepared on the spur of the moment to offer a solution; but he thought it probable that an artistic result would be obtained by continuing up the line of the slender supports in the lower storey and making the wall surface above by material and construction to be obviously only a filling in to reduce the window space.

Mr. Gregg thought the problem being discussed was a very old one. The practice of building thick glass fronts on the ground floor with a heavier building above was so old that it had almost come to be accepted, although architects could never agree that it was pleasing and right. We became accustomed to it in a one story building, and then it had come into Toronto in two story buildings. The Walker building was a very curious affair. The supports were probably fifty feet apart, and the space between light glass windows with partitions. Whether there was a support behind the divisions could not be seen, and what was presented to the eye was a very heavy stone front supported by two storys of plate glass. Of course that could not be accepted as high art, although it might be tolerated as what was demanded by the commercial requirements of to-day. The question was, if buildings of that sort were to be put up, should there be stone above the glass at all? Should not the same construction be carried through to the roof? He had seen an office building in Ottawa that he thought was a success in one way. Every office in the building had a plate glass bow window; the bow windows were carried up to the roof. It might not be pure architecture, but it had a pleasing effect, far more so than a building having glass below and stone above.

Mr. Bousfield said that some of those present did not seem to have quite understood him. Mr. Simpson seemed to think he was referring to a simple series of shop fronts on the ground floor. He thought everyone must have observed the increasing number of buildings on Yonge, King, Bay and Front streets, the proprietors of which were trying to expose their wares to view on every floor, making every floor a shop front. Mr. Gregg seemed to think the problem very old. Now he was not attempting at all to deal with the ground floor story of plate glass. But the whole front of the building was gradually becoming a front of plate glass, and probably iron, on account of the small space the latter occupied. Mr. Burke thought it was almost a hopeless problem to make it anything really architectural, and Mr. Townsend thought he meant that they should restrict themselves to these different styles. The problem was before them, and he thought if the architects did not attempt to solve it no one else would, and it was a nice problem for them as professional men to work out something which would be more really architectural than the everlasting horizontal lines that prevailed. He noticed that in some of the buildings where shop fronts were carried up only two floors, with the rest solid, they had arranged it by having a large central arch with two piers, one on each side, and then the arch above carrying the span over the whole. That plan and the horizontal lines seemed to be the only ideas at present being utilized. It would no doubt take a long time to work out the desired object, but unless the attempt was made, everyone who had a shop front built would stick to the straight lines or the one great central arch. He did not agree with Mr. Townsend that in a commercial building it was almost impossible to work out anything really architectural, and he thought it their duty as architects to make every building as architectural as they could, and if limited to certain forms of construction they should endeavor to make those forms as presentable and as architectural as possible.

Mr. Townsend thought Mr. Bousfield had not quite caught his idea; what he had tried to express was not that a building should not be architecturally correct, but that it was not well to try and compress modern requirements into forms that were the outgrowth of ancient requirements.

Mr. Burke thought he too had been misapprehended by Mr. Bousfield. What he had referred to in his discussion was the attempt to combine modern requirements with what are considered the best models of ancient architecture. With regard to the wall space above, he thought the only satisfactory way of treating it was by using the arch which was now to be seen in so many buildings, but the difficulty about the arch was that its haunches obstructed the light on that floor, and made it not nearly so valuable, although he thought it looked more correct constructionally.

Mr. Gemmell asked if the objection to the heavy front borne on a front of plate glass below had any force beyond a sentimental feeling? Did not the plate glass with the reflections of light and color look almost as solid as polished granite? He thought the attempt to get over the difficulty by the use of the arch was very much the weaker plan.

Mr. Belcher said the question at issue had been a source of perplexity to architects for the last thirty-five or forty years—the choice between art and the requirements of the businesses for which the stores were intended. Efforts had been made both in the old country and here to avoid this semblance of want of support in the upper storys, which he thought up to the present had been rather overdone. He feared that the requirements of trade would render difficult for a long time any satisfactory solution of the problem. He thought the large arch referred to did to some extent overcome the difficulty. In the old country the effort of the architect had been to make the supports as apparent as possible and to as much as possible avoid all sham, a course which he thought ought to be adhered to. He thought a building should be of such a character as to indicate the purpose for which it was intended.

Mr. Billings thought there was too much anxiety to make ancient examples fit modern requirements. He thought that was a matter of no consequence. If there was a problem to start with, it was far better to start de novo.

Mr. Paull said he supposed Mr. Bousfield when referring to buildings on Bay Street and King Street had in his mind the building on King Street opposite the Cathedral and one below Wellington on Bay Street. He did not remember any others where there was so much plate glass. It did seem to him that there was too much plate glass for the amount of iron built into the structure.

Mr. Bousfield said those were the buildings to which he referred, Oak Hall and a building on Bay Street.

Mr. Gregg said that in arranging for one Convention the proposition had been made that architects should submit photographs of their own work for criticism, and sit and listen to the criticism of them. That proposition had not been carried out. He would ask if it was right to bring up the name of a practising architect. He thought it was not. In the case of the Walker building the architect had passed away, and it was a perfectly legitimate subject of criticism.

Mr. Paull differed from Mr. Gregg on the point stated. And as to the Walker building, while the architect of the first building had passed away, the designer of the second was living.

Mr. Gregg replied that that was doubtless true, but that no doubt the architect of the second building was given an order for the replica of the first.

Mr. Townsend thought if the criticism was fair and honest it did the man whose building was criticised more good than anyone else. He would regard it as a compliment that any person should think his work good enough to stand criticism, and there was nothing he liked better than to go over his work and find where his mistakes had been made.

Mr. Gregg asked for a ruling of the question raised by him. The Association had yesterday repudiated something that approached a criticism of a government office, and he thought the present question was similar.

Mr. Paull remarked that the cases were not at all parallel. In the one case the architect had erected his work, and it had become public property, while in the other not only had he not erected the work, but it had not even been determined that the building should be erected, and the criticism was as to the architect's ability to erect such a building.

Mr. Simpson agreed in the proposition that it was not right to criticize a man's work and mention his name.

The President said it had always been admitted among themselves that one of the advantages to be gained by association was the comparison and criticism in a fair spirit of the work done by architects. Where criticism took the shape of pointing out what one man thought might have been accomplished in a better way than the one adopted he thought that was fair criticism, and he did not think anyone could object to having his buildings mentioned and his name as the architect. As Mr.

Paull had said, when a building was erected it became in a certain sense public property. It abstracted from the public a certain amount of the free light of heaven, and that being so it should justify its existence by being as beautiful as possible. He really did not think any exception could be taken to any of the comments that had been made that morning on any of the buildings referred to. It was very different with the so-called criticism which had yesterday been rebuked by Mr. Billings, which he did not think was criticism, but rather a sneer. He thought it was not well to be too sensitive about this matter of criticism where the criticism was fair and honest.

Mr. Gregg acknowledged his willingness to accept the ruling of the Chair, but pointed out that in the article referred to by Mr. Billings there was a distinction drawn, and he understood that under the ruling if the Association desired to spend half an hour in criticising the Canadian Building at the World's Fair they were quite free to do so.

The President replied that certainly if any member had any suggestion to make for the improvement of the Canadian or any other World's Fair building there was no objection. In regard to the question directly under discussion, it was certainly one of the most suggestive that could be brought before the Convention, and though an old problem, there were very few instances of its having been satisfactorily solved. He thought it might be laid down as an axiom that everything an architect handled should be treated architecturally. Unfortunately that had not always been recognized, but if ever architecture was to become again a living art it must be recognized. The difficulty in the past had been that generally shop fronts had been confined to the ground floor only, all the rest of the building being devoted to entirely different purposes, and treated in an entirely different manner. He remembered a building in Glasgow of which the ground floor front was plate glass with, for the period at which it was built, very slight supports, and the whole upper portion in the Scottish Baronial style, of a most massive character, with projecting gables, corbels and turrets, and everything calculated to give the upper part a very heavy appearance. Had it been cut off at the first story, or viewed from a window on the opposite side of the street in such a way that the lower floor was not seen, it might have been a thoroughly satisfactory design, but as it existed it was certainly antagonistic to all ideas of architectural propriety. He thought the most satisfactory treatment for these mixed buildings, where the fronts were narrow, was that pointed out by Mr. Burke, the large semicircular arch. It satisfied the eye, but the weak point was the apparent want of sufficient abutments. Where there were buildings on each side, that was not so noticeable. If it was desired to follow ancient models, plenty could be found in Italy. In the case of the Scaligeri tombs at Verona everybody could see that if it were not for the iron rods which keep the arches from spreading, they would all tumble to pieces, yet even Ruskin does not object to them. So that when the end piers were made to look as solid in design and material as possible, and the tie rod rather accentuated than concealed, it did not appear to be an objectionable method of construction. Another treatment he had observed was the making of the front like a frame, the support on each side carried up and the whole of the inside filled up with light iron and glass. He had seen some instances of that treatment which he thought were quite successful. Architects were very often denounced for not producing a new style, and if a new style was to be introduced he thought this problem was one of the fields in which it could be worked out. A few years ago the system had been adopted of building fronts entirely of iron. There were two objections to that. One was that the repetition of the parts necessary to secure cheapness became monotonous, and there was also always difficulty in attaining really artistic effects in such an intractable material as cast iron. The other objection was the danger in the event of fire, so he thought the front of the future would be on what might be called the American system, of steel or iron construction with the material encased in terra cotta or other non-combustible material. Instead of regarding it as a disadvantage that merchants at the present time called for plate glass in all their fronts, he thought it quite an advantage, because it removed the difficulty of having to provide much light below and less light above.

Mr. Langton, referring to the question which had been raised in regard to the criticism in the CANADIAN ARCHITECT AND BUILDER said the question had been cropping up at intervals, and he thought it was a very unfortunate thing. It was a matter in regard to which he would not say anything, but it had been said that the Association repudiated any criticism such as had been referred to as appearing in the CANADIAN ARCHITECT AND BUILDER, and that seemed to imply that that journal was to be muzzled because it was the organ of the Association. He did not speak with regard to the particular criticism complained of at all, and he had no doubt Mr. Mortimer would take in good part any criticism of that paragraph on the part of the Convention. But to say that the CANADIAN ARCHITECT AND BUILDER should never criticize any work done by members of the Association, seemed to him to be placing a muzzle upon the utterances of that paper in a way which was unworthy of the Association. The journal in question was the organ of the Association only in the sense that their announcements were published in it, and also with regard to any question of policy, such as that of making only members of the Association entitled to term themselves "architects," it was to be expected that the CANADIAN ARCHITECT AND BUILDER should concur. But if it should go out in the report that the fact that the paper was the organ of the Association had the effect of muzzling it entirely, and restraining it from indulging in any criticism of the work of members of the Association, he thought the result could not be one that was desirable. As to Mr. Fuller, he did not think there was an architect in the Association or in Canada who had not the greatest respect for his design, whatever he might think of the Canadian World's Fair Building. It was to be remembered that Mr. Fuller's reputation was not one that was yet to be achieved. Nothing that could be said could have the slightest effect upon his reputation, which was already established not by his past work only, but by work in progress at the present time, such, for instance, as the Toronto Armory Building, which all would acknowledge was a very fine piece of work. It was not a question of Mr. Fuller's reputation, but of a particular building. In the course of collecting material for the lecture upon the World's Fair Buildings which he was about to deliver, he had come across in an article by Mr. Van Brunt, a passage in which the United States Building at the World's Fair was criticized in very much the same terms as had been used in regard to the Canadian Building. The CANADIAN ARCHITECT AND BUILDER had said, as he understood it, that the function of the department to which Mr. Fuller belonged was to make designs for public buildings and carry them out in great quantity, and that the carrying out of such buildings as the World's Fair Building or a residence for the Governor-General was an innovation on their line of work, and an interruption to its regular course. He thought that was a fair enough view to take.

The President said the question was very simple. The CANADIAN ARCHITECT AND BUILDER or any individual had a perfect right to criticize fairly any building. He held that the article complained of was not fair criticism, and he thought the majority of those in the Convention would agree with him, but none of them would object to fair criticism from any quarter.

Mr. Power, while agreeing with the President that the paragraph complained of was not fair criticism, thought it would be a great pity to say anything which would convey to the editor of the CANADIAN ARCHITECT AND BUILDER the idea that it was not at perfect liberty to criticize the work of members of the Association.

Mr. Billings said he had felt it his duty to call attention to the way in which the paper in question was edited, and he did not think he had said anything not justified by the facts. There was no desire to muzzle the CANADIAN ARCHITECT AND BUILDER. What he had said was independent of anyone else. He felt quite sure Mr. Fuller would be quite willing to receive criticism at the hands of the CANADIAN ARCHITECT AND BUILDER or anybody else, so long as it was fair criticism.

Mr. Paull said he had seen very little criticism in the CANADIAN ARCHITECT AND BUILDER which he thought could be taken objection to, and in support of Mr. Mortimer he might say that two of the most prominent buildings in England had been the subject of very severe criticism, the Exhibition Building and the Houses of Parliament.

Mr. Gouinlock was in accord with the views expressed of the unfairness of the article complained of, and had thought at the time it was published that it was most severe. He was very glad Mr. Billings had brought it before the Convention.

Mr. Townsend proposed to offer a resolution to the following effect, "That while this meeting condemns anything in the shape of unjust or venemous criticism, it is the policy of the Association to court fair criticism upon any and all architectural work."

Mr. Gregg took a point of order; the question had been ruled on in most explicit terms, and therefore the question was settled, and there was no necessity to pass any resolution.

The President said Mr. Gregg had said practically what he was about to say himself. (Applause.) He did not think that under the circumstances any motion on the subject was in order.

Mr. Townsend said his only object in offering the resolution was to close the discussion, and he had much pleasure in withdrawing it.

Mr. Wright, of the School of Practical Science, then exhibited to the Convention, by the aid of the fine electric light lantern used in the School, a collection of views of the World's Fair buildings kindly loaned by Mr. A. W. Croil for the purpose. The plan of the grounds and of the various buildings was explained by Mr. Langton, as the views were exhibited.

At the conclusion of Mr. Langton's exhibition of views of the World's Fair Buildings the following discussion took place:

Mr. Burke:—The ground has been so fully covered by Mr. Langton that I haven't very much to say. I suppose one of the points of this exhibition is that it is the first exhibition which has been so rich in architectural art—a successful effort to produce a complete architectural symposium on a large scale. The buildings at other exhibitions were mainly buildings merely for the purpose of housing the exhibits, and of course, as Mr. Langton had already said, one of the reasons of the success of the

World's Fair Buildings has been the unity of the composition, and also that while the architects were rivals in a sense, yet it was a generous rivalry which produced harmony on account of the agreement as to scale, etc. I think one of the lessons gained there was that the classic style is capable of very grand effects when entered into as this scheme was entered into. I suppose that other styles of architecture could have been made as effective, but I think a greater time than was at disposal would have been necessary for the solution of the problem. Of course the architects who were chosen to design these buildings were men who had studied the classic, nearly all of them I think, at the French school, and they were familiar with the proportions and forms, and I think it was only for that reason they were able to produce the designs so rapidly and with such good effect. Of course if we entered into the study of detail there were many defects, but as said by Mr. Langton, the general effect was very satisfactory. Of course these buildings should be regarded simply as plaster models to a full sized scale of what these men could do if they had time. Of course the plaster model as a rule is very considerably modified when the finished work is produced. I think another lesson to be gained from the Exhibition is the value of sculpture. It has really been the first instance of the complete introduction of sculpture as an accessory in America. Mr. Montgomery Schuyler, who has already been quoted, has put the thing into very concise form when he ascribes the success of the Exhibition to three things—first, Unity; second, Magnitude; and third, Illusion. Unity, in the first place, enabling so many minds to produce effective buildings, because they were working all to the same scale. Magnitude, as Mr. Langton has so well shown, in the long vistas of these buildings, especially the Manufacturers' Building. Speaking of the magnitude, he tells a story of a Chicago man—not an architect; I am happy to say—who wanted the Manufacturers' Building taken down and placed on the lake front and re-erected, the reason that he gave being that it was "the biggest thing on earth." Without regard to the setting of the building as it was at present, he wanted it planked down on the lake front as a monument of the greatness of Chicago, regardless of the effect it gained from its setting and position in relation to the other buildings. I think another lesson is to be gained from the illusive effect. It has been a grand architectural scene provided for the enjoyment of the people. It was, as Schuyler says, Turneresque in effect—such a combination of views as Turner would have delighted in. I think there will be great danger in the future of uneducated architects endeavoring to reproduce some of these buildings on a small scale, the result of which would no doubt be failure. Perhaps men who have not seen the place at all or gained any conception of the surroundings, will see a photograph of some building and repeat it on a small scale, and be surprised that the effect he will get will not be anything like what it was in the original. I think if a taste for the careful study of classic architecture has been engendered by the examples set before the architects of the world it will be a grand step in advance, and will prove a wonderful help to the advancement of the profession.

Mr. Townsend:—I have been asked to make a few remarks as to the scale of the buildings, and I shall try to do so as shortly as possible. Mr. Montgomery Schuyler, in one of his admirable articles upon the Architecture of the World's Fair Buildings, says: "That it is a final censure upon the treatment of a piece of architecture which aims at overpowering the spectator by its size, *that it does not look its size*; as is the current and accepted criticism upon St. Peters;" and although I do not follow him in all his conclusions I fully agree with him in this. It is plain that one of the chief sources, if not *the* chief source of effect, or means of impressing the observer, at the disposal of the designers, lay in the magnitude of the buildings they were called upon to design, but I do not think the fullest advantage was taken of their unprecedented opportunities in this particular. It is true that the buildings were impressive by their size; a building over a third of a mile in length by half that in width could hardly fail to impress observers by its size; but I will venture to say that very few of the visitors to the Fair fully realized what those dimensions really mean. Few Torontonians, for instance, when looking at the Manufacturers' Building, realized that if placed upon the corner of King and Yonge Streets, it would about cover the parallelogram enclosed by Yonge, King, Church and Shuter Streets, and that all the buildings between Yonge and Church Streets from King right up to Bloor might be stowed away inside and still leave several millions of cubic feet to spare. Still fewer realized that the space between the water and the buildings on each side of the Court of Honor is about three times the width of Yonge Street.

We have seen,—Mr. Langton has pointed out,—that the landscape plan of the grounds, with its Grand Canal open at one end to the lake and crossed by lesser canals at right angles, presented a problem which could only be properly solved by a somewhat symmetrical treatment aiming at a general unity and, that, to secure this, two limiting conditions were agreed to—the adoption of the Classic style and of a module of 25 feet for width of bay and 60 feet in height of cornice. I think that it is generally agreed that the scale fixed by this module was admirably carried out. With hardly an exception the relative values of the buildings, their details and accessories were adjusted with marked skill. So cleverly indeed was this managed, that the discrepancy between the apparent sizes of the buildings and their actual dimensions was not brought home to the observer until he got inside and began to seek for the cause of the seemingly diminutive character of the exhibits, and of the innumerable expedients resorted to by the exhibitors with a view of overcoming the dwarfing effects of their surroundings.

I may be wrong, and I am not conceited enough to claim, that, in the merely cursory glance I have been able to give the subject I have found a means of attaining a result not reached by the united efforts of a board, composed of the most noted architects in the United States, but I cannot help thinking that still better results would have followed the adoption of a smaller module.

Just how much the module would bear reducing could only be arrived at by careful study and comparison with other buildings, and I have not given the subject sufficient study to be prepared with an opinion as present. But a reduction of 10 feet in height of the cornice line, while it would not have reduced the accommodation of the buildings in the slightest degree, would, if the figures given in the Official Guides are correct, have resulted in a saving of nearly three quarters of a million dollars in the buildings on the Court of Honor alone, and in my estimation would have materially assisted in the development of the magnitude of the buildings and intensified the impression made by it; by a still further repetition of the unit, i. e., the 29 bays on each half of the side of the Manufacturers' Building would be increased to 34; the 24 bays on each side of the Peristyle to 26, and so on, while the reduction in the size of the bays themselves would have been noticeable, only, in the apparently increased scale of the surrounding objects.

Mr. Gemmell:—The task was allotted to me of saying something of the impression made by the work of the Commissioner of the World's Fair, and I have taken the trouble to write something on that subject, which I will read:

I am expected to give some idea of the completed work—the effect of all the enterprise, labor and millions of money commanding the skill of the best men representing architecture in this generation of the United States—was the result such as they could congratulate themselves on as artists knowing good and evil?

To satisfy the average citizen of their own country was comparatively an easy task, he having too often been taught to admire as architecture the big, the brilliant and the costly in preference to the refined and true. But to attract the cultured of the old countries wanted a stronger and more subtle magnet, for to these the pilgrimage meant so much more of time and money, and to them art had ever dawned in the East.

My lodging determined that the 50th gate was my entrance to the World's Fair. I would like to have examined my copper plate ticket, but was hurried on by the stream of humanity and found myself in a by-street of the White City, devoted to State buildings and those of Foreign Governments, the prevailing impression of which was wonder at the luxuriant costly way in which they were doing their tenting of a few short months. Brazil, now fighting over their inheritance, was here like a prodigal wasting her substance in a far country. The rich pile carpets on her staircases were worn in places right through by the countless feet that thronged up and down all day long.

A large number of the State buildings exhibited what some time ago was the general characteristic of American architecture, the original and picturesqueness at all cost. But many others were fine examples derived from the proper study of architecture, and this not confined to the older States; the New York and the Colorado Buildings were in the same Italian Villa style, and I liked the latter the best of the two. There also lingers in my memory the quaint California Building and the Roman Villa of Vermont—the former for its striking and dignified effect, gained by such simple means as massive wall spaces, deep reveals and red tile roof and heavy eaves. The Roman Villa rivetted the attention by its quiet taste, with its open court and fountains bespeaking a delightful home life under a clear sky and balmy climate, which must have required may years of peace and plenty to foster and enjoy it. The ancients evidently were not always at war and fighting, as we are apt to gather from our histories.

I noticed also the French Pavillion, somewhat coarse I thought on the exterior for that artistic nation, but with a beautiful shady court, having colonnade all around and steps down to the garden, embellished with bronze statuary and refreshing pool of running water.

The German Building, a mediæval Town Hall, striking and picturesque; although you liked it you could not get over it that there was something barbarous about its outlines and definite color decorations. The interior I heard afterwards was a series of old art revivals that I should not have missed.

In my first day's walks I occasionally caught glimpses of cornices, pillars and perhaps a corner tower in the distance of pure white, and of grander proportions than those around me, which gave hint that I was not in the heart of the city of which I had heard so much. I did also see the Art Gallery with its stretch of water in front reflecting as pure refined a building as ever adorned the Acropolis of Athens. But you had to fix your gaze on it and its immediate surroundings, there being much in the vicinity out of harmony with its extraordinary dignity and repose. The approach from the water was very impressive. By a flight of many steps, with noble lions pedestalled to right and left, you reached the heroic statue of Minerva which marked the centre of the main door.

It was on the second day that I found myself on a bridge across a canal that led into the basin, the one with the great bears on it, and I do not think in all the Fair there was a more favored point of view, one that gave the picture in so many varied, everchanging and beautiful perspectives, as you endeavored to survey the whole. The clear blue waters of the lake had been let into a grand basin and

wide canals running into it, the margins of all parapeted as if in solid stone. Graceful bridges whose piers and abutments looked very real, statuary of men and animals, not at random, but marking a landing stage or the approaches to a bridge; broad smooth ways, steps and terracing, exotic plants in urns, accented balustrade and parapets. For beauty the surface of the water had aquatic birds, plants, and gondolas for use, noiseless launches driven hither and thither by stored electricity with the speed and ease of fishes. The grand basin was indeed a happy thought. By it you were constrained to take the perspective at a proper distance, with always a beautiful foreground. Such would not have been the case with a stretch of ground dotted by a restless populace, however finely it might have been laid out. Around the basin at magnificent distances rose the buildings you have heard spoken of in detail. Describe the impression made by these, I cannot. I could tell you what you all know, that here the dry bones of our studies in the "orders" of Greece and Rome were made to live in the most graceful fashion and form a fitting enclosure for the greatest spaces man has ever protected from the elements, and added to this such embellishments of tower and dome as wrought out by later times. On this solid basis the buildings rose as one harmonious whole, with no jarring rivalry of men and styles. All this and much more would fail to give you an idea of this scene—a panorama conceived and carried out as genius only can.

If armies in times of peace require their reviews and parades, what a necessary field-day was here for architecture, to keep our ideals pure and high in our utilitarian age! Let me suggest to the authors of the World's Fair, the grand basin itself as a symbol of their work. Viewed at the Administration end, all is life and movement—the figures around the gilded dome, the splashing fountains and terraces of water, Father Time and the Amazons on McMonnies Barque, tritons, horses and dolphins, all in a fever of activity. The opposite end, the task accomplished—the golden goddess, well pleased, looks neither to the right nor left, ready to receive the deserved homage of the nations, and behind her the stately peristyle, albeit of no use but to render the precincts of the lovely Court of Honor sacred from sight of aught unseemly, or only seen softened through the vistas of those beautiful columns.

Take it all in all, we never shall look upon it's like again. I would go further and say, that the world in all time has never had such another aggregation of great buildings with the opportunity of disposing them to give grandeur of effect. Whatever may be said elsewhere of incongruity around the grand basin, where the sway of the commissioners reigned supreme, let the eye roam as it will there was nothing to startle as out of harmony with the whole. Could this ever be said of any square in Europe, ancient or modern?

What a pity it was only for so brief a season. Perhaps! But I have gazed on Paris, Venice, Rome; I do not expect to see them again: the impression of the White City is none the less real because I cannot see it again. Is the glory of its architects to be disparaged because it was built of perishable material? Was not also Athens, Rome, Carthage? The City of Alexandria and its great library perished by fire so also did the beautiful peristyle.

Mr. Gouinlock:—I have been asked to speak on the materials used in the erection of the World's Fair Buildings, but it unfortunately happens that it is a subject to which I have given little attention, yet though I feel particularly ill-qualified to treat of the question, I am willing to make the attempt, feeling that however dismally I myself may fail in imparting any knowledge of the subject, my efforts will be the means of bringing out a fund of valuable information from others more capable and better posted. That each one of this magnificent cluster of buildings had to be designed to suit exactly the special purpose to which it was to be devoted, and that, therefore, such constructional material had to be selected as would amply sustain any strain it might be called upon to bear, was a matter of course.

That the buildings ought to be individually handsome in appearance was equally a matter of course, and that they should present collectively a grand spectacular effect was evidently aimed at, with what wonderful success no one who did not pay a visit to the Fair can even faintly realize.

But, while the buildings had to be strong and beautiful, it was not desired that they should be lasting. Had they been required for the enjoyment of posterity, no doubt the architects who devised the scheme would have preferred stone and marble, but in this case of course, there was no more need for such expensive material than there would be for a theatrical scene; effect and not durability being the object.

The trusses and frames were therefore erected in such reliable if prosaic materials as iron, steel and wood, apparently elaborate work of engineering rather than architecture, of science, than of art.

But now art with her fairy wand, or rather "staff," appears, and the labyrinth of dry facts has become an enchanted city of surpassing loveliness to be enjoyed for a day and to be remembered only in dreams. The composition known as "staff," invented for the express uses of the Paris Exhibition, is composed of plaster and hemp or other fibrous material, and being quite flexible, can be easily secured by nails or other ways, but the extraordinary extent to which it was used in the Fair Buildings, sculpture, etc., and the wonderful success with which it was employed, leads one to regard it as among the possibilities of the future.

Whether it could be used with advantage in works intended to endure is one of the many phases of this question of World's Fair material upon which I am unable to venture an opinion.

Mr. Gambier Bousfield moved a vote of thanks to Mr. Langton for his very interesting talk on the subject of the World's Fair Buildings, which had been such as to enable those who were not at the World's Fair to gain such impressions of the huge scale upon which it was carried out as they could not have obtained in any other way. The remarks of the other gentlemen who had taken part in the discussion he thought were also very helpful. It seemed to him a matter of regret that such a group of buildings could not have been maintained permanently, but at the same time there was reason to be thankful that there remained in other places groups of buildings of a more enduring character to serve as exhibitions of the wonders of architecture to the present day. Such were the sites of Athens, ruined as they were, and Rome and London. But although the buildings of the World's Fair were to be removed, the lessons to be learned from them would remain forever.

The President said Mr. Langton and the other gentlemen who had taken part in the discussion were to be thanked for the trouble they had taken and congratulated for the pleasure they had afforded. The best general description of the impressions produced by the Fair that had come under his notice was probably in the grounds of the Fair itself. He had met a gentleman there one day bubbling over with enthusiasm and almost as full of liquor, who, steadying himself as he gazed on its wonders, burst forth with the exclamation, "Must all this glory vanish?"

After lunch, which was served in the building, a paper was read by Mr. A. P. Coleman, of the School of Practical Science, on "Rocks," a synopsis of which will appear in our March issue.

Mr. Darling moved that a vote of thanks be accorded to Mr. Coleman for the highly instructive and interesting paper he had just read. The only thing to be regretted about it was, that it did not continue longer.

Mr. Power said he had great pleasure in seconding the motion; he thought every one present had been delighted. He hoped members would not fail to send specimens that might come in their way to Prof. Coleman.

The president said he had much pleasure in conveying the thanks of the Association to Prof. Coleman for the very excellent paper with which he had favored them. It was sometimes said that gratitude consisted in a lively sense of favors to come. That could not be said in this case, however, as it was not the first time they had been entertained by Prof. Coleman.

Mr. Power then read a paper entitled "Some Points on Building," the publication of which is necessarily deferred.

This was followed by a paper from Mr. Simpson, on "The Architect," which will be printed in a later issue.

Mr. Burke said that one text which might be taken from the standpoint of the committee that had prepared the programme was the fact that Mr. Simpson was one of the younger members of the Association who had kindly come to their aid and prepared this very interesting paper. There had always been considerable difficulty in inducing the younger members to take part. He had been assured by Mr. Simpson that he had himself derived very great benefit and pleasure in the course of preparing the paper. Mr. Burke thought the Association owed a debt of gratitude to Mr. Simpson for thus coming forward and assisting to make the programme interesting.

Mr. Gouinlock suggested that the council endeavor to get resident and non-resident architects to send in photographs of what they considered their best work to be exhibited at the next convention and submitted to criticism. He thought the more criticism they were submitted to, especially the younger members, the better.

The President thought the suggestion a good one, and well calculated to have a tendency to improve the tone of architectural design.

Mr. Bousfield added that if anyone had any special work, such as railway stations, that they should send it in, with the reasons for special features designated.

Mr. Darling agreed in thinking the suggestion a good one. He thought that an atmosphere of criticism was wholesome, and the meetings would be more interesting and profitable if there was something of the sort. It had been tried at the Guild. Nobody felt at all the worse for it there, and the Guild as a whole was much the better.

Mr. Helliwell then read a paper on "Current Styles," which was illustrated by magic lantern views given by Mr. Wright, of the School of Practical Science. This paper will also be published in a future issue.

At the conclusion of Mr. Helliwell's paper Mr. Gray said it must be very evident that nothing had lent greater interest or given greater practical value to the convention than the magic lantern exhibitions so kindly given by Mr. Wright. He had therefore much pleasure in moving a very hearty vote of thanks to Mr Wright for his many courtesies and the beautiful exhibitions of views he had given. (Applause).

The President said the sentiments expressed by Mr. Gray must be shared by everyone present, and he felt great pleasure in tendering the thanks of the Association to Mr. Wright.

A vote of thanks to Mr. Helliwell for his paper was then carried on the motion of Mr. Belcher, seconded by Mr. Edwards.

The Association then proceeded to the election of members of the Council. The gentlemen elected were Mr. Thomas

Fuller, Ottawa, Mr. H. B. Gordon, Toronto, and Mr. J. Gemmell, Toronto.

The following votes of thanks were then proposed and carried:

To the Hon. The Minister of Education, for the use of the room in which the Convention was held.

To the Auditors, for their labors in auditing the accounts.

To the President, for the able address presented by him this year.

Mr. Langley and Mr. Gregg were then appointed Auditors for the year.

The President then declared the Convention for 1894 adjourned.

THE DINNER.

The annual dinner was tendered, as usual, by the resident to the non-resident members, at Webb's restaurant, and at the social board a few hours were pleasantly spent.

Among the guests were Professors Galbraith and Coleman, Messrs. C. H. C. Wright and T. R. Rosebrugh, of the School of Practical Science.

A few informal toasts were proposed and honored. Mr. Burke in proposing "The Profession," referred to the efforts which had been put forth to obtain legislation by which the word "Registered" would no longer qualify the word "Architect" in the Architects' Act. He urged the members to stand by the Association and the objects it was seeking to attain. While there was reason to deplore the apathy of some of the members, the excellent character of the meeting which had just come to a close, was a subject for congratulation. The main object of the Association should be the education of the rising generation of architects.

Mr. Curry, in responding, referring to the difficulties in the way of the Association, said that it was well to have obstacles to overcome, necessitating the putting forth of effort. Those qualified by education should alone be allowed to call themselves "Architects." The civilization of the present day demanded proof of competency on the part of both the professions and the trades. The Association should be maintained whether the desired legislation is secured or not, on account of the benefits resulting from the better acquaintanceship of the architects themselves and the removal of petty jealousies.

Mr. Langton proposed a toast to "The School of Practical Science," and took occasion to express appreciation of the advantages derived by the Association from contact with the School.

Prof. Galbraith, in reply, referred to the Geological and Architectural departments of the School, and said that as a school they were sufficiently interested in architecture to wish that the profession might be made a close corporation. Only by this means could the standard of professional work be maintained, which formerly was done by the guilds.

Prof. Coleman said the world was full of artists, good bad and indifferent, but the public was placed under no obligation to look at their work. With architecture it was different. The work of the architect is exposed to view on the public thoroughfares, not temporarily, but for a period of many years. It must be looked at. Nothing so affects for good or bad the taste of everybody, therefore the government should as far as possible impose such conditions as would prevent the erection of architectural abortions.

Mr. C. H. C. Wright stated that the Association had been a benefit to the School. As yet they had only a poor collection of photographs representing the architecture of the province, and he would be pleased therefore if the members of the Association would send him photos, drawings, etc., from which lantern slides could be made and a permanent collection formed. Where required these photos and drawings would be returned to their owners after being retained for a few days at the school.

Mr. Rosebrugh, Lecturer in Electricity, also responded briefly to the toast.

Mr. Jarvis remarked that as there was only here and there a young man with the qualifications of a successful architect, he hoped the Architectural Department at the School of Science would endeavor to discourage those students who had no natural aptitude for the profession.

Mr. Gouinlock in suitable terms proposed "Our Guests."

Mr. Power in responding adverted to the success of the Convention just held, and urged effort on the part of those present to increase the membership of the Association.

Mr. Belcher responded with a song.

Mr. Billings thanked the Association for having elected his chief, Mr. Fuller, to a position on the Council.

Messrs. Edwards, of Hamilton, and Kinsey, of Port Elgin, commented upon the fact that while some outside members had come long distances to attend the Convention, many of the members resident in Toronto were conspicuous by their absence.

Mr. Kennedy, of Barrie, replied briefly.

Mr. Burke expressed his pleasure at seeing present the first graduate under the Architects' Act, Mr. Baxter, of Stratford.

Mr. Baxter, in reply, said that for 99 per cent. of what he knew about architecture he had to thank the Association, and he strongly urged upon architectural students the advantage to be derived from submitting themselves for examination. The Association, he was sorry to say, was not as well known as it should be throughout Western Ontario. He was sorry also that there were no other members from west of Stratford present.

Mr. Curry, in responding to "The Council," congratulated that body upon the election of three such capable men as had that day been added to their number. For himself, he had been connected with the Association in an official capacity ever since its organization, and now for the first time found himself in the position of a private member.

The health of the retiring President, Mr. D. B. Dick, was enthusiastically received, accompanied by expressions of appreciation of the ability and faithfulness with which as President he had served the interests of the Association.

Mr. Dick, in reply, said that he had done his best for the Association, especially in connection with the examination of students. As a means of awakening a greater interest in the Association and a wider knowledge of its objects, he hoped that the new Council would arrange for a series of lectures to which the public should be invited.

The toast to "The Press" was acknowledged by Mr. C. H. Mortimer, of THE CANADIAN ARCHITECT AND BUILDER, and "The Ladies," by Messrs. Connolly, Jarvis and Sproatt.

At intervals, during the proceedings of the evening, songs were sung by Messrs. Gouinlock, Connolly and Belcher.

A great deal of amusement was afforded also by the clever ventriloquil performances of Mr. Simpson.

BUILDING MATERIALS IN THE NORTHWEST.

BELLEVILLE, ONT., Feb. 9th, 1894.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—Circumstances have given me an opportunity to visit the North West Territory and examine the building materials in that part, which may be interesting to many of the readers of the CANADIAN ARCHITECT AND BUILDER.

During the past year I have been under a contract with the Dominion Government to build a post office at Calgary, which placed me in a position to notice and examine the resources in that part of the country in the way of material for building purposes.

What will strike a visitor to Calgary as being marvelous is the solid appearance of the buildings erected there, for stores, banks, hotels and the new public building. The reason for this is, they are built with a sandstone found in abundance in that locality, very easily worked to any design, and which gives the whole structure a solid substantial appearance, and the use of which the Department of Public Works has not been slow to encourage. Although no improved appliances have been introduced into the quarries, I have seen some large stones quarried. My men quarried a stone of the following dimensions: 18 ft. long, 8 ft. wide and 3 ft. thick. When first quarried the stone is very soft, of a buff color, with a green tint, but soon hardens by exposure. I have seen tombstones and monuments worked out of this stone, to designs which give an excellent appearance. The lime is white, and the quality is equal to any I have used in Ontario. There is also slate used for roofing, of a very good quality, brought from New Westminster, B. C. Lumber, lath, etc., is furnished at about the same prices as in many parts of Ontario.

I have no doubt, that with such materials in abundance, in a few years some of our best monuments of architecture will be found in the Alberta districts. I also believe a great future is in store for that part of the country, with its coal mines to be found all over for hundreds of miles, also iron beds, water in abundance, and the lands of the best. Just now the demand is limited for the materials I have named, but with better railway facilities it will be sure to increase, and in a few years that country will be better known and appreciated.

I do not write this to induce mechanics to go there; that is not the class wanted, but men used to agricultural pursuits cannot fail to do well. But, my object in sending these few lines is to inform your numerous subscribers what that part of our great country produces in our line of business.

Yours, etc.

WALTER ALFORD,
Contractor, etc., Belleville, Ont.

COMPETITION.

THE competition for designs for a library and museum for the city of Milwaukee, Wis., has been decided in favor of Messrs. H. C. Koch & Co., of Milwaukee. Seventy-four designs were submitted, from which Prof. Ware, the expert, selceted five as the most suitable, and of these five the committee gave Messrs. Koch & Co.'s first place. Messrs. Gordon & Helliwell, of Toronto, were among the competitors in this competition.

PUBLICATIONS.

We are indebted to the Potsdam Red Sandstone Co., of Potsdam, N. Y., for a copy of their artistically designed and lithographed calender for 1894.

The Cosmopolitan for February introduces a famous European author to its readers—Valdes of Madrid, and the artist Marold, of Paris, well known as a French illustrator.

Mr. Fred. P. Spalding, assistant Professor of Civil Engineering in Cornell University, is the author of a work of 100 pages, which has just reached our table, entitled "Notes on the Testing and Use of Hydraulic Cement.' Price, $1.00, bound in cloth.

Encouraged by the compliments bestowed upon their calendar of 1893, the B. Greening Wire Company, of Hamilton, Ont., have issued a handsome and serviceable calendar for the present year. It is printed in four colors, the blank spaces being filled with illustrations of the manufactures of the company, and on the back, are given a number of reference tables.

ILLUSTRATIONS.

C. A. & B. COMPETITION FOR A TOWN HOUSE AND STABLE—DESIGN SUBMITTED BY "GOTHAM" (MR. A. E. WELLS) AWARDED FIRST POSITION.

This design is for a house of frame construction on a foundation of stone. By the arrangement of the lot, light and air are obtained on three sides of the house. The dining-room is benefited by the morning sun, and the kitchen has cross ventilation. Serving pantry and bath room have abundant light; and the position of plumbing fixtures on both floors renders possible a simple and cheap system of plumbing. The detail of stair case hall indicates the general character of the interior wood-work. The exterior of the house shows walls and roofs hung with shingles. Leaded glass, such as is indicated on the front elevation, besides being a pleasing external feature, might be made to contribute to charming interior effects. The stable is in construction, similar to the house. The accommodation here required has been provided for and this adjunct of the house made as simple and unobtrusive as possible.

OLD HOUSE AT BRUNSWICK, GERMANY.

RAILWAY STATION AT DUDDSWELL JUNCTION.—STRICKLAND & SYMONS, ARCHITECTS.

BREWERY BUILDING, MONTREAL.—DUNLOP & HERIOT, ARCHITECTS.

THE CONSTRUCTION OF HARDWOOD DOORS.

In constructing the modern hardwood door, a series of operations are gone through by the joiner which are extremely interesting and of value to those who desire to know something of the method of construction employed in completing this now universal detail, writes Owen B. Maginnis in the *Building Monthly*. These operations embody a number of systems of proceeding, each aiding to a final end, and are as follows:—The first process is to glue the cores or grounds together. These generally consist of kiln-dried white or yellow pine, say 1½ inches thick for a 1¾-inch veneered door, the veneers being ⅛ of an inch thick. The cores are generally got out full enough to allow for facing and thicknessing on the jointer and in the planer. The number of pieces in the cores depends on the desired width of the stile or rail, as, for instance, a 6-inch would require a ¾ inch band of the necessary hardwood, ash, oak or walnut, as specified, and four 2¾ inch pieces of pine. In glueing these cores together they are carefully jointed with the plane and scratched, then heated in the hot box and at once glued, being pressed tightly together with large handscrews, in order to squeeze out the superfluous glue and close the joints.

In making joints in veneered work, the surface of the joint must in all cases be (a little shaving) hollow, for the purpose of allowing the outer arises to come close together. Of course, all the cores should be long enough to make the necessary height, as 7 ft. 9 in. long for a 7 ft. 4 in. door, and so on as needed, always allowing enough to round over the bottom ends, so that the veneer will not be torn off when moving the door. When the glue is set the surfaces are scraped off clean, and they are faced up perfectly out of wind of the jointer and afterwards tried up true with the try plane. This being done the stiles and rails, which are built up in the same manner, are brought to the planer or planing machine and there thicknessed. The stuff cores are then brought back to the bench, where they are surfaced as before with the try plane (to remove all lumps) and scratched with the scratch plane to form a keying for the veneer. All knot holes or flaws which might be liable to cause a defect in the veneer are carefully filled up to ensure good veneering. This being done, it is usual to prepare the veneer after it has been ripped to its necessary width and crosscut to its length—that is, the different pieces for the stiles, rails, muntins, etc. It is usually prepared by smoothing the poor side (being very careful that it is entirely free from spots or shakes, little knots or other flaws) and scratching it thoroughly to ensure a firm keying for the glue. All the pieces (which generally run from ⅛ thick up to ½) are placed between strips edgeways in the hot box, and allowed to become thoroughly impregnated with the heat, so as to keep the glue from cooling, besides opening the pores of the wood to admit it. While the veneers are in the box the cores are placed (the stiles first, in pairs) on the glueing horses and the big handscrews set ready for applying, keeping the jambs wide enough apart to take in two pairs of 2 inch stiles, or eight inches, or six inches, for one pair of 3 inch, and so on as required. When the veneers are sufficiently heated the flat faces of the cores are glued both sides and turned up on their edges (hardwood strip side up) slightly apart, and the veneers are dropped between.

Be sure, however, to have the points of the grain up, to have the grain running up, and to have the grain so that they will pair alike. This should always be done before placing the veneers in the box. Having placed the cores of the stiles on the edges to which the hardwood strips are affixed, the woodworker takes his veneer and, after carefully matching the grains, places them grain points up with the scratched side towards the glued faces of the cores resting on the horses, so that the edges of the veneers and cores will come fair. He will then place a veneer on each of the right and left outer surfaces of the cores. Having done this, he places a crawl or piece of 1¼-inch stuff on each outside to press the outer veneers against their ground, and takes the big hand screws which have been set to span the combined width of the cores and veneers. He places one at either end about two inches from the end spaces, the rest eight or ten inches apart, applying each screw from opposite sides. He screws the inner throat screw till it grips on the edge, and then turns the outer lever screw solidly down on the crawls, thus pressing the surfaces tightly together and forcing the glue into the scratches, at the same time driving out that which is superfluous. Before the screws are permanently screwed tight, the whole mass is turned up to see that the veneers completely cover the whole width of the surfaces and, if they do not they must be driven to their places with a block, taking care not to bruise or break the edges. Be certain, too, that the screws are all right and the veneers pressed to a perfectly close joint. It is best for two to veneer, for one can regulate the veneers while the other is applying the screws, and both can act together on the screws afterwards, giving more power. The glued stiles or mullions are then left in the screws about five hours to allow the glue to set. Let me here impress the fact that the stuff must in all cases be thoroughly heated, and the glue perfect glue (about one-third water and two-thirds glue) laid on quickly with a large soft brush from a large pot, also that the operation be rapidly done before the stuff has time to cool. The crawls must be only the exact width of the stuff and no wider. It is advisable that the jaws of the hand screws be also wide enough to reach across the width.

SHAVINGS.

In wrought iron, such as railings, grilles, etc., perhaps no paint is so effective as a perfectly dull black.

It is reported that the Stanstead Granite Company have disposed of nearly $40,000 of stock, under their new charter.

The Record Foundry and Machine Company, of Moncton, N. B., are about to engage in the manufacture of iron and steel bridges.

Messrs. Edmund Burke and S. H. Townsend have been appointed to represent the Toronto Architectural Guild on the Toronto Technical School Board.

The Sanitary Association of Hamilton, Ont., is urging upon the Mayor and Council of that city, the necessity of employing an inspector of plumbing.

On the 21st of January, the new First Presbyterian church lately erected at the corner of Dufferin and Park avenues, London, Ont., was opened with appropriate cefemonies. The building is of red pressed brick, and cost about $25,000.

Mr. John Sykes, of Oshawa, is handling largely British Columbia shingles, and expresses the opinion that an increased trade can be done in the manufacture of doors, sash and blinds.

Mr. R. J. Davidson, upon severing his connection, extending over a period of twenty years, with Thackery's planing mill at Ottawa, was waited on by a number of contractors, builders and employees of the mill, and presented with an engrossed address and a handsome gold watch.

We learn from the Metal Worker, that Messrs. Merchant & Co., of Philadelphia, have recovered heavy damages against a contractor for having used ventilators which were claimed to be infringements on their Star patents, in the Lincoln, Neb., Hospital for the Insane, where it was specified that the Star ventilator should be used.

The new building of the Toronto Athletic Club was formally opened last month, and was visited by several thousand citizens. It is excellently adapted in all its appointments, for the purposes of recreation and physical improvement. The cost of the building approaches $100,000. Mr. E. J. Lennox was the architect.

In an action brought against the city of Toronto recently, by one Harman, for injuries received in falling from a scaffold while working at the city swimming baths, the defence entered by the City was, that as the plaintiff had built the scaffold himself, he alone was responsible for his injuries. The defence was upheld by the court, and a verdict given in favor of the city.

The British Columbia Shingle Manufacturers' Association has been formed to regulate prices, and otherwise promote the interests of its members. A local paper states that shingle bolts cost $4.00 to $4.50 per cord, that it costs $1.30 per thousand to produce shingles, and that the very lowest price at which shingles can be put on board cars at Vancouver, is $1.50 per thousand.

Mr. Peter Redpath, the well-known philanthropist, of Montreal, died in that city, on the 2nd inst., at the age of 73 years. Mr. Redpath donated to McGill University, in 1880, the Peter Redpath Museum, and in 1891, the Peter Redpath Library Building. He also gave $20,000 as an endowment to a chair of natural philosophy, and $10,000 for expenses and improvements to the Museum, besides over three thousand volumes, comprising the Peter Redpath collection of historical books.

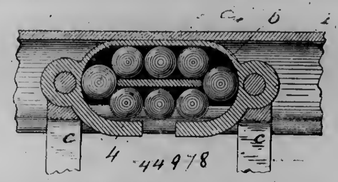
Mr. Chas. Baillargé, City Engineer of Quebec, has an interesting article in a recent number of the Engineering Record, on the "Fall of the Louisville and Jeffersonville Bridge," a subject which has largely engaged attention of late in the columns of the American engineering press. In the article reference is made to the circumstances connected with the landslide at Quebec several years ago, an illustration of which was kindly furnished to this journal by Mr. Baillargé, at the time of the occurrence.

Alexander Potter, C.E., Assoc. M. Can. Soc. C. E., 137 Broadway, New York city, has been awarded second prize of $500 for the best design of a new system of waterworks for Evansville, Ind., a city of 80,000 inhabitants. Twenty-two plans were submitted by engineers from all parts of the United States. Mr. Potter, who is a Canadian, began his engineering studies under City Engineer Keating at Halifax in 1883, and was the youngest competitor, having graduated at Lehigh University in 1890 at the age of 24.

A great deal of interest has been aroused by the discovery in Toronto of what is alleged to be a picture painted in oil by Raphael when twelve years of age. The subject of the picture is the Mosque Della Grande. On the back of the canvas there are three inscriptions, which read as follows:—"Painted at Urbino by Raphael, when aged twelve years, being the interior of the Mosque Della Grande." "Taken from Holyrood in 1688 by Lord Russell." "To the Lady Arabella Russell in the year of our Lord 1739 (or 1789)." Below the last inscription is the single word "Raphael." The existence of the inscriptions was revealed by the picture falling out of its frame, the frame having previously covered the writing. The picture is 22 inches wide and 26 inches deep, and is owned by Miss Annie Lackie, 58 Shaftesbury ave.

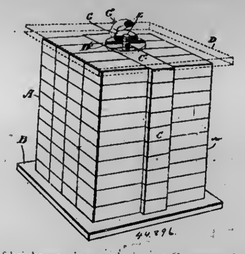
RECENT CANADIAN PATENTS.

A patent No. 44,917, has been granted to James Thomas McCabe, of Toronto, Ont., for a travelling hanger for doors, curtains, etc., the principal features of which are: the combination of a track composed of a tube having a longitudinal slot formed therein, and bearing surfaces arranged on



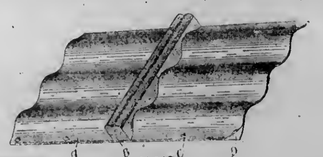
each side of the slot, bearing balls running upon the surfaces, a carriage supported by said bearing balls, a depending arm from the carriage, and means for detaching the depending arm to the object to be supported. An illustration of the device is given herewith.

Thomas Parker, John E. Wright, Francis F. Stuart and Alexander M. Colquhoun, of Toronto, Ont., have been granted a Canadian patent, No. 44,896, for a shipping device for bricks and similar articles, consisting of a top and bottom board, central bolt passing through a central opening



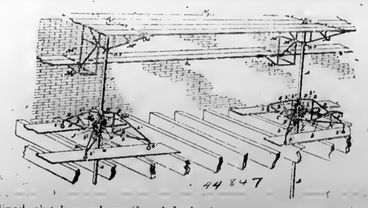
within the pile of bricks—a ring or clevis nut G1 screwed on to the top of the bolt and top and bottom washers D , and B , surrounding the bolt and situated between the nut G, and the head of the bolt respectively, as shown in the accompanying illustration.

Hugh Silver, of Lindsay, Ont., was on the 11th of December last, granted a Canadian patent, No. 44,869, for a wood wall covering, which consists of the combination with a wall or similarly substantially flat



surface, W, of sheets of veneer, A, corrugated in line with the grain thereof, and having some of the bottoms of the corrugations nailed to wall, and a moulding B, whose under surface fits the corrugation, set over the joint between the sheets, as per illustration.

A Canadian patent, No. 44,847, for a builder's scaffold, was granted on December the 9th last, to John Elzear Ennis, of Duluth, Minn. The invention consists of a combination with a main frame or support, of a shaft movable vertically in frame, a platform bracket supported on the upper end of the shaft to turn thereon, and a clutch mechanism located within the main frame, engaging the shaft, in combination with the shaft A, of the lifting mechanism, consisting of yoke C, lever D, pivoted therein, oppositely



inclined clutch members G and J, having screw shanks projected from opposite sides thereof, link arms E and E , screw nuts F, and detachable weights; the combination with the shaft A, and the bracket Mx, supported thereon, consisting of an upper section M, a downwardly extending portion M , and an outwardly extending section M2, the plates P, having concaved portions adapted to fit the bearing bars of the said bracket, and upwardly projecting lugs P1, and the planks held on the said plates P, as shown in illustration.

The second edition of the December World's Fair Cosmopolitan brings the total up to the extraordinary figure of 400,000 copies, an unprecedented result in the history of magazines.

USEFUL HINTS.

The paint on the outside of a brick wall 30 feet in length and 20 feet in height of a warehouse in New York came off after a year's exposure; in another year the hard bricks of which the wall was built began to crumble. The cause, which for some time was a mystery, was eventually found to be a large quantity of salt in burlap bags stored behind the walls. Although thick boards intervened at places the salt had thoroughly impregnated and destroyed the solid brick wall, and therefore the oil and paint.

GOLD LACQUER.—For making gold lacquer for metals, the following formulas are recommended: 1. shellac, 100 parts; alcohol, 895 parts; boric acid, 5 parts; picric acid, enough to color. 2. dragon's blood, 7½ parts; gamboge, 40 parts; mastic, 30 parts; sheellac, 30 parts; elemi, 7½ parts; sandal-wood, 20 parts; sandarac, 20 parts; venice turpentine, 15 parts; alcohol, 850 parts. 3. shellac, 120 parts; gamboge, 30 parts; mastic, 30 parts; sandarac, 60 parts; aloes, 10 parts; venice turpentine, alcohol, 750 parts.

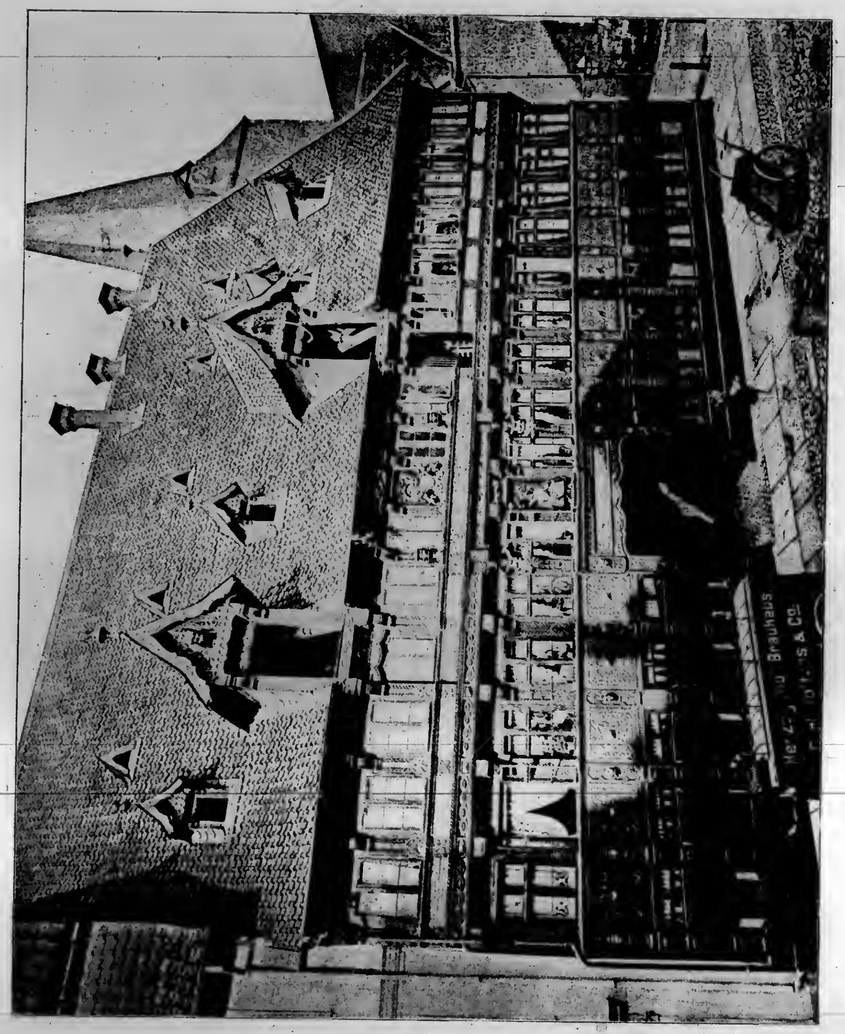
An experiment with two bars of iron separated by a layer of charcoal and subjected to an electric current of fifty-five amperes at two and a half volts has resulted in one bar, the cathode, being converted into steel on the side next the charcoal, while the other bar, the anode, remained unaffected. This was after three hours of heating under the current, and is one of a series of experiments carried out recently by M. Garnier, which are likely to lead to better understanding of the principles underlying the process of converting iron into steel.

TO MOUNT PHOTOGRAPHS WITHOUT BUCKLING.—The satisfactory mounting of photographs is a troublesome operation, and the following suggestion from a contributor to the *Outlook* may be of assistance to amateurs: I have found a method by which a photograph or engraving can be mounted on the thinest paper without curling or wrinkling. If the picture is a photograph it should be ironed out smooth with a hot iron and then trimmed. Mix a little gum-arabic in hot water, so as to make a rather thick mucilage. Place the picture on the page in position and mark just inside the corners. Remove the picture and take some of the mucilage on a ruling pen and draw a heavy line of mucilage from one point to another, so as to make a line of mucilage all around the place where the picture is to be. As soon as the mucilage is sticky, put the picture in place, and a book over it to keep it flat. When dry, you will have a smooth mount that will not curl.

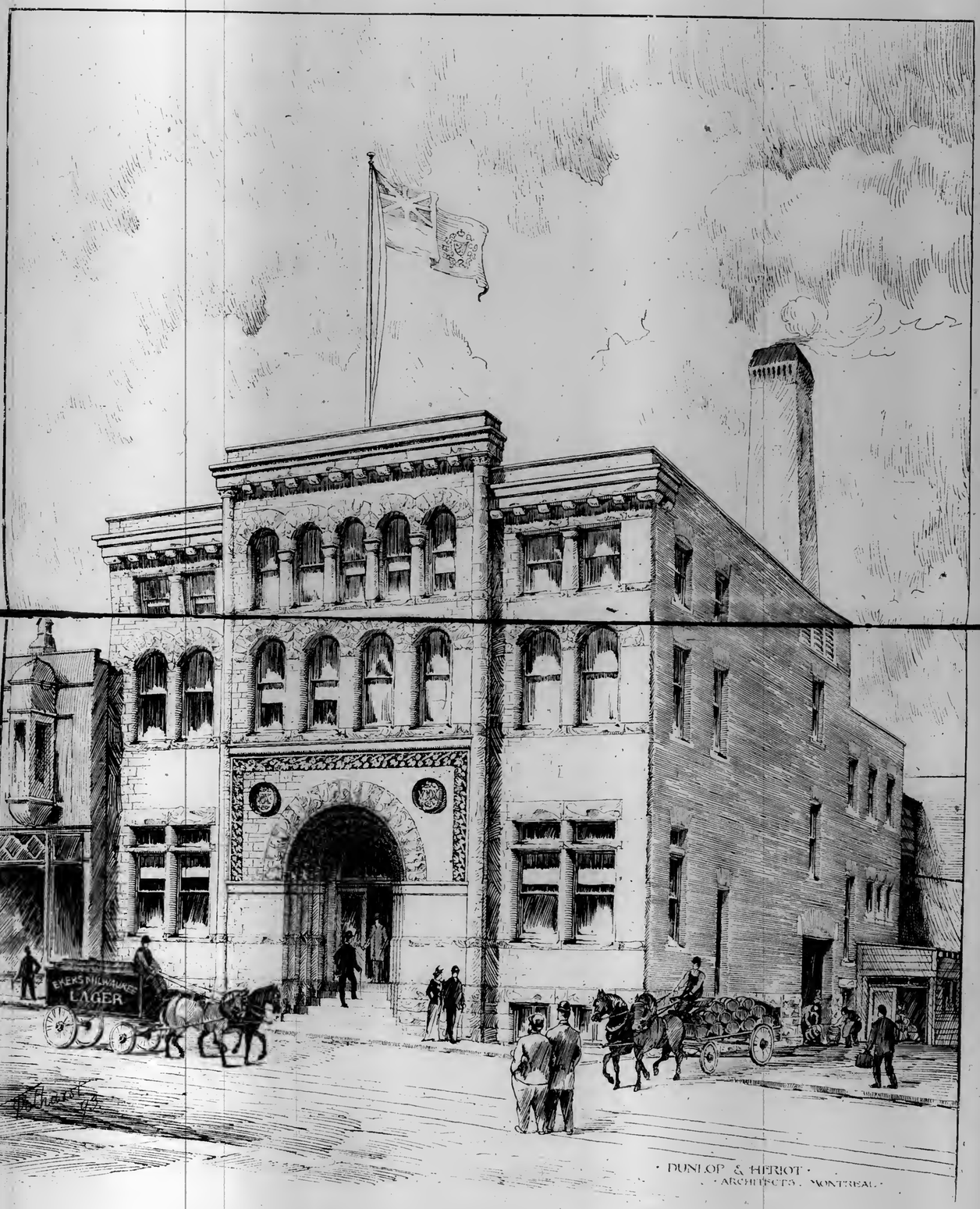
WEIGHT OF MATERIALS.—According to an American exchange, roof boards weigh about three pounds per superficial foot. Terra-cotta tiling weighs from 25 to 35 pounds per square foot. Hollow tile for five-inch partition weighs from 22 to 25 pounds per superficial foot. Lath and plastering, two-coat work, weighs from 9 to 12 pounds per superficial foot. The weight of a superficial foot of brick work, eight inches thick, including mortar, is from 83 to 87 pounds. An iron roof 100 feet wide, with a rise of one-third pitch, will weigh from 10 to 15 pounds per superficial foot.— One hundred pounds per square foot, distributed uniformly over a surface of a bridge, is a safe working standard. The weight per square foot of roof tiling, set in iron or between wood rafters ready for slating is about 12 lbs. A-fireproof floor, constructed of iron beams and four-inch brick arches, will weigh from 65 to 75 pounds per superficial foot. The safe and proper bearing of a joist, timber and girders supporting a floor should not exceed ten tons on brick walls and fourteen tons on good stone walls. A fireproof floor constructed of iron beams and of iron arches made of No. 18 iron, and filled in on top with concrete or slag and cement, will weigh about the same as brick work four inches thick. Fireproof floor made the same as above, with the introduction of hollow tile arches, instead of brick, concrete or slag, will weigh from 12 to 55 pounds, according to the thickness of the arch, running from 4 to 16 inches.

LEAKAGE OF AIR.—The porosity of walls and the vast amount of leakage around door and window frames are seldom appreciated, says Carpentry and Building, by those who talk of stagnant air. Experiments with ordinary windows have made evident a leakage of eight cubic feet per minute while the passage of air through apparently tight walls has been frequently shown by experiment. In one instance a room supplied with hot air from an ordinary hot air furnace was tightly closed. The fire place was stopped up, windows were packed with rubber molding and the door shut. The wood work was sheltered and the brick work oiled. A measurement of the air volume entering showed that it was nearly equal to that when the doors were open. If the air entered it was obvious that it must escape somewhere. A second experiment was made after five coats of paint had been put on the walls and ceiling and three coats on the floor. Still the air entered through the register in large quantities, in fact its volume was only 20 per cent. less than in the former case. Such wholesale leakage readily explains the cause of low temperatures in exposed rooms on windy days, for the outside pressure exceeds that within and the cold air actually leaks through the walls. Surprise is sometimes expressed that in many instances no vent flues are provided when the blower system is installed. This is particularly true of manufactories, offices and stores. Nevertheless, a volume of air sufficient to change the entire cubic contents once in 10 to 12 minutes is frequently supplied in such buildings and escapes only through walls and crevices.

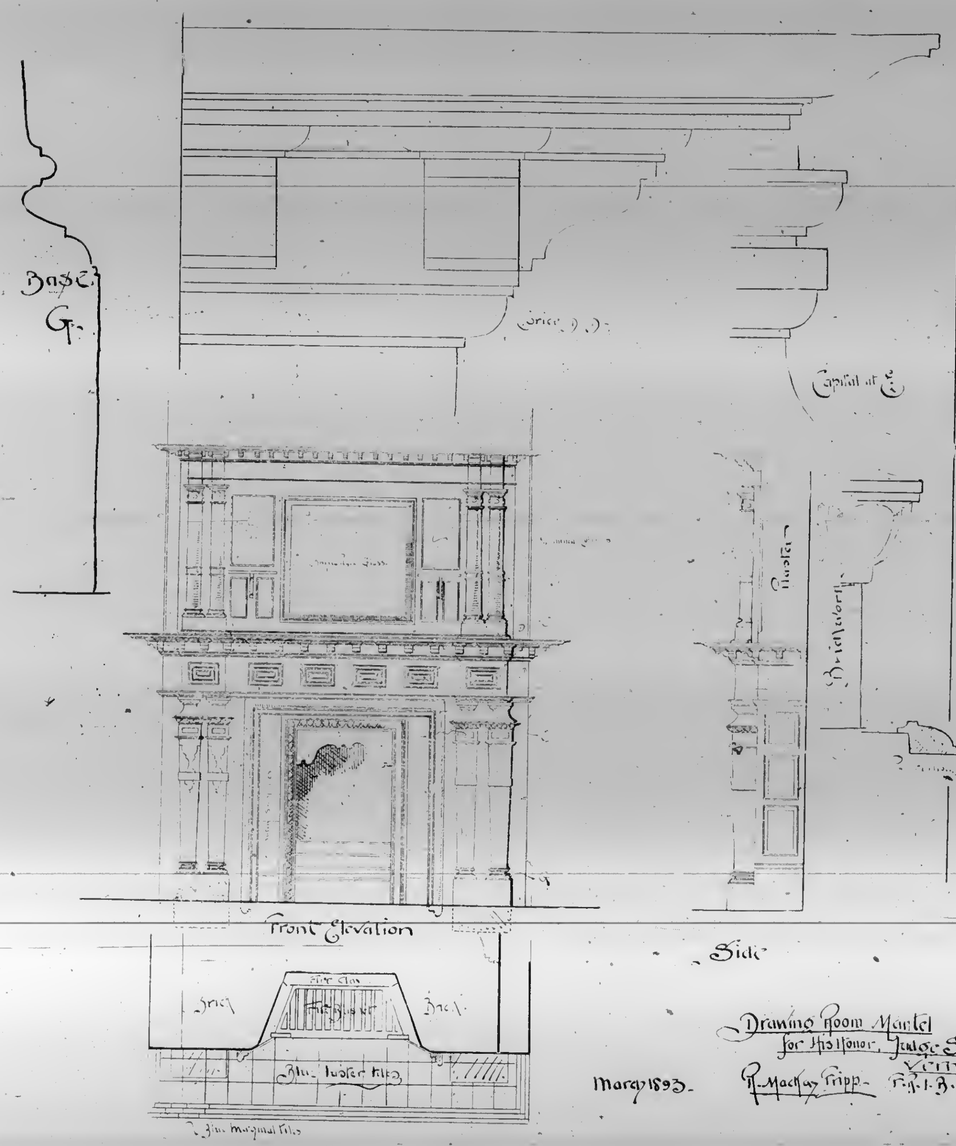
PRESSURE OF ARCH STONES.—The result of investigations on the pressure of arch-stones on a center is, says the National Builder, that the center should be combined in such a manner as to withstand as advantageously as possible the effort of the stones to slide upon their beds. Experiment has shown that hard stones have not any tendency to slide on the bed until it is elevated to about 36°; and it has also shown that when the stone is set in fresh mortar it does not begin to slide until the bed is elevated to an angle of from 34° to 36°. Voussoirs of soft stone, absorbent of moisture, have been raised to an angle of 45° without sliding, when the center of gravity did not fall without their base. Reasoning from these experiments, and assuming 32° as the limiting angle of resistance, the conclusion would be arrived at that the center did not require to commence until the arch stones had reached that angle; and in the Pont du Gard, and the arch of Cestius at Rome, the corbels on which the centers were supported remain at from 25° to 28° above the springing. Beyond 32° the weight on the center goes on increasing as it approaches the keystone; but in practice it is safe to consider the whole weight of the stone as resting on the center, when a vertical line drawn through its center of gravity falls without the lower bed of the stone; and the amount of error is not great, and is on the safe side, if this is taken to be the case when the bed of stone exceeds 60°. But to make this observation more accurate, we quote Mr. Tredgold's words. He says: "When the depth of the arch stone is nearly double its thickness, the whole of its weight may be considered to rest upon the center, at the joint which makes an angle of about 60° with the horizon. If the length be less than twice the thickness, it may be considered to rest wholly upon the center when the angle is below 60°, and if the length exceed twice the thickness the angle will be considerably above 60° before the whole weight will press on the center.

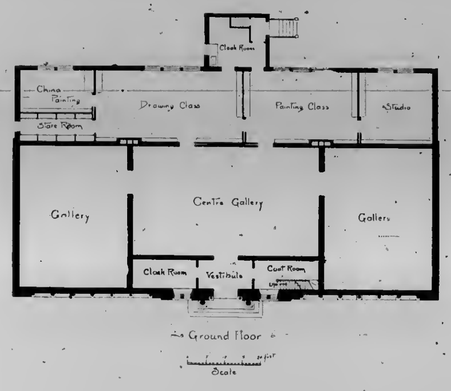


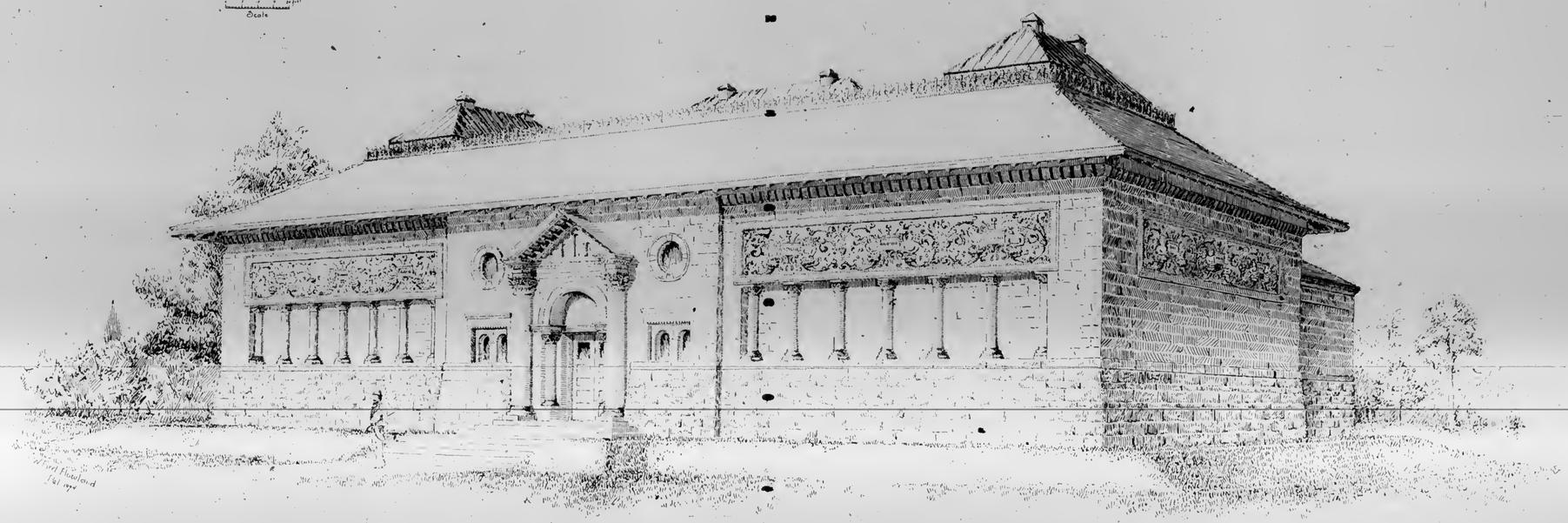
OLD HOUSE, BRUNSWICK, GERMANY.



EKER'S BREWERY, MONTREAL, QUE.

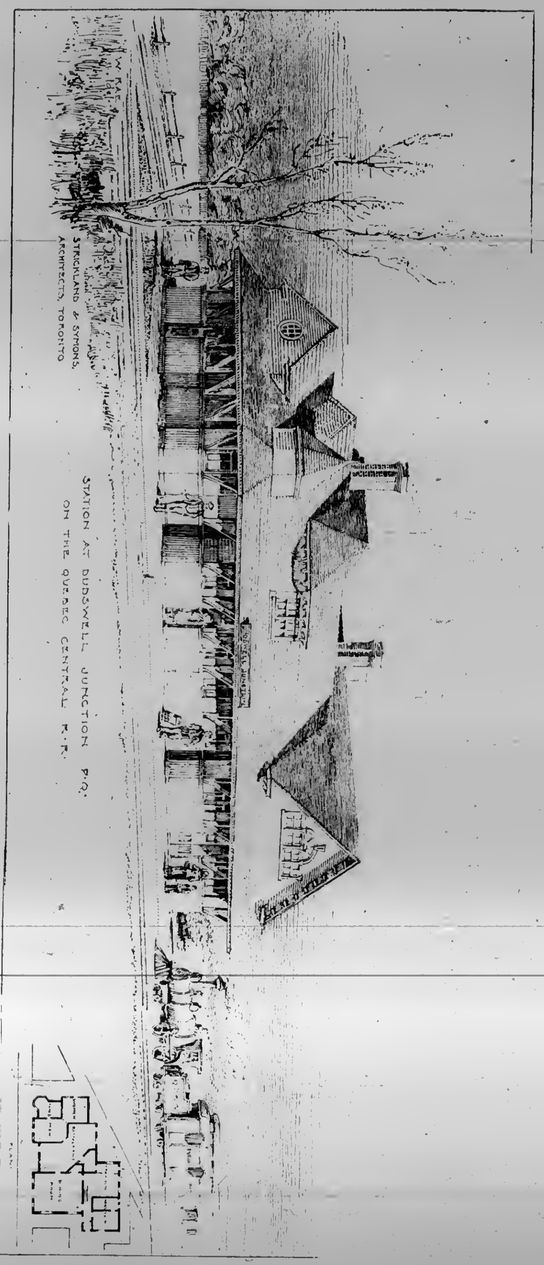

Base G.
Front Elevation
Side
Shelf
Square
3/4 Turned Column
Base G
Front.
Bed Room Mantel
Drawing Room Mantel
for His Honor, Judge Spinks.
Vernon, B.C.
March 1893.
R. Mackay Fripp.
F.R.I.B.A.

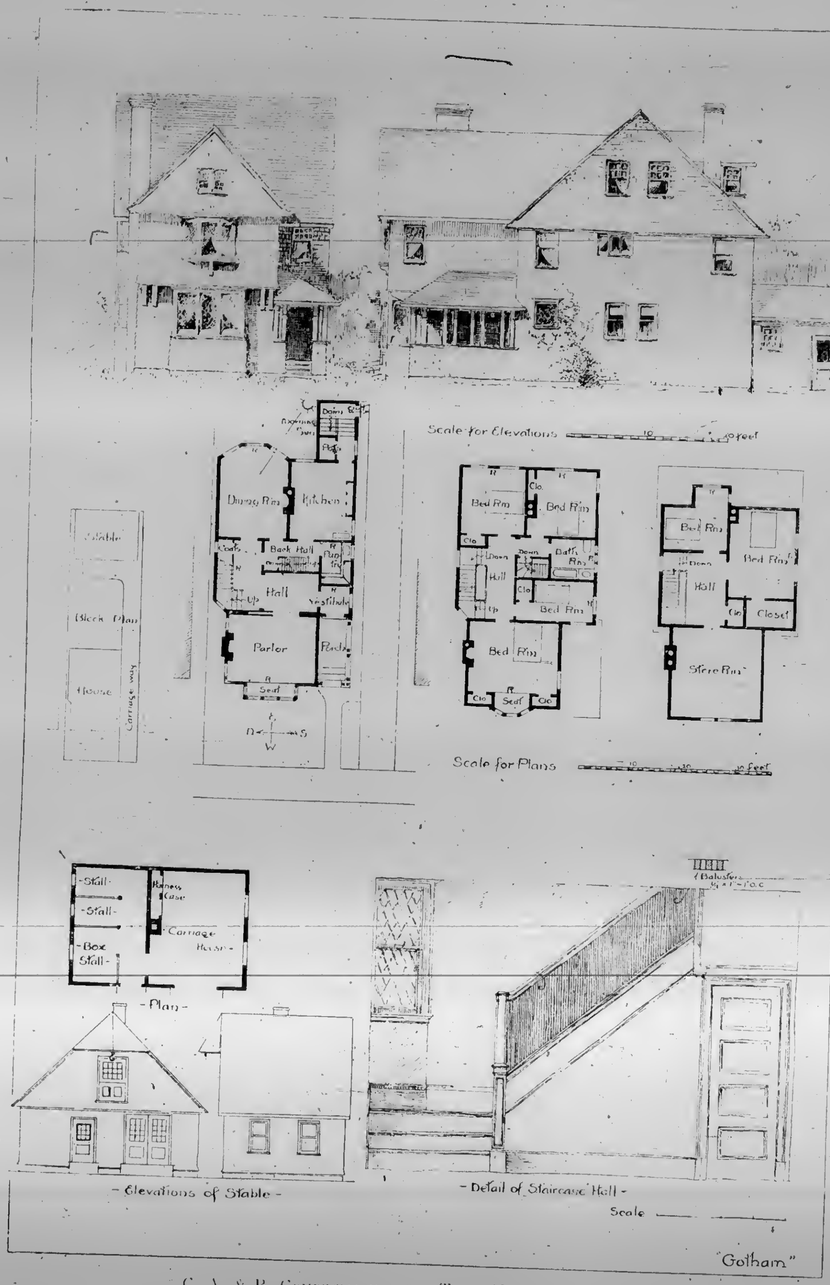




ART INSTITUTE, MOUNT ALLISON LADIES' COLLEGE, SACKVILLE, N.B.

EDMUND BURKE, ARCHITECT, TORONTO.





C. A. & B. COMPETITION FOR A TOWN HOUSE AND STABLE.

DESIGN SUBMITTED BY "GOTHAM" (MR. A. E. WELLS), AWARDED SECOND POSITION.

CANADIAN ARCHITECT AND BUILDER.

VOL. VII.—NO. 3. MARCH, 1894 PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods,
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
64 TEMPLE BUILDING, - MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	EDMUND BURKE, Toronto.
1ST VICE-PRESIDENT	J. E. BELCHER, Peterboro'.
2ND VICE-PRESIDENT	W. A. EDWARDS, Hamilton.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI	Ottawa.
FRANK DARLING	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:
W. A. LANGTON — Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	J. NELSON, Montreal.
1ST VICE-PRESIDENT	CHAS. BAILLAIRGE, Quebec.
2ND VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
SECRETARY	JOSEPH HAYNES, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. GENDRON,	Montreal.
J. B. BERTRAND	Quebec.
ERIC MANN	Montreal.
J. VENNE	Montreal.
G. TANGUAY	Quebec.

AUDITORS—THEO. DAOUST, J. F. PEACHY.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.	FRED. WAKEFIELD.
WM. PARK, 1st Vice-President.	WM. BOOTH.
GEO. OAKLEY, 2nd Vice-President.	JAS. ISAAC.
DAVID WILLIAMS, Treasurer.	H. LUCAS.
JOHN ALDRIDGE.	JAS. THOMSON
JAS. CRANG.	H. MARTIN.

JOHN L. PHILLIPS, Secretary.

THE Royal Institute of British Architects have decided that women may take part in the Institute examinations, and the proposal to admit them to membership in the Architectural Association is at present the subject of a lively discussion in the pages of the official organ of that body.

THE Commissioner of Customs states that notwithstanding a protective duty of 50 per cent., large quantities of wire goods and slate are exported from the United States to Australia, and and he sees no reason why manufacturers of these goods in Canada should not compete with the Americans for the Australian trade.

SOME particulars have reached us of the invention by a Canadian of a process which promises to revolutionize the present methods of clay working in connection with the manufacture of brick, terra cotta, drain pipe, etc. It is stated that by this process the time required for the manufacture of materials of this description will be reduced in a wonderful degree with a somewhat proportionate reduction in cost of production. As the inventor has not yet secured the protection of his discovery by letters patent, it would not be just to him that we should make public at present any further particulars concerning it, but we hope to be in a position to do so at an early date.

IN the annual report of the Secretary of the National Association of Builders, presented at the annual convention of that body held recently in Boston, it is made to appear that there are upwards of 40 Builders' Exchanges in the Dominion of Canada, and in affiliation with the National Association. We have no hesitation in declaring this statement to be totally incorrect. There are not a dozen Builders' Exchanges or Associations in Canada, and not half a dozen in affiliation with the American Association. We would be pleased to see the builders of Canada as well organized as the report of the Secretary of the National Association would imply them to be.

A BILL has been introduced in the Ontario Legislature which provides for the taxing of church buildings. Petitions have also been addressed to the Legislature by the City of Hamilton and other municipalities praying for the enactment of legislation with this object. The passing of such a law would doubtless affect very materially the cost of many church buildings erected in the future, a result which would scarcely be appreciated by architects, whose commissions are usually based on the cost of the building. It would have a good effect, however, in the direction of restraining church trustees and committees from vieing with each other as at present in the erection of expensive churches, the funds for which must in most intances be raised by heavy mortgages.

MR. WAITE, of Buffalo, the architect of the new Legislative buildings at Toronto, is said to have recently preferred a claim for commission, amounting to about $28,000 in addition to the $38,000 or more which has already been paid to him by the Government. It will be remembered that the original limit of cost of the buildings was $750,000, and that notwithstanding the designs submitted by Canadian architects were thrown out because the tenders on them exceeded this amount, Mr. Waite was afterwards given the work and allowed to expend nearly a million and a half upon it. It is said that the understanding was that he was to be paid a commission of 5 per cent. on the original estimated cost. However this may have been, he now demands his commission on the full cost of the building.

An American contemporary says: "We have had so many applications of late for sample copies of The Southern Architect, which are unaccompanied by the stamps or other evidences of a disposition to appreciate the favor of such an accommodation, that we have been compelled to refuse all such requests. In fact the calls for samples are so numerous and regular that we suspect the sample copy fiend is trying our good nature and attempting to save the two dollars necessary to insure the regular monthly arrival of the paper." We have had a similar experience, and have satisfied ourselves that there are in the United States a large number of builders and some persons claiming to be architects who make a practice of writing to the publishers of architectural journals for free sample copies, with no intention of becoming subscribers. By this means they secure a collection of valuable illustrations and printed information at the cost of a few cents for post cards. From one individual we received at different times no less than three requests for sample copies, which confirmed our previous suspicion that a fraud was being practiced. Since then requests for free sample copies have been met with refusal unless they were accompanied by some evidence of the bona fides of the applicant. Publishers of architectural journals should refuse to be further victimized.

Since the ejectment by the architect of Mr. Neelon, the contractor for the new city buildings at Toronto, and the granting by the Courts of permission to the architect to proceed with the erection of the building, both parties to the dispute have been busily engaged in collecting evidence with which to substantiate their positions when Mr. Neelon's suit for damages should come up for hearing. The case, which was looked forward to with much interest owing to its novel character and the magnitude of the interests involved, came up for argument before Mr. Justice Rose at Toronto in the early part of the present month. From the number of the witnesses and the mass of evidence ready to be submitted, it appeared probable that the case would occupy several weeks, but circumstances arose which brought it to a close for the present on the fourth day, when but little evidence had been adduced. Mr. Blake, the plaintiff's counsel, raised the contention that Mr. Lennox, the architect, had not the power to dismiss the contractor without the written consent of the Court House Committee of the City Council. The proceedings were adjourned to allow the Judge to consider the point, and as a result of such consideration he decided on the following day that the architect had the power under the contract to dismiss the contractor. Mr. Neelon's counsel having stated that his client was averse to proceeding further with the evidence in this Court, Mr. Justice Rose dismissed the action, with costs against the plaintiff. The case will be appealed to the Chancery Divisional Court, and should the decision there prove unsatisfactory, the plaintiffs will doubtless carry it to the highest court of appeal.

We have heard much during the last month of the sufferings of the unemployed, and the unusual extent to which lack of employment prevails. We have witnessed also the unusual sights of the principal thoroughfares of Toronto being blockaded at certain hours of the day by crowds of people waiting to have food and clothing dispensed to them by certain of the newspapers, which, judging by the manner in which their charity was heralded, were quite as anxious to attract attention to themselves as to relieve the needs of their fellow citizens. We believe that positive injury has resulted from the methods pursued by these papers. In the opinion of ministers of the leading churches and of persons connected with the numerous charitable organizations of the city, the distress existing this winter is but little greater than in former years, yet it has gone abroad to the world that our streets are thronged with people clamoring for bread, while the overdrawn pictures of want which have appeared in the newspapers have emboldened the idle and dissolute classes of the community to assume a threatening attitude. The suggestion has very properly been made, that instead of paying out large sums of money to the unemployed for snow cleaning, and such like unnecessary work, the City Council should endeavor to provide useful employment by carrying out the construction of some of the needed improvements which must be undertaken in the near future, as for example, the trunk sewer or the water tunnel recommended by the City Engineer. If such works as these are undertaken largely with the object of relieving the wants of the unemployed, it should be with the understanding that the unions will not as in the past insist on the city paying a rate of wages equal to that which might be expected under more prosperous conditions.

The City of Toronto is once more giving evidence of its conservatism in adhering to village practices, by attacking its officials, and especially its engineering department. The present engineer has shown immense capacity for organization and grasp of the details of the whole work of his department, to which was added the charge of the water works, with its unenviable legacy of a leaking conduit, broken connections at all points, leaky pumping wells at the pump house and numerous other troubles. The work of the city has never been carried on so smoothly and satisfactorily, and instead of being thankful for their lot, a few new aldermen have assailed the whole organization of the civic staff. Of the miserly savings effected in the engineer's department,—about $3,300,—over $2,000 is contributed by four officials. With a most excellent and unlimited supply of pure water at their door, an unreasonable agitation has been sprung on the Council to bring water from Lake Simcoe. The council cannot be induced to consider the report of their own engineer which they themselves ordered him to prepare; it is at present waste paper. Lake Simcoe is the hobby of one man who seems to have completely hypnotized a section of the Council into believing and desiring to see carried into effect a scheme which will be the ruin of those who undertake it. Ten thousand horse power from Lake Simcoe to begin with, and any amount afterwards, to give power, light and heat to poor languishing Toronto, is as glibly talked about as building a head race for a flour mill. Millions of dollars of expenditure are spoken of with such levity that one is induced to believe the whole financial world is longing to help Toronto to drain Lake Simcoe, leave its 10,000 H. P. higher and drier than Noah's Ark, and seek no return or revenue for the monies invested. It makes one tired to hear this constant agitation about Lake Simcoe water. The promoters appear to have a considerable following in the Council; let them get their friends to move for an appropriation to extend and complete the surveys made when Mr. McAlpine and Messrs. Hering and Gray were here. An expenditure of $5,000 will effect this, prepare estimates, and give the Toronto public full and reliable figures on which they can discuss intelligently the question of this source of water supply, and it will effectually settle the water supply, power, heating, aqueduct and canal schemes.

The citizens of Toronto should feel indebted to Colonel Sweny for having suggested in the public press the construction of waterways on Toronto Island, which should afford communication between the different parts of the island by means of steam or electric launches, in preference to electric railway transit. Undoubtedly it would be possible by such means as Colonel Sweny has suggested, to make of the island a most attractive and healthful resort. In detail his various suggestions appear to be in some respects inconsistent. He objects to the electric cars because, as he states, they would create noise and by conveying crowds from one Coney Island show to another, the whole place would be given up to revelry and clamor. On the other hand he suggests the making of a race course, which would become the champion course of Canada and attract thousands of visitors annually to witness the great races of professionals and amateurs. The carrying out of this suggestion would probably destroy quite as effectually as the electric cars the character of the island as "a quiet and delightful retreat where many a family flying from the city's heat may find rest in the summer days." With the scheme as a whole, however, we are in entire accord. The World's Fair grounds at Chicago were a sufficient indication of what might be done at Toronto. We cannot agree with Colonel Sweny's statement, that "the past history of the island conclusively proves that neither the people nor its representatives are alive to the importance of the property they own." This was true as regards the island a few years ago, but the Parks and Gardens Committee of the City Council have within the last five years changed the aspect of the central portion of the island in a manner which has very materially increased its attractiveness,

and by doing so have shown themselves to be alive to the possibilities of improvement. The Toronto Architectural Guild at its last meeting discussed this subject, and unanimously adopted the following resolution, which will be forwarded to the City Council: Moved by E. Burke, seconded by S. H. Townsend:—"That the Architectural Guild respectfully urges upon the City Council the wisdom of a very careful consideration of the transportation and other problems at the island; that we deprecate the proposed introduction of the noisy and dangerous trolley, and would advocate such a scheme as that outlined by Col. Sweny in the public prints. The artistic effects in the way of connected lagoons and wooded islands, such as were introduced at the Chicago World's Fair, are possible here on an extended scale, and we think this generation will be very remiss and lacking in breadth of view if such magnificent opportunities are not taken advantage of from the beginning. The sanitary advantage gained will also be of immense benefit. We beg to suggest a very careful consideration of the whole subject and the engagement of the best available landscape architect to advise and plan for what may be made in time a Toronto Venice".

AN INTERNATIONAL EXPOSITION AT TORONTO.

As this number of the Architect and Builder goes to press, our attention is called to a resolution adopted by the Toronto Board of Trade, favoring the holding of an International Exposition at Toronto a couple of years hence, and to an editorial article in the Toronto Globe in support of the project.

The space at our disposal will only permit us briefly to express the hope that immediate steps will be taken to carry out the undertaking. It would be the grandest possible advertisement for Canada, and would be the means we believe of giving a much needed impetus to immigration and business enterprise, while needed employment would be furnished to the laboring and artizan classes. The conditions are likewise most favorable to the carrying out of the scheme at the smallest possible expense. Architects and builders, who, with other classes, would be benefitted, should give the enterprise their prompt and earnest support.

TORONTO BUILDERS' EXCHANGE.

Toronto, March 6th, 1894.

Editor Canadian Architect and Builder.

Sir,—As a member of the Supply Dealers Section of the Toronto Builders' Exchange, I have to complain of the treatment which I have received at the hands of some of my fellow members. It is one of the regulations of the Exchange that members belonging to the Builders' Section who may purchase materials from members of the Dealers' Section, shall receive a certain discount off prices charged to outside builders on condition that the materials thus purchased are paid for within 30 days. Many of my fellow members to whom I have sold materials, allowing them the cash discount with the understanding that the goods would be paid for within the specified time, have failed to make payment for two, three or four months, and have then insisted on getting the benefit of the discount, notwithstanding their disregard of the terms upon which it was to be allowed, and unless their demand is complied with, I am given to understand that they will withdraw their orders from me. In view of the dull times, they well know that every dealer must be anxious to avoid loss of trade, so take advantage of this fact to repudiate the well known conditions of purchase as laid down by the Exchange.

This is a matter which the Board of Directors of the Exchange would do well to take cognizance of, as unless the members of the organization are compelled to deal fairly by one another, the benefits of membership must soon disappear.

Very truly yours,

Material Man.

PERSONAL.

Mr. P. Lacroix, of Montreal, was a delegate at the convention of the National Association of Commissioners and Inspectors of Buildings recently held in Boston.

The death is announced at London, Ont., of Mr. William Wales, father of the wife of the Mayor of that city. Mr. Wales, who was a native of Devonshire, Eng., was a well-known contractor, having carried on business in this line at Kingston, Ont., and having recently been engaged on the construction of the Parliament Buildings in Toronto. The deceased was in his seventy-sixth year.

Much surprise was occasioned a few days ago by the announcement that Hon. C. F. Fraser, who has occupied the office of Minister of Public Works in the Ontario Government since 1874, had tendered his resignation. Mr. Fraser has been in ill health for several years past, and on more than one occasion would have resigned his duties had not his colleagues in the Ministry prevailed upon him to continue in the position.

TORONTO TECHNICAL SCHOOL.

There can be but one idea with reference to the usefulness of technical schools, and we believe that the majority of the people in civilized countries hold to that idea, namely, that when managed by competent bodies of men forming the board of management, with zealous instructors, duly qualified, under them, nothing could be of greater advantage to the mechanic, anxious to obtain an education in his particular trade, which he could not possibly obtain without them. When, in addition to the facts that a technical school exists in any city, and is well governed and managed, the instruction is given absolutely *free*, the boon to the working man is simply immense. That a man should be able to acquire not only an insight into, but a thorough training in the science of his trade by diligent attendance three or four nights a week in a well lighted and well ventilated building, listening to the instruction given in a manner suited to his ability to grasp it, must be regarded as a very valuable privilege, and men who will not take advantage of all this, must be considered drones of their class. But everything in the success of such an institution must depend upon the zeal of the board of management, and the ability of the instructors. The board of management must be composed of men who are to a greater or less degree experts in the branches they represent; they must be men who will throw themselves into the work of the institution with zeal and unflagging interest, who will carefully watch their several departments and see that those who come up for instruction are receiving all that the school is able to give. Under them must be a supervisor or head master, who is responsible for the direct management of the school, and while capable of taking occasional classes himself, must be able to know that all the other classes are well managed, that the teachers are doing a thorough work and are able to impart instruction.

The teaching staff must not only be persons who have passed qualifying examinations and are experts in their particular lines, but they must have the *faculty of teaching*, which is by no means possessed by every one who may be considered an expert in any particular science. Necessarily, of course, they must have a love for teaching, and the ability to guage the minds of those who come to them for instruction, and be readily able to grasp the meaning of the duller students who have difficulty in expressing their needs succinctly. Patience is a gift that must be possessed by all teachers, and then with a love of the subject and a desire to infuse into the students an equal love of the subject, the qualified expert will be a successful instructor.

We have in Toronto a technical school the general working of which is little known to the public. It is in its infancy, and much that such an institution desires to accomplish, is necessarily beyond the means in hand at present. But it speaks well for the school that the attendance has already become too large for the rooms now occupied, and the work done by the students such as is of a character that can be exhibited, is very creditable to the institution.

The Toronto Technical School has a board of management composed of the Mayor of the city, the chairman of the Executive Committee and three aldermen, ex officio members; two experts in technical education; two stationary engineers; two members of the Council of the Ontario Association of Architects; one manufacturer, and five representatives of the Trades and Labor Council. Of the technical staff, the head master Mr. Duff, and one other, are B. A's, and graduates of the School of Practical Science; one other is a graduate of the same school; one is a B. A., another a B. A. and M. C., while another is a member of the Ontario Association of Architects, and another a lady, is a B. A., and holds the position of Public Analyst.

We have given these particulars because of our insistance upon the necessity of proper qualification in the instructors of a school such as the one in question. It may be said that something of the same importance must attach to teachers in all schools, but there is even a greater necessity in an institution of this kind because it is not rudimentary work that is here studied, but work that cannot be successfully carried out but by eminently qualified teachers. Mechanics, chemistry, physics, mathematics, descriptive geometry and drawing cover a wide range of technical study, both theoretical and practical, starting at a point considerably in advance of the highest grade of public school instruction and stretching forward to an indefinite grade of study in science. One of the important points for first consideration therefore must be: what shall be the highest limit of the instruction given in a particular school. This must be decided by two things: first the amount of funds at disposal for the purchase of apparatus and appliances, and secondly by the requirements of the majority of the students likely to attend. There must be some limit, or the theorist might carry on his course over several years and a great deal of time would be spent in mere speculation, while in practical matters it would be a mistake to go beyond the recognized requirements of particular trades. It has been found necessary to treat in an elementary manner upon some subjects, such for instance as arithmetic and mensuration. A student would profit little by the most excellent instruction in mathematics unless he had a certain fluency in arithmetic, and as most students coming first to the school, have passed some years since they left the public school, their arithmetic, except in very simple matters, must necessarily be "rusty" even if they ever learned enough "at school" to enable them to take up the higher branches. Descriptive

geometry and drawing cover, perhaps, a larger field than any other subjects, from practical geometry, drawings of constructions in all trades, the setting out of carpenter and joiners' work (some of which is necessarily indicated), drawings for pattern makers for machinery, up to free hand, ornament and design, and even architecture. Thus this subject illustrates, in a way, the importance of a thoroughly qualified instructor.

Another very important point to which a Board of Management must be thoroughly alive is, that having satisfied themselves with the *qualifications* of the teaching staff, they ascertain from time to time that the teachers are making progress themselves and keeping abreast of the times. It is very easy for an instructor in any subject to "get into a groove" or even to become careless in the preparation of his lectures; the problems he propounds must be progressive and must carry with them important lessons; and again these problems must be suited to the various stages at which the students have arrived. A problem may be in every respect a very excellent one, but if it goes beyond the instruction given, or does not come up to it, it is valueless, for in the one case the student will work it out with the greatest ease as belonging to a stage he has passed, or in the other, it will be a waste of time for him to puzzle over something about which he has not as yet received full instruction. It has been said that the guarantee against failure, in this respect, on the part of the instructor would be, that the students would themselves complain that they did not obtain that which they found of necessity to them. But it must be remembered that the majority of students, probably, would not have sufficient ability to detect any weakness of this kind in the teacher, and few would like to take upon themselves the responsibility and the great unpleasantness of making a complaint. The consequence would be, that one or two, who felt this, but did not see how to help themselves would leave, while the majority would remain and waste their time under the impression that they were progressing. Examinations of students to ascertain their progress would not mend matters or be a sufficient guarantee in the matter. This work of keeping the instructors up to the mark would, we suppose, devolve upon the two experts in technical education. These two experts are Prof. Galbraith and Dr. R. B. Orr, and we find their names head the list of the "School Management Committee." In these two gentlemen we think the public have a thoroughly satisfactory guarantee in this particular.

One point which concerns the public generally more perhaps than any other, and vitally concerns the institution itself, is the salaries paid to the instructors. The suggestion of reduction of question of salaries is now occupying the attention of the Board of Management. Every institution in its infancy, to be a success, must be carried on on the most economical principles consistent with the objects to be attained. An institution of the kind in question requires a large number of appliances for the execution of its work, as well as competent instructors, and the instructors must necessarily be hampered in their work without a sufficiency of appliances. When the appropriation for the work of the school is limited, it becomes a nice question as to what proportion shall be spent in salaries and what in the purchase of appliances, having first deducted from the appropriation the current expenses, such as rent, fuel, light, etc., etc. It seems to us that the subject has not received the attention it deserves at the hands of the board of management, and that the principle in force in the technical school of Toronto is an easy one of disposing of a difficult question, but that it is open to question as to whether it is very fair to the instructors themselves or altogether judicious in view of the limit of the appropriation. We do not for a moment agree with undervaluing the services of qualified teachers, but the point is one of utilizing the funds to the utmost advantage. Out of an appropriation of $7000, $4000 is divided equally among the eight instructors, no difference being made between one who has to spend a large amount of time in necessary preparation of his lectures and one whose subject being practically book work, does not need much time for preparation—between one whose subject is endlessly progressive, and one whose subject is by very nature, a limited science. In the first place $500 seems a large sum for an instructor who having the whole day for earning his livelihood, puts in say three nights a week for about six months of the year, and has little or no preparation to make for his class work at the school. But it does not seem too much for one who has to put in five nights a week for the same time, and has to spend two or three hours a day besides in preparation, even if he is an expert, and thoroughly posted on his subject.

In this institution the principle is that the work of instruction is to be divided up as equally as possible among the eight instructors, and if one has more than he can do in one subject, he must get the assistance of one whose time is not so fully occupied, so that the time of each shall be equally employed and all receive the same remuneration. But is there not a weakness here? The expert in one science is not likely to be an expert in another. If the instructor in drawing had too much on his hands, he could hardly obtain assistance from the expert in chemistry, or the expert in chemistry from the teacher of mathematics. While we do not advocate the reduction of salaries as an all round principle, nolens volens, we think that there would be a decided gain to the institution if the matter were regulated in a rather more practical manner than at present.

The limited space at command of the institution should make the matter of admission to its benefits, one of some consideration. At present any applicant (unless something serious is known against his character for instance) is admitted. A youth may think it will do him good to attend certain classes and he applies for admission; he attends a few nights and "drops out"; another may find it a pleasant way of spending a few evenings a week, taking up much valuable time of the instructor, and learning nothing, or one may come to learn, for example freehand drawing, not for the purpose of improving himself at his trade, but simply as an accomplishment. Thus, the space being limited, these three would shut out others, worthy seekers after knowledge as a means of improvement in their trades, for whom we conclude the institution is primarily intended. Now that the two dollar deposit, originally demanded from an applicant is not required, there is absolutely no guarantee of serious intention on the part of the applicant. Some kind of enquiry should, we think, be made concerning the applicant before admission is granted, of a fuller scope than is supplied by the simple form of application.

There is one other point upon which we wish to touch, that is examinations. The institution, like all others in their youth, cannot be expected to produce in the short time that it has been at work, very great results, and the public should not be disappointed that experts are not turned out at the close of every term. The work is necessarily progressive, and a certain course must be taken (in some classes of two years duration), before the ground is covered. There are certain disadvantages perhaps in permitting each instructor to examine his own class, but there are many advantages, and on the whole this principle really has proved in the majority of institutions to be more satisfactory than the employment of "outside" examiners. The "outside" examiner is generally or should be necessarily an expert among experts, but he has no intimate knowledge of the students he has to examine. Consequently he looks over the work through which the students have waded in the term, concludes that they have reached a certain standard, and he possesses certain or if we may say so, stock or test questions, which, if every student was of the same mental calibre as his neighbor, would no doubt test their abilities very well. But in all classes, there are some students brighter than others, and some who cannot by any means grasp a subject so easily as others. Moreover every examiner knows that many a student fairly well posted in his subject and who has shown great diligence at his work may fail completely at an examination through nervousness or the inability to comprehend the exact meaning of the questioner; while it may happen and has happened that a student may be acquainted with the peculiarities of a particular examiner and come out with flying colours at an examination who really was not so well grounded as the former example. There is a difficulty here that is not easy to get over in the way of satisfying the public that the results of the work are commensurate with the appropriation. A certain amount of result may in some branches be seen, as for instance in the exhibition of drawings executed by students, but even this is not satisfactory, for if a student exhibits a beautiful drawing of an elaborate machine, the public cannot know from the drawing that the student has an accurate knowledge of the use and working of every portion of the machine. A knowledge of algebra and such sciences cannot be exhibited, nor can the result of a two years course of chemistry be practically demonstrated to the public mind. In this matter the public must trust to its representatives on the board of management. The duty of the public to themselves is to see that the best men for the positions are elected to fill these offices and the public may and should scrutinize carefully the work done and the attention given by each member of the board.

A visit to the institution satisfies us that so far as it is able to go, the lines upon which its work is based are very excellent. It is a school worthy of a much larger appropriation, but the foregoing suggestions with reference to improvement in management present themselves, and are worthy we think of investigation.

Our thanks are due to the very courteous reception we met with at the hands of Mr. Duff, and the pains he took to give us the fullest information concerning this valuable institution.

ONTARIO ASSOCIATION OF ARCHITECTS.

THE first of a series of public lectures to be delivered under the auspices of the Association was given by Mr. Grant Helliwell, in the School of Practical Science, Toronto, on the evening of Thursday, the 8th inst. The subject of the lecture was "Current Architectural Styles." The subject was treated in a most interesting manner, and illustrated by a stereoptican under the direction of Mr. C. H. C. Wright, Lecturer in Architecture in the School of Science.

In substance the lecture is embodied in the paper read by Mr. Helliwell at the recent convention of the Association, and printed in the present number of this journal. It was, however, considerably amplified and popularized as befitted the occasion.

The audience numbered between two and three hundred, but strangely enough the students and to some extent the architects also were conspicuous by their absence.

It is learned that a special autumn meeting of the Association has been decided upon. It will probably be held in September. It will not be a business meeting, but a meeting for instruction, for which an interesting programme of papers, etc., is to be provided.

ROCKS. *

Geologists and architects have at least one interest in common, they both deal in what a geologist calls "rocks" and an architect "stone." The rocks of the geologist include, however, the sand of a seashore, the soil of a field and the ice of a glacier, whereas no architect would think of building in any of these materials unless perhaps an ice palace at Quebec this or some other winter. The geologist when dealing with rocks is apt to dub himself a petrographer or a lithologist, but the architect is more modest and gives himself no special name because he builds in stone.

The petrographer divides rocks into three grand divisions,—massive or igneous rocks, resulting from the cooling of melted material; schistose rocks having their minerals arranged in a parallel way so as to split most readily in one direction; and sedimentary or clastic rocks made of fragments of other rocks deposited by water. The massive rocks show the greatest variety of minerals, and are always taken up first. Their mineral constituents are of two kinds—essential, when their absence would throw the rock into another species, and accessory when less important.

The mineral playing the largest part in the formation of rocks is quartz, rock crystal when it displays its own form, a six sided prism ending in a pyramid. It is the hardest of the essential rock-forming minerals, is almost unattacked by the weather, and therefore is the most useful constituent of many stones suitable for building. Next in importance come the felspars, orthoclase with its flesh red or white cleavage surfaces, and plagioclase showing delicate striations, on cleavage planes. The former is a silicate of alumina and potash, and the latter of alumina and soda or lime. Some of the plagioclase felspars have a magnificent play of color as in labradorite. Of the darker rock minerals, mica, hornblende and augite are most important.

There are several kinds of mica, but we need mention only muscovite, a silicate of potash having pale colors, and biotite, a magnesian silicate very dark in color. All micas may be recognized by their very perfect cleavage into exceedingly thin elastic plates. Hornblende is a dark colored silicate having two planes of cleavage with an angle of 124 degrees between them. The scales cleft off are not elastic. Augite or pyroxene, another dark, almost black, silicate, has usually no distinct cleavage, and may be distinguished thus from hornblende. Of the accessory minerals, few are of much interest to us, though garnet, often of a fine red color, occurs in many rocks around Toronto, and tourmaline in black triangular prisms may sometimes be seen. The most important of the accessory minerals to the architect, is iron pyrites, a hard, brassy looking sulphide of iron crystallizing in cubes, which under the action of the weather may change to a sulphate and finally stain the rock where it occurs rusty brown with oxide of iron.

Turning now to the rocks themselves, granite is naturally taken up first by both petrographers and architects, as the most widespread and useful of the group. It consists essentially of quartz, felspar and mica or hornblende, and takes on grey or flesh red colors from the prevalent orthoclase felspar. It is one of the handsomest and most durable of building stones and but for its great hardness would no doubt come into much wider use. Its one defect is the ease with which it crumples under the action of intense heat, as shown at the Boston fire. If quartz be omitted from granite the rock is called syenite, which has the same colours and uses as the previous rock, though a little softer to work. When the felspar is striated and mixed with hornblende, forming a dark green or black rock, it is named diorite; if augite is the dark mineral the rock is diabase or gabbro. All these rocks fall into the same line in the hands of the builder, who sometimes calls them black granite.

Porphyries are rocks, unlike those that have been described, in that the general mass is fine grained or compact in structure enclosing larger grains or crystals of quartz or the felspars. Some of the porphyries are very handsome stones for ornamental work, but are little used in building.

The more important ancient massive rocks have now been described; and it will scarcely be necessary to take up in detail the corresponding series of modern eruptive rocks, including the lavas, such as trachyte and basalt; since this whole group is absent from eastern Canada.

The schistose rocks, too, need only a brief mention, since only one of them, gneiss, practically granite, having a parallel arrangement of its mica plates, is used to any extent for building. In Norway one sometimes sees a whole house built of gneiss, roof as well as walls. Far more important are the fragmental or sedimentary rocks, which provide the most commonly used building stones. We may divide them into three groups, those made of clay in some form, those made up of silica or the silicates (quartz, felspar, etc), and those which consist of carbonate of lime or of this with carbonate of magnesia.

The clayey or argillaceous rocks are usually too feeble and easily acted on by the weather to be of use in building. The slates, however, which are clays consolidated and metamorphosed, are an exception, since innumerable minute crystals of mica and other minerals have begun to form in them binding the materials together and giving a resistance to the weather surpassed by no other rock. The perfect cleavage which gives slate its value as a roofing material does not correspond to the stratification, as one would expect, but has been caused probably by strong lateral pressure in mountain building. The different tones of color in slates are taken advantage of by architects to give variety in roof effects.

Perhaps the most useful group of rocks in architecture is that of the sandstones. Breccias, made up of large angular fragments are too rare to find much place as a building material; and conglomerates, formed of rounded pebbles cemented together, are also rarely put to use, though some notable buildings, such as the Pitti Palace, are built of them. Our brilliant jasper conglomerate from Lake Huron with its red pebbles in a white ground might give striking effects, though it would be very hard to work. It would probably last for eternity, however, if put into a building. Sandstones, on the other hand, are among the most favored building materials. They consist chiefly of grains of quartz, often with a large admixture of fragments of felspar or other silicates, and result from the destruction of the older massive rocks. The cement binding the particles together has a great effect on the durability of the stone and should receive more attention than it does from architects. A siliceous cement forms a rock difficult to work but that will practically last forever. A ferruginous cement consisting of oxides or carbonate of iron is a durable one and occurs in many reddish or brownish sandstones. The cement is said to be calcareous when carbonate of lime is deposited between the sand grains. Such sandstones effervesce with cold, dilute acid, and the lime is more or less easily attacked by rain charged with carbonic acid from the air of cities, allowing the stone to crumble. The least efficient cement of all is argillaceous or clayey, and sandstones containing it readily disintegrate when exposed to the weather in a climate like ours. The clayey odor when breathed upon affords a rough test for the argillaceous cement. It is an unhappy fact that the durability of a sandstone is often in inverse ratio to the ease with which it is worked, so that the builder is tempted to use the poorer qualities.

Last come the carbonates, consisting of calcium carbonate in limestone, and of calcium and magnesium carbonates in dolomite. The two may be distinguished by the action of cold acid, which effervesces strongly with the carbonate of lime, but hardly at all with dolomite. The limestones are generally formed of broken shells, though in many compact varieties, such as lithographic stone, the fossils have completely disappeared. Porous modern limestones, formed by springs are called travertine. The most ancient limestones have been so metamorphosed as to become thoroughly crystalline, and when very fine grained and pure white are statuary marbles. Many of the colored varieties of so called marble are really, however, uncrystalline limestones. The limestones are often admirable building stones, durable and handsome, but are apt to be attacked by the atmosphere of great cities charged with acid fumes. The dolomites resist this action somewhat better. A very handsome variety of chemically deposited carbonate of lime, sometimes used for interior decoration, is called Mexican onyx in the trade, though incorrectly, since the true onyx is a variety of silica.

The coloring matter of rocks is usually some compound of iron. Reds are caused by the sesquioxide, hematite; browns and yellows by the hydrous or brown oxide. Red and brown sandstones are good examples of this, the paler they are the less oxide of iron they contain, while pure white ones are practically free from this metal. The flesh color of orthoclase felspar in the granites arises also from the red oxide of iron. On the other hand silicates and other compounds of iron in the monoxide state show various shades of green or gray, or almost black, as in the diorites and other greenstones, in green slates, and greenish grey sandstones. These green monoxide compounds of iron tend to weather into the ruddier sesquioxides. One often notices that pale greenish sandstones turn yellowish or brownish on exposure, a result of slow oxidation of ferrous oxide. The darker limestones are usually colored with bituminous or coaly matter, which on exposure gradually oxides; so that a blue limestone, like that of Kingston, eventually bleaches to a pale grey, almost white; Kingston by moonlight seems built of marble.

The weathering quality of rocks is a matter of great interest to architects, for on this turns the permanence of their work. Certain rocks, such as quartz des and sandstones with a siliceous cement are practically indestructible by the weather, as one can see on surfaces scoured by glaciers during the ice age 7000 years ago, but still showing the polish and scratches then given them. Rocks formed of silicates, like granite and syenite, are also very resistant; others like the limestones and marbles are slowly dissolved by rain and are more rapidly acted on by the impure air of large cities, which contains traces of sulphuric acid. The dolomite of the English parliament buildings is said to be suffering badly from this cause. Sandstones with clayey cements are readily disintegrated in moist and changeable climates; and stone containing much iron pyrites should be looked on with suspicion, since it is very apt to weather into brown oxide of iron, weakening the stone and giving rusty stains, as in the parliament buildings at Ottawa. The porosity of a stone is a matter of prime importance in a climate like ours where water soaked walls may be quickly crumbled under the action of frost.

In rocks composed of several different minerals, like granite, great changes of temperature tend toward disintegration through unequal expansion. Quartz has a cubic expansion of .000036 for one degree centrigrade, orthoclase only 17 parts in a million. In case of a great fire where the temperature may be raised suddenly 1000 degrees or more, this unequal expansion sets up strains which splits off the surface, as in the great fires of Boston and Portland, where massive granite buildings crumbled to ruins. One would expect limestones to burn to quicklime and thus fall to pieces, but actually they resist far more heat than granite, while sandstones resist fire best of all.

The last point to be referred to is the best means of testing a rock intended for building purposes. The test of time is of course the most convincing of all, but then one cannot always wait a thousand years to see how durable a building stone is. The resistance of a cube of stone to crushing strain gives useful evidence as to its strength, and the amount of water it absorbs helps to a decision as to its durability in frosty climates; but the most valuable test of a scientific kind is a petrographical examination. The lithologist unlike other men can look through stone walls. By the microscopic study of thin rock sections one can determine the actual minerals that make up a rock, their relationship to one another, their state of freshness or, decay and the character of the cement that binds the particles together. No other method will give such complete evidence as to the internal structure of a rock, on which its durability depends, as a careful examination of sections under the microscope.

* Paper by Prof. A. P. Coleman, of the School of Practical Science, read at the annual convention of the Ontario Association of Architects.

THE ARCHITECT.*

As this is the first time that I have had the pleasure of reading a paper either before architects or others I sincerely trust that you will bear with me, look kindly upon any errors I may make, and if the paper as a whole be weak I hope you will be light in your vituperation and that I may be strengthened in this to better prepare another at some other time. I have chosen as you see for a subject "The Architect."

It has been said that any one possessing the knowledge of a poor carpenter, the skill of an indifferent draughtsman, a little audacity and a ten dollar bill, can appoint himself an architect. Certainly in the present state of affairs all persons are privileged alike in practising architecture, or rather in, shall I say, designing, and superintending the construction of buildings, notwithstanding the important consideration of health and safety of life involved, to say nothing of the hideous aberrations that our cities and towns are often besmeared with by men whose only passport to public patronage is their "gall" and the assumption of the name of architect.

It seems a pity that something cannot be done to limit the practice of architecture to properly qualified men. I have sometimes thought that instead of having the word "Registered" removed from Clause 25 of the Ontario Architects' Act, that those only who have passed examination be allowed to call themselves "Registered"; all others who though still being allowed to practice, would not term themselves "registered architects" and thus save the ignorant public, if they choose, from being victimized.

I have also thought a measure of the trouble might be averted, the beauty of the city improved and the architectural profession edified, if the city would not grant a permit for any building unless a copy of the plan as made by, and bearing the signature of an architect be filed, and if the architect would not undertake to make plans for any person unless he be commissioned to superintend the construction of the building as well.

Loan companies and money lenders would have better security for their money if they would insist that the building on which they are asked to advance money should be planned and superintended by an architect.

But before the general public will be able to distinguish between architects and ARCHITECTS, it will necessary that they be educated to distinguish between good and bad architecture—to accomplish which there is no doubt this Association has done and is doing a great deal, but perhaps if architects would voice their opinions through the press oftener on things architectural the matter would receive more consideration from the public. The taste of the coming generation would be greatly cultivated along this line if the study of architecture were brought into our public schools. In whatever way this great change shall be brought about I cannot say, but I sincerely trust that the time is not far distant when incompetent men, such as real estate agents and mechanics, will not be allowed to practice architecture without the proper qualifications.

How often we see exemplified the sarcasm of Lessing when he says—

> Tomkins forsakes his last and awl
> For literary squabbles,
> Styles himself poet.
> But his trade remains the same—he cobbles.

I remember hearing of one of this stamp erecting a large building for manufacturing purposes where all the internal supports were wooden posts from basement floor to roof; the weight to be imposed on each support would be something enormous. Under each post he had one stone 18" × 18" × 9" resting on the earth, and but for the better judgment of the builder who objected to carrying out the plans in this respect, there would probably have been very disastrous results. This architect, with fear and trembling, went to the owner and made the excuse that owing to the softness of the earth which he had not foreseen, it would be necessary to enlarge the footings under the posts.

When we hear such things as this about people who call themselves architects, we can hardly wonder at owners employing what is known as the "practical man," instead of an architect, for this kind of work.

Plagiarism, or purloining the designs of others and calling them your own, is, unfortunately practiced by this class of people who usurp the name of architect, who, if they do not crib the entire design, pick out the features they think suitable for their purpose from the published work of other architects and who manage in this way to form some sort of a design, and hearing whatever praise the unsuspecting client may have given expression to, he "bears his blushing honors thick upon him" just as if they had been honestly merited. I remember being asked to compete for a small country church. Out of respect for the feelings of the kind friend through whose influence I was asked, I submitted plans, but was not, however, the fortunate man. In conversation with the secretary of the Building Committee he informed me that he had in his possession one design which met with the approval of the committee. He showed me the plans and perspective drawing, the latter being a tracing from the CANADIAN ARCHITECT AND BUILDER of a published design which I myself had made.

Dryden has aptly marked the three steps in the career of most men of genius, thus—

> "What the child admired
> The youth endeavored and the man required."

In my mind I can scarcely conceive of a man being proficient in this profession whose career has not been marked by these three steps—one who has studied the profession from his early youth, spent a number of years in the office of a recognized member of the profession at all kinds of work in connection with architecture, and who makes a constant study of his profession.

It is perhaps a misfortune of the profession that its members must be at once artists, business men and scientific experts, and they cannot choose to be either more than the other without great injury to their usefulness and success. It is thought by a great many to be beyond human capacity to excel in design and anything else at the same time. The man who would be a thorough architect, while taking great pleasure in exercising his designing qualities, should not overlook the importance of making constant efforts to keep himself familiar with details of construction, prices and specifications.

It is often found that an architect for fear of discouraging his client at the beginning, systematically makes all sorts of encouraging responses to enquiries regarding the cost, and does everything to get a building started; so the owner after having seen a most elaborate sketch is tempted to go on with the work, although the tenders have now exceeded his appropriation by say $2,000. Afterwards tenders are to be taken for mantels, gas fixtures, heating, etc. Of course the architect told him that these were not included in the original estimate, but he had no idea they would run into so much money; so that when the building is completed it has cost several thousand dollars more than he intended. The owner in his discouragement of course blames the architect. If the architect had spoken plainly to his client in the first place and told him he was expecting too much for the money, all the trouble would most likely have been prevented. There is far more merit in being able to build well on a minimum allowance than to design artistically, but unfortunately without any regard for cost. What credit is it to the architect who makes a pretty building where cost has not been a consideration?

The architect should bear in mind that his first clients will generally be his personal friends, and that defective specifications or ignorant supervision, bad construction or impossible plans, may bring extra expense and bitter disappointment to them; and to him, an unfavorable reputation from which he will sufter through his whole professional life.

I have heard very many definitions of what an architect is. The most amusing one to me was from the simple son of a lady client. It was my unpleasant duty, at one stage of the work, to condemn a large piece of Credit Valley stone. The contractor in the presence of Bob, the son, was affirming very forcibly that he thought the stone was good enough, and expressed several other things that he thought. "Well," says Bob, "That's all right, Mr. ——, but there's a man paid to do the thinking."

There was a lesson in the remark for me, and to every conscientious architect, to be always thoughtful of his work, considering every detail—that the design be most suited to the purpose for which it is intended and to the purse of the owner—that from the foundation to the ridge every constructional problem be thoroughly considered, and that when completed the building will be beautiful. We will then find we shall have the mightiest of all proofs of success, that our clients will come to us for plans the next time they build, and use their influence with others on our behalf.

* Paper read by Mr. H. Simpson, read at the fifth annual convention of the Ontario Association of Architects.

HAMILTON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

A special committee of the Hamilton City Council have recently recommended that the building by-law be amended by extending the fire limits, and providing that all schools, theatres, and other public buildings shall have fire escapes attached, and that no explosives be permitted to be stored in any building. The owner or contractor is made liable for the infraction of the by-law. The fire limits, which at present are Bay street on the west, John street east, the mountain on the south, and the Grand Trunk railway on the north, are to be changed to Wentworth street on the east, from the Grand Trunk Railway to the Northern and North-Western track, thence west to Ferguson avenue, south to Aberdeen avenue, west to Locke street, north to King street, west to Dundurn street, north to the Grand Trunk railway tracks, thence in a south-east direction to Queen street, south along that street to York street, east to Hess, north to Cannon, east to Bay street, and north to the Grand Trunk railway. Builders will be required to deposit with the inspector a ground plan of the buildings. Nothing but stone or brick buildings will be permitted to be erected within the fire limits.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Mr. Geo. E. Wade, R. A., of London, Eng., who won the competition for designs for a memorial statue to the late Sir John A. Macdonald, to be erected on Dominion Square, in this city, has sent a representative here in the person of Mr. F. A. Williams to make the preliminary arrangements. The statue is to cost $20,000, which amount has already been subscribed. It will stand on a base of unpolished granite, 12 feet in height, with steps on the four sides leading up to the pedestal of the main statue. The statue itself will be surrounded by twelve polished red granite clustered columns fourteen feet in height, and with bronze caps. Resting on these columns is a stilted arch nine feet in height, with reliefs in bronze, emblematical of Canada's progress. Resting on the arch are four colossal lions in bronze, and above these stand a group of seven figures, holding shields and linked arm-in-arm to represent the seven provinces of the Dominion, which were confederated by Sir John Macdonald. In the centre of these figures, and overtopping them, will be the statue of the Queen of Plenty, holding in her hand a cornucopia filled with Canadian products. Different bronzes, representing the various industries of the country, are placed at the base of the pillars. The model of the statue has been completed by Mr. Wade, and has been approved by Her Majesty, the Queen, and the Prince of Wales. The impression prevails that the winners of the second and third prizes in this competition will be declared to be Mr. Griffiths, of London, Eng., and Signor Xeniéres, of Rome.

Contracts are about to be let for the erection of the Canada Life Association's new office building, plans for which have been prepared by Mr. Waite, of Buffalo. The building, which has been designed in the free Renaissance style, will consist of seven stories and a basement. It will stand at the corner of St. James and St. Peter street, extending back to Fortification Lane. It will have a frontage of 58 feet on St. James street. The frame work will be of steel, encased in fire proof materials and faced with Ohio blue stone. There will be two principal entrances, on James and St. Peter streets respectively. Offices for the owners will be arranged on the first floor; the ground floor story is to be occupied by the Canadian Bank of Commerce.

Referring to the appointment of a committee by the Architectural League of New York to draft an ordinance to forbid the erection of buildings of excessive height, on the ground of their being insecure, insanitary and inartistic, the Insurance and Finance Chronicle, of this city, says: If the action of the architects is backed up by the insurance companies, and all who have judgment enough to realize how health must be endangered by streets running through deep defiles of buildings that keep out sunlight and air, there will be a limit placed on these Babel-like structures.

A dinner was recently tendered at the St. James club, in this city, to the Hon. Mr. Nantel, Provincial Commissioner of Public Works, on the eve of his departure on an extended trip to Europe and the Holy Land.

The Building Inspector reports that the number of buildings erected during 1893 was 561 as compared with 640 in the previous year. The value of the buildings erected last year was $2,835,800, as against $2,508,825 in 1892, thus showing the buildings put up last year to have been of a much superior class to those of the previous year. As the result of his recent visit to the convention of Building Commissioners and Inspectors of the United States, Mr. Lacroix will recommend that our building ordinance be amended so as to provide for the erection of fire escapes to a much greater extent than heretofore.

An old stone front building in the rear of the Home of the Sisters of Notre Dame collapsed recently, throwing into the street the walls and windows of the third story. Fortunately no one happened to be passing at the time; if there had been, one or more deaths would have to be recorded. This occurrence points to the necessity for frequent and careful inspection of old structures which front on public thoroughfares. It is due to our Building Inspector to say that he has usually shown himself to be thoroughly alive to the duties of his position in this regard.

The fifteenth annual spring exhibition of the Montreal Art Association will be opened on April 29th next in the galleries of the Association, and will close on May 9.

STUDENTS' DEPARTMENT.

"CANADIAN ARCHITECT AND BUILDER" STUDENTS' COMPETITION.

IN connection with the Students' Competition for a Drug Store and Dwelling, the conditions of which were announced in the ARCHITECT AND BUILDER for February, we regret to state that the number of designs received was not sufficient to form a basis for the decision of the competition by a vote of the students as provided for by the conditions.

It may be that the time allowed for the preparation of the drawings was not deemed sufficient, and also that the time of a number of students who would otherwise have entered the competition was fully taken up with the Ontario Association of Architects examinations. In view of the possibility that these causes may have hindered the success of the competition, it has been thought desirable to extend the date when the competition will close to the 8th of April.

It is hoped that in consequence of this extension of time a larger number of students will decide to submit drawings. Should this hope prove to be ill-founded, the competition will necessarily be withdrawn.

INTERCOMMUNICATION COLUMN.

This column is intended to afford a means of correspondence for students, builders, and all our readers desiring information they cannot otherwise obtain. Questions for which an immediate reply is required should be marked "Urgent." Names and addresses of correspondents must be sent with their communications, but these may be signed with initials or otherwise for publication.

QUESTIONS.

[9]. I have had a present of $50 for the purchase of books most useful to me as a student of architecture and want advice how best to spend it? Could you get information for me in your new column.—BUDDING ARCHITECT.

[10]. An old stone barn in an exposed situation suffers much from the weather on one side. The stone it is built of is soft and though it was all carefully pointed up in the fall, the stone itself seems to need treatment. Can you tell me any method of preserving it that will be effectual as well as inexpensive?—J. B. M.

[11]. I should be glad if "G" [6] would give me some information as to what papers he would suggest for circulation in the proposed "Club." I should be pleased to join but would like to know about the expense proposed to be borne by each member.

[12]. The snow lies thickly on a church roof and what with the sun, and also the warmth of the building it sometimes slides off with a roar that drowns the voice of the preacher and considerably startles the congregation. Is there any way to prevent this?—N. J.

REPLIES.

[1]. "Analysis of Ancient Domestic Architecture," by Dollman & Gibbons, "Baronial Halls," by Harding and others, "Domestic Architecture in England," Turner.

[2]. H. W.—There can be no doubt that hollow walls properly constructed, have many advantages over solid walls. It is best to build them with the air space as near the exterior as possible, i.e., in a brick wall, the air space should be next to the half brick facing, but in a stone-faced wall the air space must necessarily be against the internal brick work. Careful bonding of the thin portion to the thick, is a *sine qua non*, as also is a damp preventing course at the bottom of the air space; the inside face of the outside brick or stone face should be well parged, and if these precautions are taken a hollow wall will be a great improvement to a building.—P. M.

[2]. H. W.—I would recommend "H. W." to read what is said about "Hollow Walls" in Vol. II. "Notes on Building Construction," (South Kensington).

[4]. "Builder":—You say your contract does not say anything about the time for *final* payment; does it say anything about payment by certificate?—there may be a clause which covers the whole subject; I can hardly understand a contract without such particulars. Without a stipulated time for payment the architect's certificate does not bind the owner to pay at a stated time. I suppose your only remedy would be under the "Mechanics' Lien Act." Great care should be executed in dealing with such questions as this, and without the fullest particulars of the case, I can hardly venture to advise. I would recommend you to see your lawyer and suggest to him to study "Mechanics' Legal Hand Book" before advising you.—L. A. W.

[5] "Quebecer."—If you "invoke the aid of the law" to set you free, you would find that your "written agreement" was binding upon you, unless there is a clause in reference to the point raised. You have apparently been fifteen months at the profession; to do nothing but "kick your heels" would seem a waste of time certainly. Instead of having any unpleasantness with your employer, your wisest course is to ask him to help and direct you in a course of study, to prepare for being of greater use to him when more busy days arrive and to fit you for the examinations which you ought to go up for. You should have gone up for the "first intermediate" this month. Look up the published questions of last years O. A. A. examinations and see if you can answer them; if not, here is a field with which to occupy yourself with great profit. You should be able to answer all these questions after being fifteen months in an architect's office.—[ED. "INT. COL."

[7] "Jack."—The only way of mounting tracings on drawing paper so as not to injure them when rolled up, is to stick down one side and leave the others loose. It should be the top side, and it should then be rolled from this side; that, however, can hardly be called "mounting."—J. C.

[8]. "Architect."—Write to Mr. C. H. C. Wright, of the School of Practical Science, Toronto, who, from tests of cement made at the institution, could no doubt tell you the most reliable brands for your work in the country. Being at a distance you cannot easily get your cement tested, of course. Possibly one or two rough methods of test may help you. Fill a bottle with a paste made with neat cement and let it stand for a few days, if the cement is not in good condition it will expand and crack the bottle, or if it has not been burnt enough the cement will shrink slightly. Plunge your bare arm into the cement; if it feels cold it is bad, if hot it requires more turning over; to be good it should be pleasantly warm to the skin. I have known some fairly eminent men make use of the latter test when no other means were at hand.—"ARCHITECTUS."

N. B.—With reference to the suggested "Reading Club," we are sorry that we have not heard from more students so far, but when "G" answers the question which appears this month about it, we shall be somewhat surprised if there is not a rush to take advantage of it. The expenses we should think would not be more than a dollar (perhaps less) to each member.—[ED. "INT. COL."

[13]. Where and of whom can we procure a book on bricklaying?—J. R. & SON, Dorchester, N. B.

[13]. We can procure for you any of the following books on bricklaying:—"Useful Information for Bricklayers," being an improved method for setting out ganged arches, by J. Buckle, price $1.00; "Drawing for Bricklayers" by E. A. Davidson, illustrated, $1.50; The Rudiments of Practical Bricklaying," by A. Hammond, including general principles of arch-drawing, cutting and setting, pointing, paving, tiling, etc., illustrated, intended to be a hand book for apprentices and beginners, 60 cents; "Practical Brick Cutting and Setting," by the same author, illustrated, 108 pages, 60 cents; "Brick Work," a practical treatise on the higher principles of cutting and setting and the application of geometry to roof tiling, etc., two editions, illustrated, 60 cents each edition.—ED. INT. COL.

USEFUL HINTS.

Paste may be kept several months without getting mouldy if a little pulverized blue stone is added while hot.

Professor Laurie in a recent lecture at the Society of Arts, stated that there are at least two preparations on the market which are as valuable commercially as white lead, whilst they lack its qualities which are so harmful to human life. These are sulphate of lead and oxide of zinc. A mixture of the two, known as "Freeman's White," has been proved to have a greater covering power as a pigment than white lead, whilst oxide of zinc keeps its color for a much longer time in impure air, and is therefore valuable for interior work.

TAR PATHS.—Secure a firm foundation, and slope the ground with cinders or gravel, allowing a quick run towards the gutter. Sift furnace ashes through ¼in. screen and well mix with gas tar, lay on a layer ¾in. thick, well tread down, and finish by continually rolling, sifting over a little dry ashes and lime to prevent roller sticking. The greatest art is in finding how much tar is required to "set" the ashes, and not to put more, or it will be soft and spongy in warm weather. No absolute rule can be laid down, as much depends both upon the quality and nature of ashes. Try a small piece first, measuring both tar and ashes, use your own judgment as to the proportions. Do not boil the tar.

EXPANSION OF GIRDERS.—A writer on strains in girders referring to the amount of movement of iron girders due to expansion and contraction under extreme variations of temperature, observes that for iron and steel the coefficient or rate of expansion is nearly 1 inch for 100° of heat (F.) for every 100 feet in length. Thus a girder 60 feet in length will expand sixtenths of an inch for 100° increase of temperature, and contract the same amount for 100° decrease of temperature; or a girder 75 feet long will vary seventy-five-one-hundredths of an inch, or ¾ inch, for a variation of 100°. He says: "In order to provide for all contingencies it is the general practice to allow for a vibration of 100° F., or a movement equal to 1½ inches for every 100 feet in length." A girder 60 feet long will therefore require to have an allowance for movement in the moving end equal to nine-tenths of an inch or 1 inch, the other end being fixed. It is only necessary to put the rollers under one end of the girder, so that the movement of the girder may be at that end only.

FIREPROOF WHITEWASH.—A most effective composition for fireproofing exterior surfaces may be formed by slacking a sufficient quantity of freshly-burned quick-lime of the best grade, and, when slacking is complete; there is added such an amount of skim milk, or water in its absence, as will make the liquid of the consistency of cream. To every ten pounds of this liquid is added separately and in powder, stirring constantly, the following ingredients in the order named: Two pounds of alum, twenty-four ounces of sub-carbonate of potassium or commercial potash, and one pound of common salt. If white paint is desired, a further addition is made to the liquid, though the whiteness is found to be improved by the addition of a few ounces of plaster of Paris. Lampblack has the effect of giving it a number of shades from slate color to black. Whatever tint is used, it is incorporated at this stage, and the whole, after being strained through sieve, is run through a paint mill. When ready to apply the paint is heated nearly to the boiling point of water, and is put on in its hot condition. It is found that the addition of a quantity of fine white sand to this composition renders it a valuable covering for roofs and crumbling brick walls, which it serves to protect.

THE ARCHITECT.*

As this is the first time that I have had the pleasure of reading a paper either before architects or others I sincerely trust that you will bear with me, look kindly upon any errors I may make, and if the paper as a whole be weak I hope you will be light in your vituperation and that I may be strengthened in this to better prepare another at some other time. I have chosen as you see for a subject "The Architect."

It has been said that any one possessing the knowledge of a poor carpenter, the skill of an indifferent draughtsman, a little audacity and a ten dollar bill, can appoint himself an architect. Certainly in the present state of affairs all persons are privileged alike in practising architecture, or rather in, shall I say, designing, and superintending the construction of buildings, notwithstanding the important consideration of health and safety of life involved, to say nothing of the hideous aberrations that our cities and towns are often besmeared with by men whose only passport to public patronage is their "gall" and the assumption of the name of architect.

It seems a pity that something cannot be done to limit the practice of architecture to properly qualified men. I have sometimes thought that instead of having the word "Registered" removed from Clause 25 of the Ontario Architects' Act, that those only who have passed examination be allowed to call themselves "Registered"; all others who though still being allowed to practice, would not term themselves "registered architects" and thus save the ignorant public, if they choose, from being victimized.

I have also thought a measure of the trouble might be averted, the beauty of the city improved and the architectural profession edified, if the city would not grant a permit for any building unless a copy of the plan as made by, and bearing the signature of an architect be filed, and if the architect would not undertake to make plans for any person unless he be commissioned to superintend the construction of the building as well.

Loan companies and money lenders would have better security for their money if they would insist that the building on which they are asked to advance money should be planned and superintended by an architect.

But before the general public will be able to distinguish between architects and ARCHITECTS, it will necessary that they be educated to distinguish between good and bad architecture—to accomplish which there is no doubt this Association has done and is doing a great deal, but perhaps if architects would voice their opinions through the press oftener on things architectural the matter would receive more consideration from the public. The taste of the coming generation would be greatly cultivated along this line if the study of architecture were brought into our public schools. In whatever way this great change shall be brought about I cannot say, but I sincerely trust that the time is not far distant when incompetent men, such as real estate agents and mechanics, will not be allowed to practice architecture without the proper qualifications.

How often we see exemplified the sarcasm of Lessing when he says—

> Tomkins forsakes his last and awl
> For literary squabbles,
> Styles himself poet
> But his trade remains the same—he cobbles.

I remember hearing of one of this stamp erecting a large building for manufacturing purposes where all the internal supports were wooden posts from basement floor to roof; the weight to be imposed on each support would be something enormous. Under each post he had one stone 18" × 18" × 9" resting on the earth, and but for the better judgment of the builder who objected to carrying out the plans in this respect, there would probably have been very disastrous results. This architect, with fear and trembling, went to the owner and made the excuse that owing to the softness of the earth which he had not foreseen, it would be necessary to enlarge the footings under the posts.

When we hear such things as this about people who call themselves architects, we can hardly wonder at owners employing what is known as the "practical man," instead of an architect, for this kind of work.

Plagiarism, or purloining the designs of others and calling them your own, is, unfortunately practiced by this class of people who usurp the name of architect, who, if they do not crib the entire design, pick out the features they think suitable for their purpose from the published work of other architects and who manage in this way to form some sort of a design, and hearing whatever praise the unsuspecting client may have given expression to, he "bears his blushing honors thick upon him" just as if they had been honestly merited. I remember being asked to compete for a small country church. Out of respect for the feelings of the kind friend through whose influence I was asked, I submitted plans, but was not, however, the fortunate man. In conversation with the secretary of the Building Committee he informed me that he had in his possession one design which met with the approval of the committee. He showed me the plans and perspective drawing, the latter being a tracing from the CANADIAN ARCHITECT AND BUILDER of a published design which I myself had made.

Dryden has aptly marked the three steps in the career of most men of genius, thus—

> "What the child admired
> The youth endeavored and the man acquired."

In my mind I can scarcely conceive of a man being proficient in this profession whose career has not been marked by these three steps—one who has studied the profession from his early youth, spent a number of years in the office of a recognized member of the profession at all kinds of work in connection with architecture, and who makes a constant study of his profession.

It is perhaps a misfortune of the profession that its members must be at once artists, business men and scientific experts, and they cannot choose to be either more than the other without great injury to their usefulness and success. It is thought by a great many to be beyond human capacity to excel in design and anything else at the same time. The man who would be a thorough architect, while taking great pleasure in exercising his designing qualities, should not overlook the importance of making constant efforts to keep himself familiar with details of construction, prices and specifications.

It is often found that an architect for fear of discouraging his client at the beginning, systematically makes all sorts of encouraging responses to enquiries regarding the cost, and does everything to get a building started; so the owner after having seen a most elaborate sketch is tempted to go on with the work, although the tenders have now exceeded his appropriation by say $2,000. Afterwards tenders are to be taken for mantels, gas fixtures, heating, etc. Of course the architect told him that these were not included in the original estimate, but he had no idea they would run into so much money; so that when the building is completed it has cost several thousand dollars more than he intended. The owner in his discouragement of course blames the architect. If the architect had spoken plainly to his client in the first place and told him he was expecting too much for the money, all the trouble would most likely have been prevented. There is far more merit in being able to build well on a minimum allowance than to design artistically, but unfortunately without any regard for cost. What credit is it to the architect who makes a pretty building where cost has not been a consideration?

The architect should bear in mind that his first clients will generally be his personal friends, and that defective specifications or ignorant supervision, bad construction or impossible plans, may bring extra expense and bitter disappointment to them; and to him, an unfavorable reputation from which he will suffer through his whole professional life.

I have heard very many definitions of what an architect is. The most amusing one to me was from the simple son of a lady client. It was my unpleasant duty, at one stage of the work, to condemn a large piece of Credit Valley stone. The contractor in the presence of Bob, the son, was affirming very forcibly that he thought the stone was good enough, and expressed several other things that he thought. "Well," says Bob, "That's all right, Mr. ——, but there's a man paid to do the thinking."

There was a lesson in the remark for me, and to every conscientious architect, to be always thoughtful of his work, considering every detail—that the design be most suited to the purpose for which it is intended and to the purse of the owner—that from the foundation to the ridge every constructional problem be thoroughly considered, and that when completed the building will be beautiful. We will then find we shall have the mightiest of all proofs of success, that our clients will come to us for plans the next time they build, and use their influence with others on our behalf.

* Paper read by Mr. H. Simpson, read at the fifth annual convention of the Ontario Association of Architects.

HAMILTON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

A special committee of the Hamilton City Council have recently recommended that the building by-law be amended by extending the fire limits, and providing that all schools, theatres, and other public buildings shall have fire escapes attached, and that no explosives be permitted to be stored in any building. The owner or contractor is made liable for the infraction of the by-law. The fire limits, which at present are Bay street on the west, John street east, the mountain on the south, and the Grand Trunk railway on the north, are to be changed to Wentworth street on the east, from the Grand Trunk Railway to the Northern and North-Western track, thence west to Ferguson avenue, south to Aberdeen avenue, west to Locke street, north to King street, west to Dundurn street, north to the Grand Trunk railway tracks, thence in a south-east direction to Queen street, south along that street to York street, east to Hess, north to Cannon, east to Bay street, and north to the Grand Trunk railway. Builders will be required to deposit with the inspector a ground plan of the buildings. Nothing but stone or brick buildings will be permitted to be erected within the fire limits.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Mr. Geo. E. Wade, R. A., of London, Eng., who won the competition for designs for a memorial statue to the late Sir John A. Macdonald, to be erected on Dominion Square, in this city, has sent a representative here in the person of Mr. F. A. Williams to make the preliminary arrangements. The statue is to cost $20,000, which amount has already been subscribed. It will stand on a base of unpolished granite, 12 feet in height, with steps on the four sides leading up to the pedestal of the main statue. The statue itself will be surrounded by twelve polished red granite clustered columns fourteen feet in height, and with bronze caps. Resting on these columns is a stilted arch nine feet in height, with reliefs in bronze, emblematical of Canada's progress. Resting on the arch are four colossal lions in bronze, and above these stand a group of seven figures, holding shields and linked arm-in-arm to represent the seven provinces of the Dominion, which were confederated by Sir John Macdonald. In the centre of these figures, and overtopping them, will be the statue of the Queen of Plenty, holding in her hand a cornucopia filled with Canadian products. Different bronzes, representing the various industries of the country, are placed at the base of the pillars. The model of the statue has been completed by Mr. Wade, and has been approved by Her Majesty, the Queen, and the Prince of Wales. The impression prevails that the winners of the second and third prizes in this competition will be declared to be Mr. Griffiths, of London, Eng., and Signor Xeménes, of Rome.

Contracts are about to be let for the erection of the Canada Life Association's new office building, plans for which have been prepared by Mr. Waite, of Buffalo. The building, which has been designed in the free Renaissance style, will consist of seven stories and a basement. It will stand at the corner of St. James and St. Peter street, extending back to Fortification Lane. It will have a frontage of 58 feet on St. James street. The frame work will be of steel, encased in fire proof materials and faced with Ohio blue stone. There will be two principal entrances, on James and St. Peter streets respectively. Offices for the owners will be arranged on the first floor; the ground floor story is to be occupied by the Canadian Bank of Commerce.

Referring to the appointment of a committee by the Architectural-League of New York to draft an ordinance to forbid the erection of buildings of excessive height, on the ground of their being insecure, insanitary and inartistic, the Insurance and Finance Chronicle, of this city, says: If the action of the architects is backed up by the insurance companies, and all who have judgment enough to realize how health must be endangered by streets running through deep defiles of buildings that keep out sunlight and air, there will be a limit placed on these Babel-like structures.

A dinner was recently tendered at the St. James club, in this city, to the Hon. Mr. Nantel, Provincial Commissioner of Public Works, on the eve of his departure on an extended trip to Europe and the Holy Land.

The Building Inspector reports that the number of buildings erected during 1893 was 561 as compared with 640 in the previous year. The value of the buildings erected last year was $2,835,800, as against $2,508,825 in 1892, thus showing the buildings put up last year to have been of a much superior class to those of the previous year. As the result of his recent visit to the convention of Building Commissioners and Inspectors of the United States, Mr. Lacroix will recommend that our building ordinance be amended so as to provide for the erection of fire escapes to a much greater extent than heretofore.

An old stone front building in the rear of the Home of the Sisters of Notre Dame collapsed recently, throwing into the street the walls and windows of the third story. Fortunately no one happened to be passing at the time; if there had been, one or more deaths would have to be recorded. This occurrence points to the necessity for frequent and careful inspection of old structures which front on public thoroughfares. It is due to our Building Inspector to say that he has usually shown himself to be thoroughly alive to the duties of his position in this regard.

The fifteenth annual spring exhibition of the Montreal Art Association will be opened on April 20th next in the galleries of the Association, and will close on May 9.

STUDENTS' DEPARTMENT.

"CANADIAN ARCHITECT AND BUILDER" STUDENTS' COMPETITION.

IN connection with the Students' Competition for a Drug Store and Dwelling, the conditions of which were announced in the ARCHITECT AND BUILDER for February, we regret to state that the number of designs received was not sufficient to form a basis for the decision of the competition by a vote of the students as provided for by the conditions.

It may be that the time allowed for the preparation of the drawings was not deemed sufficient, and also that the time of a number of students who would otherwise have entered the competition was fully taken up with the Ontario Association of Architects examinations. In view of the possibility that these causes may have hindered the success of the competition, it has been thought desirable to extend the date when the competition will close to the 8th of April.

It is hoped that in consequence of this extension of time a larger number of students will decide to submit drawings. Should this hope prove to be ill-founded, the competition will necessarily be withdrawn.

INTERCOMMUNICATION COLUMN.

This column is intended to afford a means of correspondence for students, builders, and all our readers desiring information they cannot otherwise obtain. Questions for which an immediate reply is required should be marked "Urgent." Names and addresses of correspondents must be sent with their communications, but these may be signed with initials or otherwise for publication.

QUESTIONS.

[9]. I have had a present of $50 for the purchase of books most useful to me as a student of architecture and want advice how best to spend it? Could you get information for me in your new column.—BUDDING ARCHITECT.

[10]. An old stone barn in an exposed situation suffers much from the weather on one side. The stone it is built of is soft and though it was all carefully pointed up in the fall, the stone itself seems to need treatment. Can you tell me any method of preserving it that will be effectual as well as inexpensive?—J. B. M.

[11]. I should be glad if "G" [6] would give me some information as to what papers he would suggest for circulation in the proposed "Club." I should be pleased to join but would like to know about the expense proposed to be borne by each member.

[12]. The snow lies thickly on a church roof and what with the sun, and also the warmth of the building it sometimes slides off with a roar that drowns the voice of the preacher and considerably startles the congregation. Is there any way to prevent this?—N. J.

REPLIES.

[1]. "Analysis of Ancient Domestic Architecture," by Dollman & Gibbons, "Baronial Halls," by Harding and others, "Domestic Architecture in England," Turner.

[2]. H. W.—There can be no doubt that hollow walls properly constructed, have many advantages over solid walls. It is best to build them with the air space as near the exterior as possible, i.e., in a brick wall, the air space should be next to the half brick facing, but in a stone-faced wall the air space must necessarily be against the internal brick work. Careful bonding of the thin portion to the thick, is a *sine qua non*, as also is a damp preventing course at the bottom of the air space; the inside face of the outside brick or stone face should be well parged, and if these precautions are taken a hollow wall will be a great improvement to a building.—P. M.

[2]. H. W.—I would recommend "H. W." to read what is said about "Hollow Walls" in Vol. II. "Notes on Building Construction," (South Kensington).

[4]. "Builder":—You say your contract does not say anything about the time for *final* payment; does it say anything about payment by certificate?—there may be a clause which covers the whole subject; I can hardly understand a contract without such particulars. Without a stipulated time for payment the architect's certificate does not bind the owner to pay at a stated time. I suppose your only remedy would be under the "Mechanics' Lien Act." Great care should be executed in dealing with such questions as this, and without the fullest particulars of the case, I can hardly venture to advise. I would recommend you to see your lawyer and suggest to him to study "Mechanics' Legal Hand Book" before advising you.—L. A. W.

[5] "Quebecer."—If you "invoke the aid of the law" to set you free, you would find that your "written agreement" was binding upon you, unless there is a clause in reference to the point raised. You have apparently been fifteen months at the profession; to do nothing but "kick your heels" would seem a waste of time certainly. Instead of having any unpleasantness with your employer, your wisest course is to ask him to help and direct you in a course of study, to prepare for being of greater use to him when more busy days arrive and to fit you for the examinations which you ought to go up for. You should have gone up for the "first intermediate" this month. Look up the published questions of last years O. A. A. examinations and see if you can answer them; if not, here is a field with which to occupy yourself with great profit. You should be able to answer all these questions after being fifteen months in an architect's office.—[ED. "INT. COL."

[7] "Jack."—The only way of mounting tracings on drawing paper so as not to injure them when rolled up, is to stick down one side and leave the others loose. It should be the top side, and it should then be rolled from this side; that, however, can hardly be called "mounting."—J. C.

[8]. "Architect."—Write to Mr. C. H. C. Wright, of the School of Practical Science, Toronto, who, from tests of cement made at the institution, could no doubt tell you the most reliable brands for your work in the country. Being at a distance you cannot easily get your cement tested, of course. Possibly one or two rough methods of test may help you. Fill a bottle with a paste made with neat cement and let it stand for a few days, if the cement is not in good condition it will expand and crack the bottle, or if it has not been burnt enough the cement will shrink slightly. Plunge your bare arm into the cement; if it feels cold it is bad, if hot it requires more turning over; to be good it should be pleasantly warm to the skin. I have known some fairly eminent men make use of the latter test when no other means were at hand.—"ARCHITECTUS."

N. B.—With reference to the suggested "Reading Club," we are sorry that we have not heard from more students so far, but when "G" answers the question which appears this month about it, we shall be somewhat surprised if there is not a rush to take advantage of it. The expenses we should think would not be more than a dollar (perhaps less) to each member.—[ED. "INT. COL."

[13]. Where and of whom can we procure a book on bricklaying?—J. R. & SON, Dorchester, N. B.

[13]. We can procure for you any of the following books on bricklaying:—"Useful Information for Bricklayers," being an improved method for setting out gauged arches, by J. Buckle, price $1.00; "Drawing for Bricklayers" by E. A. Davidson, illustrated, $1.50; The Rudiments of Practical Bricklaying," by A. Hammond, including general principles of arch-drawing, cutting and setting, pointing, paving, tiling, etc., illustrated, intended to be a hand book for apprentices and beginners, 60 cents; "Practical Brick Cutting and Setting," by the same author, illustrated, 108 pages, 60 cents; "Brick Work," a practical treatise on the higher principles of cutting and setting and the application of geometry to roof tiling, etc., two editions, illustrated, 60 cents each edition.—ED. INT. COL.

USEFUL HINTS.

Paste may be kept several months without getting mouldy if a little pulverized blue stone is added while hot.

Professor Laurie in a recent lecture at the Society of Arts, stated that there are at least two preparations on the market which are as valuable commercially as white lead, whilst they lack its qualities which are so harmful to human life. These are sulphate of lead and oxide of zinc. A mixture of the two, known as "Freeman's White," has been proved to have a greater covering power as a pigment than white lead, whilst oxide of zinc keeps its color for a much longer time in impure air, and is therefore valuable for interior work.

TAR PATHS.—Secure a firm foundation, and slope the ground with cinders or gravel, allowing a quick run towards the gutter. Sift furnace ashes through ¼in. screen and well mix with gas tar, lay on a layer 3in. thick, well tread down, and finish by continually rolling, sifting over a little dry ashes and lime to prevent roller sticking. The greatest art is in finding how much tar is required to "set" the ashes, and not to put more, or it will be soft and spongy in warm weather. No absolute rule can be laid down, as much depends both upon the quality and nature of ashes. Try a small piece first, measuring both tar and and ashes, use your own judgment as to the proportions. Do not boil the tar.

EXPANSION OF GIRDERS.—A writer on strains in girders referring to the amount of movement of iron girders due to expansion and contraction under extreme variations of temperature, observes that for iron and steel the coefficient or rate of expansion is nearly 1 inch for 100° of heat (F.) for every 100 feet in length. Thus a girder 60 feet in length will expand sixtenths of an inch for 100° increase of temperature, and contract the same amount for 100° decrease of temperature; or a girder 75 feet long will vary seventy-five-one-hundredths of an inch, or ¾ inch, for a variation of 100°. He says: "In order to provide for all contingencies it is the general practice to allow for a vibration of 100° F., or a movement equal to 1¼ inches for every 100 feet in length." A girder 60 feet long will therefore require to have an allowance for movement in the moving end equal to nine-tenths of an inch or 1 inch, the other end being fixed. It is only necessary to put the rollers under one end of the girder, so that the movement of the girder may be at that end only.

FIREPROOF WHITEWASH.—A most effective composition for fireproofing exterior surfaces may be formed by slacking a sufficient quantity of freshly-burned quick-lime of the best grade; and, when slacking is complete, there is added such an amount of skim milk, or water in its absence, as will make the liquid of the consistency of cream. To every ten pounds of this liquid is added separately and in powder, stirring constantly, the following ingredients in the order named: Two pounds of alum, twenty-four ounces of sub-carbonate of potassium or commercial potash, and one pound of common salt. If white paint is desired, a further addition is made to the liquid, though the whiteness is found to be improved by the addition of a few ounces of plaster of Paris. Lampblack has the effect of giving it a number of shades from slate color to black. Whateyer tint is used it is incorporated at this stage, and the whole, after being strained through sieve, is run through a paint mill. When ready to apply the paint is heated nearly to the boiling point of water, and is put on in its hot condition. It is found that the addition of a quantity of fine white sand to this composition renders it a valuable covering for roofs and crumbling brick walls, which it serves to protect.

CURRENT ARCHITECTURAL STYLES.*

By Grant Hellwell.

The title "current styles" somewhat imperfectly expresses the object of this paper. To do justice to a description of the current styles of architecture, at least in these days, would be altogether beyond the scope of a short paper, and moreover, while extremely interesting, and to a certain extent profitable, it is a question whether, in the limited time at our disposal, in a convention of architects gathered from different parts of the province, the opportunity cannot be better employed. The object, then, will be, not so much to attempt a full description of the many styles now prevalent, as to briefly review some of the more important of them; to endeavor to look beneath the surface and if possible ascertain the fundamental principles underlying architectural style, and from our investigation to deduce some conclusions as to how real progress may be made in the achievements of a profession than which there is none nobler in the realms of art or science.

The frequency with which, in matters pertaining to architectural design or buildings, the public propound to one the question "what style is it?", would be amusing were it not so often embarrassing. It is embarrassing fo rtwo reasons. In the first place it opens up the question "what is style"?—one by no means easy to define. A thoroughly logical definition of the term is seldom attempted. Gossfried Semper says: "style is the coincidence, in a work of art, with the history of its coming into reality, with all the conditions and circumstances that are causal to its origin." Another authority defines "style" as "the language in which we express our thoughts, the natural expression of our requirements in building." But for the purposes of this paper it is not necessary to go further; these two definitions are probably sufficient to convince anyone that an explanation of the term is not quite so simple as at first it may appear. In the second place, the conundrum arises, respecting the building or design in question. "Has it any style, and if so what?" The answer to this may be more difficult than the first. True, if the building were a copy of one of the structures of ancient Greece or of one of the scarcely less famous cathedrals of the mediaeval period, it would be easy for the veriest tyro to name its style correctly. Incomparably beautiful, however, in their respective classes, as those buildings were, their exact reproduction in modern times is usually deemed a ludicrous mistake. The customs, manners and conditions generally, under which they were erected, belong to a by-gone age, and charming as such structures might be to the eye, they would, except in rare caese, wanting in two of the chief elements of the highest art, viz., by utility and truth. But for the most part the buildings on whose style we are called upon to pronounce are of a very different stamp. Erected to fill many requirements, and restricted by innumerable conditions, the average modern erection is of a complex character. In many instances, perhaps the majority, it is more than doubtful whether the building possesses any style at all. In others, the taste and skill of the designer have produced a building, having an unmistakable air of character and individuality, but of whose style, in the ordinary sense of the term we are not so certain.

In proceeding to discuss styles of architecture, while we are primarily and chiefly interested in the architecture of our own Canada, we must, without any disloyalty or self reproach, admit that while we have produced work, which, in its class, compares favorably with that of any country, we are, architecturally, overshadowed, on the one hand, by the great and wealthy nation to our south, and on the other, by the head of that mighty empire of which we are proud to form a part, and to the architecture of of these two countries let us now direct our attention.

In reviewing current architecture in England, the traditions of the past are so intimately connected with modern work, that it may not be amiss briefly to refer to the early history of the art. Beginning with the crude ideas introduced at the time of the Norman Invasion, the progress of architecture as it slowly developed into the various phases of gothic is clearly marked in the buildings which still remain as monuments of English art. With the exit of the Tudor style a new and outside influence can be plainly descerned.

Renaissance forms appear, first of a German and Flemish type, followed later by evidences of Italian and French inspiration, culminating in that grand achievement, the pride of all England, St. Paul's cathedral. Since then the course of English architecture, at no time a particularly smooth one, has taken it through many vicissitudes. From the classic to the gothic, and from there to the renaissance again, first of one period, then of another, such has been its course. The gothic revival of the present century, ending perhaps with the erection of the London Law Courts by Street, was the last of anything approaching a uniform style. Since that time a spirit of eclecticism, the doctrine of selection, has reigned supreme. Every architect has felt free to choose this or that style as his fancy dictated, and the result has been an infinite variety of forms. This system prevails in England to-day, so that the term "current styles," as far as British architects are concerned, is a most comprehensive one. To those few men gifted with exceptional talent, this has been no particular drawback. It has developed in a special manner their individuality. This is markedly apparent in the work of Norman Shaw, whose buildings, familiar to us all, delightfully charming in their scholarly picturesqueness, their freedom from conventionality, are a standing testimony to his genius, and yet they cannot be classed under the head of any known style, although possessing that quality in a strong degree. Another master in English art is his contemporary, Waterhouse, whose versatility is not less noticeable than his artistic talents. Although he has perhaps achieved his greatest successes in the Romanesque style, an illustration of which is one of the most ooted of modern English buildings, the South Kensington Museum, a view of which will be shown us presently, the Manchester Assize Courts and the Town Hall in the same place, both in the gothic style, gave him a world wide celebrity, while his masterly treatment of the National Liberal Club building, is an example of his genius in renaissance art. Time forbids mention of some of the best recent work by other well known British architects, designed, for the most part, in some phase of Italian renaissance, though by no means wholly in that style. But it is an undeniable fact, that with certain few exceptions, English architecture of the last decade, shows little progress.

Interesting and instructing as it is to study the architectural types of English building art, it is with even keener interest and greater profit that we turn our attention to prevailing styles in America, for though bound by ties of kinship and political sovereignty to the mother land, in all those conditions which affect the subject of our discussion here, we have much more in common with our near neighbors on this side the Atlantic. We have the same climate and practically the same building materials, and even in our modes of living, our methods of business and all the environments of national life, we are more closely allied to them than to our honored head. So that the consideration of current styles in the United States may apply equally to Canada, and for the purposes of this discussion we will consider both countries as one.

Any review of American architecture, apart altogether from the ancient buildings of Mexico, is necessarily brief, being of such recent beginning as almost to deny it a history.

A nation of Anglo Saxon origin, and that not so very far back, nothing worthy of the name of architecture in its buildings dates over 200 years, and until comparatively recent times it has followed so closely in the lead of England that what has been said of the latter country is quite applicable to the new land. About the time of the birth of the Republic a modified classic style prevailed, now known as the Colonial, and many of the buildings of that era still remain to testify to the chaste and simple beauty with which they were clothed. But after this a decided retrogression took place, and for the greater part of a century few if any new buildings were erected having any claim to style. It was not until the beginning of the last quarter of this century that a distinctly new era in the architecture of the western world set in. That the restless vigor and energy so characteristic of the American people, and which in every other line has forced its achievements to the front, should remain quiescent in matters architectural, was not to be expected, and about the time above mentioned the bonds and shackles of traditional art were thrown off and an advance made into new fields of effort. The progress made has been most marked. Doubtless to the late H. H. Richardson more than to any other single individual is due the credit of the appearance, not of a new style, but of a new principle in American architecture. Trained in the modern Renaissance as taught in the schools of France, he early broke free from the limits of that style, and with his strong individuality took up the study of the round arch architecture prevailing in Europe prior to the gothic era, commonly known as Romanesque. In the hands of such a master work was produced which soon attracted the atten ion of his contemporaries and of the public. He above all men in his generation was the brightest example of that rare genius which can perceive and evolve the hidden beauties and possibilities of the work of past ages. Without slavishly copying, he was able to draw inspiration from every source and adapt it to the varying requirements of his art, and thus produced work which, while it bore the stamp of his own personality, challenged by its beauty and dignity, the admiration of all beholders. It is impossible to say to what degree of perfection, had he lived, he might have carried his chosen style. Apparently his mantle has not fallen on any of his successors. True, the influence of his work has been felt far more since his death than while he was amongst us. Like a tidal wave the fashion—for so we may call it—for Romanesque swept the land from ocean to ocean. Many large and attractive buildings were and are still being erected in that style. Some enthusiastic but superficial observers loudly hailed it as the long called for American style. But it was short lived. Richardson had many weak imitators, but few true followers; they copied the *forms*, but with the underlying principles that guided the master mind, with that power of adaptation, that fulness of resource possessed by him, they were unendowed. What was the result? Buildings, *said to be Romanesque*, rose by the thousand all over the continent, and the noble and dignified round-arch style was deposed from the lofty throne on which its greatest exponent had placed it to a position almost of contempt. As a consequence, those who did appreciate its charms and possibilities, and who, according to the measure of their ability, were thoughtfully and successfully working out the problems committed to their hands, forsook the style entirely and sought new

* Paper read at the fifth annual Convention of the Ontario Association of Architects, Toronto, Jan. 17, 1893.

motifs from other sources. Their methods of study and differences of taste led them in various directions; the spirit of eclecticism prevailed, and is still dominant.

There had been, even when the Richardsonian movement was at its height, some few men who had never inclined to the popular style; educated like him, in the French schools of architecture, thoroughly trained in and imbued with Classical art, they had remained true to their early training and had all along been producing good work of the Classic and Renaissance types. The waning of the Romanesque brought this style of design into special prominence, and the reaction which followed the surfeiting of the public taste with the characteristic freeness and irregularity of the former only served to render the symmetry and precision, the studied proportions, the refined and delicate detail of the beautiful Renaissance the more attractive. The example of these leaders, prominent among whom may be mentioned the names of R. M. Hunt and McKim, Mead and White, was soon followed by other members of the profession, and the new order of things quickly spread. About this time the projected Columbian Exposition at Chicago offered an unprecedented opportunity for architectural achievement, and the selection of Renaissance and Classic styles for its principal buildings and the subsequent successful carrying out of the designs was all that was needed to make these styles, perhaps even more popular than the Romanesque in its palmiest days. Still, though no other style or styles can fairly be considered as in the field for popular favor, the disciples and exponents of many other types of architecture are not idle, nor do they fail to find an appreciative and responsive public. The variety of style as exhibited to-day in all classes of buildings is simply amazing. A walk through a residential street in almost any of our cities or larger towns affords a striking confirmation of this fact. Here for instance, we may see a large imposing residence, the great detached columns in the Ionic or Corinthian order extending through two stories and supporting the entablature with its low, broad pediment, the wide verandahs, the central doorway with semicircular fanlight, the broad square topped windows with moulded architraves, all tending to carry one back to the old Colonial days. Close by is a handsome dwelling with a high steep roof with ornamental ousting, the circular corner bays rising through the several stories and terminating in a graceful pointed roof, dormer windows, large and high, with slender crocketted pinnacles and sweeping lofty pediment and finial, window and door openings with ornamented pilasters of slight projection and moulded enriched cornices, all with a degree of symmetry and balance and loftiness, strongly suggestive of the French chateau. Across the way, possibly, is a dwelling of Elizabethan type, with coped gables of fanciful and pleasing outline. On a little farther, and we pass several residences in what we will call for want of a better name, the American dwelling house style,—lower story built of brick or rough faced stone, above this the walls and gables faced with shingles, sometimes without color other than the soft silver grey tint produced by the weather, but oftener stained in some of the pleasing hues of brown or olive here is a tastely designed oriel window, there a cosily recessed and deeply shaded balcony; on one side the simple outline of the roof is broken by a graceful turret or dormer, on another it descends with sweeping curve to form the roof of a verandah. The general contour is certainly pleasing, the outline often picturesque, and there is an unmistakably homelike air about the whole that attracts in spite of many eccentricities and incongraities. It may be called the typical American home, in the production of which American architecture has gained its greatest success. But we are pre-eminently a commercial people and may naturally look to the buildings devoted to commerce in order to gauge the architectural progress of the day.

In any reference to current architecture in this country, the business buildings take a conspicuous place and we will briefly discuss some of their most characteristic features. And here, as nowhere else, has been brought to our architects a problem for the solution of which there was absolutely no precedent. The tremendous expansion of trade and commerce during the last two or three decades, has correspondingly increased the value of land in our great commercial centres and has necessitated the construction of those enormously high buildings which are the wonder, if not the admiration, of all who visit us. These buildings of 12, 15 and even 20 stories have been adversely criticized by some; but was it to be expected that in such an entirely new departure no mistakes would be made? The wonder rather is that such a measure of success as has unquestionably been achieved in the case of not a few of these gigantic buildings, should have been attained in view of the extreme difficulties of the problem. In perhaps the majority of instances the designing of these tall constructions, in which the height is so greatly disproportioned to the width, has been so skillfully managed by the disposition of the horizontal lines that the effect of height has been to a large extent obscured. The Romanesque style has been most happily employed in many cases, the usual disposition of the parts as seen in European mediaeval structures lending itself admirably to the requirements of the design which is commonly composed of a basement boldly and massively treated comprising two or three stories, then a central division of several stories in height with disposition of arches, the whole composition terminating in an attic of two or three stories. In the most successful buildings the angles have been admirably managed so as to give the appearance of strength and dignity necessary in structures of such size. Some of the later designs are in the popular Renaissance style and show a very clever treatment of the problem.

A word as to prevailing styles in ecclesiastical work. In a nation of such cosmopolitan character as America, embracing an almost innumerable variety of religious beliefs, it might be expected that great differences of style would be found, and such is the case. Romanesque, Gothic, Mauresque, Spanish and many other types are represented, though for the most part, it must be admitted to the discredit alike of their designers and the congregations for whom erected. In no class of architecture have the Americans so much to learn as in their church buildings. Still in their more recent works, signs of improvement are not wanting. The notable competition, a few years since, for the great Episcopal cathedral of New York has done not a little to advance ecclesiastical architecture. Although, as poicted out previously, a great variety of styles prevails in church work, it is doubtful if any are as appropriate for this class of building as the beautiful gothic forms, and the latest designs of perhaps a majority of our leading architects clearly point to this conclusion.

In her public and legislative buildings, with one or two notable exceptions, America has less claim to congratulation than in other architectural achievements, although here too, the most recently designed buildings show vast improvement over earlier work. No reference to American architecture is complete without allusion to the Capitol at Washington, a building of which any nation might well be proud. Although it cannot be termed a modern building, yet, inasmuch as the style in which it was built is more popular to-day than when it was designed, a reference to it is specially appropriate here. It is too well known to need description, and it is questionable if a structure of such stately dignity and grandeur will ever cease to exert a powerful influence on the architectural productions of the American people. In this sketch of current American architecture may be seen much that is encouraging. That there is an abundance of life and vigor is evident and that the character of our work has steadily and rapidly improved is equally apparent. Probably one of the most perplexing circumstances presented to our minds is the great variety of styles seen in our modern buildings, a spirit of restlessness, a lack of definite purpose which would seem necessary for the proper development of our art. Why is this so? Possibly one reason may be the deeper and fuller knowledge of the architectural styles of the past. If this is the case there need certainly be no fear as to the result, bearing in mind the fact that such knowledge includes not only an acquaintance with the form, but what is of vastly greater importance, a perception of the idea, of the principles underlying the outward form. To possess this knowledge and the power to apply it, requires patient thought and study, but there is no other royal road to the true development of architecture. Or again a reason may be the search after new elements of beauty, fresh and varied forms of architectural expression. This too need cause no alarm. Have we not in the works of nature an infinite variety of beautiful forms from the designs of the Divine Architect refreshing and delightsome to our senses. Can we wonder then in this age of versatility, of the ever changing forms of architecture? The impressive and stately monuments of classic art cannot satisfy every condition of aesthetic taste and it is doubtless in response to this characteristic of our nature, that we may see, in the case, for instance, of domestic architecture, the signs of a return to the picturesque and quaint beauties of the half timbered houses of a decade or two since, in the very latest designs of some of our leading architects.

We may not look for the formation of a new style; all attempts in this direction have resulted in dismal failure, and this after all is not to be wondered at when we consider that the styles of past ages, admirable and beautiful as they are, were not created in any such way. The degree of perfection to which they were brought, was only attained after generations if not centuries of patient and laborious effort, in which the object to be gained was not novelty, but a beautiful and natural expression in the best materials at their hand, of the requirements of their age. And it is unquestionably in the same way only that any real progress can be made to-day in the true development of architecture.

ILLUSTRATIONS.

DRAWING ROOM MANTEL FOR HIS HONOR, JUDGE FRINK, VERNON, B. C.—R. MACKAY FRIPP, A.R.I.B.A., ARCHITECT.

SOME WAYSIDE SKETCHES—DRAWN BY E. WILBY.

C. A. & B. COMPETITION FOR A TOWN HOUSE AND STABLE—DESIGN SUBMITTED BY "COLONIAL," (EDWARD LANGLEY, JR.) AWARDED THIRD PLACE.

Iron gas pipe was originally made up of gun barrels, lengths being formed by screwing the muzzle end of one into the breech end of another. After this, welded tubes of equal diameter and thickness were made, and the screw socket joint used to unite them. The seam was first welded, a few inches at a time, by inserting a rod within the heated tube and hammering the lap together. After this came an improvement which took the form of drawing the heated tube, arranged for butt welding, through a pair of half circular dies which forced the edges to unite.

DECORATION AND FURNITURE

CARVING.

IF we consider for a moment the present condition of the sculptor's art, as it is exemplified in the best of our modern furniture, we cannot fail to congratulate our wood carvers upon the immense advancements they have made in their industry during the past fifty years. At the time of the great exhibition the handicraft of the wood carver had sunk to the lowest art level that it is possible to conceive. Now that we have arisen from such an inartistic lethargy, it is amusing to occasionally look back into the illustrated Art Journal of the '51 Exhibition and reflect upon the many ridiculous designs that are chronicled there, as emanating from some of the then leading fashionable furnishers. If we regard such exhibits with a view of studying the contemporary carving, we can indeed discover a plethora of wonders. Sideboards carved all over with bewildering growths of convolvuli, tables with myriads of curves and cabriole legs galore, cabinets carved entirely in imitation of rustic work, and looking like glorified summer houses in suburban back gardens. Such fancies as these—unstudied, uninspired, barbarous fancies—passed current in those days for "noble and magnificent wood carving."

That kind of sculptured work represents one bad extreme—an extreme to which we have, as yet, no fear of returning. But there is an opposite extreme, viz., *forced elegance*, and to this we are quickly drifting. We lack conception, freedom and individuality in our carving, by paying too great a deference to old work, and, like the sculptors of the cinque cento, who made the same error, we are beginning to err on the side of finish and beauty, and to lose thereby the very life and soul of our labor.

The tremendous differences between the carving of our National Woodwork and the carving of to-day is evident to everybody. But, unfortunately, whereas most cultured people appreciate and admire the *old* work, they, none the less, would not accept such sculpturing from the hands of the *modern* craftsmen. Thus they do their utmost—unconsciously, no doubt—to discourage true originality. The most delightful scroll-work and vigorous crude figure carving would infallibly pall upon the taste of such people. That which many a connoisseur would rave about as *quaint* and spirited in an Elizabethan panel, would, forsooth, be blamed as barbarous if it were known to have been produced by a modern true art workman. It is this deplorable public inability to discriminate between that which is clever and original, and that which is merely a tasteful repetition, that has so effectually prevented the general introduction of the "human form divine" into our modern carved work. In an old Dutch buffet, or on a piece of Jacobean panelling, the crudest and roughest employment in the figure was regarded, in its true sense, as a quick and lasting expression of a more or less brilliant idea—not as an example of painstaking patience.

Nowadays our figure work must be perfect or it is to be condemned. And what is the result? Neither perfection or imperfection, but a worse state of affairs—the almost total absence of any attempt in our everyday furniture to introduce the figure at all. This ought not to be so. The human figure is a beautiful and essential element in our carved work, and its absence is much to be deplored. The figure gives life and sentiment to our old carved work, and all the finest epochs of our industry abound with representations of the human form.

FIG. 2.—FRENCH CARVED PANEL, PERIOD HENRY IV.

Far be it from us to advocate crudeness—the old work was crude enough in all conscience, but then the carvers of that day did the *best they knew*. Let us, therefore do likewise, and if our sentiments urge us to introduce the figure into our work, let us give the reins to our fancy, and not wait until we become Royal Academicians before we essay to attempt figure sculpturing at all. Our predecessors three hundred years ago did splendid work, with but indifferent—if any—knowledge of anatomy, and surely we, who have innumerable advantages, can excel them if we wish. But, alas! Our very advantages are our hindrances, for if we had not the means to become so clever, by studying the work of others, we should be compelled to rely on our resources and—work—instead of copy.

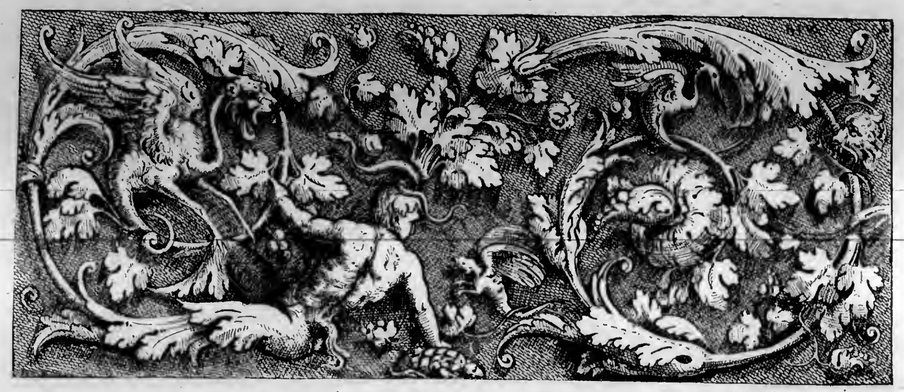


FIG. 1.—CARVED PANEL, EARLY GERMAN RENAISSANCE.

Let us glance, for instance, at the piece of old German scroll-work which is shown in fig. 1. The figure contained therein may or may not be anatomically correct—it does not matter—it is a part of the scroll, and a necessary and very interesting feature of

the panel. How much better is this than the orthodox vase would be with its everlasting acanthus scroll, even though it were Italian or Oriental London in design! For that matter, too, how unmistakably does it excel the next example that we show in fig. 2! This, however, belongs to a different period, viz., that of Henry the Fourth of France, and though it is somewhat formal design—as was usual with the work of that era—yet it is a bold and fearless effort to introduce some part of the figure at least. That life-representing head—crude and grotesque though it be—would attract the eye of an observer much more readily than the most delicately wrought but lifeless vase or patera that it would be possible to carve in its stead.

And what shall we say about the "Grotesque?" That it is a joke in art; a mere bit of fanciful bye-play? If so, it is welcome, for it cannot fail to interest us, and, may-be, amuse us. Why should not our furniture occasionally contain some embodied piece of wit? The old buffets often did; surely we stand in need of mirth in these matter-of-fact days, much more than our jovial ancestors. The sparing introduction of the grotesque into our cabinet would be a boon. It would be an easy change to effect, too, for the grotesque in carving is very much less difficult

FIG. 3.—GROTESQUE HEAD. PERIOD EARLY LOUIS XV.

to render than the perfect figure. This will be at once apparent to any one who attemps to draw a face. For example, it will be found to be extremely difficult to make a likeness, whilst it is the easiest thing imaginable to make a burlesque, simply because anything you do is a burlesque, whilst anything you do is not necessarily a likeness. So with the grotesque. Provided that we do not set ourselves to adopt any recognized school of art in this matter, we shall soon be able to produce grotesque figures with considerable facility.

The last of our sketches shows a capital study in this direction. It is French of the early Louis Quinze period, and though this is, of course, an elaborate example, it will serve to show what a degree of animation may be awakened in our work by the introduction of the figure, even though it be grotesque.

It would be well for the carver to remember, however, that there are many styles of grotesque art, and that these are extremely varied and distinctive in their several schools. These, therefore, should either be carefully studied or studiously avoided.—Furniture and Decoration.

From the budget speech of the treasurer of the Ontario Government it is learned that the expenditure on Government buildings during the last five years has been $3,167,656.

The value of new buildings for which permits were taken out in the city of Toronto in January of the present year, is $73,600, as against $56,300 for the same month last year.

Mr. Hebert, the sculptor whose design had been accepted for the Sir John A. Macdonald Statue to be erected on Parliament Square, Ottawa, has assured the Minister of Public Works that the statue will be ready for unveiling in October.

The expenditure and contracts to date on the new Legislative buildings, at Victoria, B. C., have reached the sum of $686,425, or $89,425 in excess of the limit of cost fixed by the Legislature. It seems probable that another hundred thousand dollars at least will be required to complete the buildings.

The second annual meeting of the Association of Ontario Land Surveyors was held in Toronto, a fortnight ago. The meetings, which occupied two days, were presided over by the President of the Association, Mr. Elihu Stewart, of Collingwood. A number of interesting papers were read and a pleasant time was spent at the annual dinner. The following officers were elected for the ensuing year.—President, Mr. J. Fuller, Napanee; vice-president, Mr. Gaviller, Collingwood; council, W. Chipman, T. B. Speight, V. Sankey, J. McAree, Toronto; H. J. Bowman, Berlin; J. D. Evans, Trenton; E. T. Wilkie, Almonte; H. Winter, Thornyhurst; J. W. Tyrrell, Hamilton; R. Coad, Glencoe, and W. R. Burke; Ingersoll; auditors, M. W. Hopkins, Hamilton; I. Fraynor, Dundalk; H. B. Proudfoot, Toronto; T. H. Jones, Braniford; secretary, A. J. VanNostrand, Toronto.

SOME POINTS ON BUILDING.*

BY JOS. POWER.

In taking this as a subject for a paper, I do not intend to go into any of the many points on which I may touch with any degree of elaborateness, from a scientific point of view; but merely the most salient from a constructional point, and on which so much depends; sometimes—yes often—success or failure.

In proceeding, let us suppose we are going over the requirements of the ordinary every day building. By this I mean one with which we are all familiar. We are consulted as to a building on a certain lot or site; its purpose is named. Consider well the surroundings (if of a permanent nature), the style of design best fitted for the requirements of the proposed building; and no matter for what purpose, let it speak for itself as far as practicable. By this I mean, let your design give the ordinary passer-by an idea of its use—not by ginger-bread ornament and signs, but by character and treatment. Let a "wholesale" be a plain, heavy, substantial looking building; a bank, a massive building of refined treatment; a school, plain and substantial; a collegiate, college or other public building, classic or of classic feeling, plain, neat and substantial; the public building, with broad and lofty open portal, or other entrance, simple in treatment and decoration. And, above all, let a church be a church, a model of perfection, perfect in every detail and without sham.

All this you will say is a matter of cost and seldom to be realized. Admitted, to some extent, it is; but work and advise to that end, and if then it cannot be got, do the best you can, always bearing in mind that what you do must be substantial, even if perfectly plain, and if this cannot be done with credit to yourself, better have nothing to do with it. But in most cases you can advise and prevail that more money be put in it; or the building cut down so that it may be fairly well done for the amount available.

Your design being satisfactory, see that the foundation is good—if not the rock,—that your footings are good, of large stone flags and cement, piles and steel beams if necessary. The drainage being properly provided for from a sanitary standpoint, see that it is so put in, first that the intended grade and no more is taken out, or if by chance it should, that it is made up with broken stone. Do not depend on earth, even if tamped in. Next see that the pipes to be used are of the best salt glazed, and without blemish, laid with tarred rope of sufficient size to just fill the space or difference in size between pipe and fosset, tamped well up to the shoulder of fosset. Throw your level over them to be positive that there are no low spots; then have them well blocked under with stone, to prevent rolling. They may now be cemented. Try an occasional joint by passing your knife into the cement, to know that the rope has been tamped well to the shoulder of the fosset and be most particular that they are cemented all round, especial attention being given to the under side, and if satisfactory they are now ready for filling, which, however, should not be done until the cement is dry; then fill carefully with clay well rammed to the top of the pipes.

The masonry is probably the next to require our special attention, as too many, especially when building coursing or ashlar, will give you two very poor walls where but one is required by building up the face to as much as two feet before backing it up and bonding over. This should not be allowed for at most more than one foot, and then it should be well bonded.

See that all joists have 4½ bearing, and are cut back that not more than two inches are in the wall at top edge.

When partitions are over one another, let the studs of the upper come down on the head of the lower and thus save settlement by shrinkage of joists and breakage or cracking of plaster in angles, to some extent. Where partitions meet walls have first stud well spiked to walls.

I will now pass on to the question of plumbing, one I need hardly state of the most important to the profession to-day. In laying down your system, avoid placing the pipes against outside walls, burying them in cement or behind plaster as far as possible. The soil pipe or drain should be of medium iron, well coated inside and out, with brass cleaners, whereby to remove any chance stoppage which might take place by the introduction of foreign matter, for such things will occur, even under the best of management. Introduce fresh air, if trap can be got 12 or more feet from building, or where there are no windows over, and run pipe through and well above roof, enlarged to prevent stoppage by hoar frost. Before fixtures are set, have openings plugged and system tested by filling with water. Vent all traps with pipe of same size into standing vent. Have all fixture connections made with brass and rubber, and all lead joints properly wiped and gasketed, funnels run and caulked to cast pipes. After fixtures are set, subject the whole system to a second test of either smoke or oil of peppermint. In short, have it done in the best possible way; put in no more than what is really necessary and can be done in a thoroughly sanitary and substantial way.

Mr. Blue, of the Ontario Department of Mines has lately been inquiring into the existence of clay suitable for the manufacture of vitrified brick, and reports that there are large deposits of such clay available.

* Paper read at the fifth annual convention of the Ontario Association of Architects.

WINNIPEG.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER).

As the season advances rumors of "costly" and "beautiful" buildings like "the flowers that bloom in the spring" fill the air with a sweet aroma, refreshing to the souls of the weary waiting who cannot but rejoice when they see the clouds are breaking, and the shadows of hard times disappearing before the rising sun of brighter days.

Plans were prepared last year for the new St. George's church, providing for a frame building on stone foundation, but the congregation have decided to build a higher basement arranged with a large sunday school room, class, vestry and furnace rooms, and to build the superstructure of frame and brick veneer. The style to be gothic treated in a quiet manner.

The tenders of the Wesley College building were received on the 7th instant, and the amounts of some of the bulk tenders were less than $75,000 the sum appropriated for its erection. The building no doubt will be built above grade line, with Calgary stone, which is grey in color with a granite tint, very soft when first quarried, but becomes harder after being exposed to the air, is easily worked, and after allowing for the long haul, can compete successfully with our local lime stone, which is of a hard; flinty nature, and difficult to split or cut.

This country is seldom without a railroad or two looking for financial assistance from the government, and from any one else who is willing to give it. The Hudson's Bay Railroad was such a fizzle, and saddled the province with such a heavy debt, for which it has nothing to show, that the government are wisely cautious in not granting aid to any but gilt edge enterprises. The latest is he "South Eastern Railroad" to run from the city to the Lake of the Woods, with a prospect of forming a connection there with another railway to Port Arthur, thus giving a line to Lake Superior independent of the C. P. R. The promotors of the S. E. are interested in the lumber mills at Rat Portage, Keewatin, &c., and they state that should this railroad be built, all the lumber mills now at the Lake of the Woods will be removed to Winnipeg, which would be very beneficial to the city in many ways, reduce the price of lumber, and provide the market for the slabs and saw dust, which have now to be got rid of by burning in furnaces specially built for that purpose at a cost of about $5,000 each.

The Scotch pasttime, the roaring game of curling, which has been "running" this country every winter for the past four or five years, has caused buildings of a new style to spring into existence, and while they are now put together in a rough and ready manner, no doubt if the curling fever continues and the several clubs grow richer, a higher style of architecture will be demanded, which will develop and become as characteristic of the purpose as the buildings erected for other kinds of amusement.

We have here in Winnipeg, in the new Court House addition erected the past year, an excellent illustration of the old adage "great minds think alike" for the resemblance of this building to the Court House, Tacoma, W. T., is very striking, and shows how two designers miles apart can be inspired with similar ideas. The former Court House, however, is not equal to the latter either in proportion or detail, and has a squat and undignified appearance, entirely out of harmony with its surroundings, and the purpose for which it has been erected.

PUBLICATIONS.

The "Progress of the World" of the *Review of Reviews* is not confined merely to a review and discussion of current political, financial, economic and sociological events. In this department of the March number, for instance, appears a report on the geographical and scientific explorations that have recently been completed, are now being carried on, accompanied by maps and portraits of the explorers.

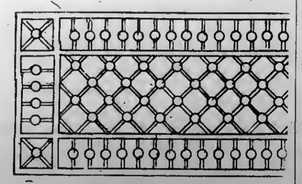
Whites from lead should never be used in water-color drawing. In many of the drawings by the old painters patches of black occur where the high lights were introduced. This is due to the use of white lead.

The New Massey Music Hall now in course of erection in Toronto, is to be opened with a grand musical festival on the first of June At a meeting of the architect, contractors, and the festival board, held a few days ago, it was decided that the building should be completed by the date mentioned.

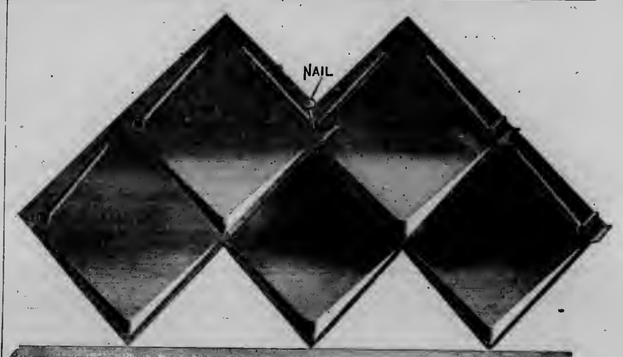
ARCHITECTS and ENGINEERS
APPLY TO
THE NEW COLOR PROCESS CO.
214 ST. JAMES ST., MONTREAL,
for Instantaneous Reproductions in Colors of Drawings and Plans.

IT WILL SAVE YOU . . . . . .
MONEY Copies on Manilla Paper 4c. per sq. foot.
LABOR No recoloring by hand.
TIME We print without the aid of the sun.
ERRORS We give exact facsimiles.
TRACING CLOTH We print direct from originals on paper.
DISSATISFACTION We guarantee uniformly perfect work.
Originals sent from a distance returned with copies same day as received.

ORNAMENTAL
Grille and Fret Work
... FOR ...
DOORS
ARCHES
WINDOWS
AND
STORE
DECORATIONS
Any design to order or designs furnished.



OTTERVILLE MANUFACTURING CO., LTD.
Otterville, Ontario.



DIAMOND TILES

"Empire" Patent Shingles

CORRUGATED IRON.
V CRIMPED AND PRESSED
STANDING SEAM ROOFING
for all classes of buildings.
Hayes' Patent Steel Lath
WRITE FOR PRICES.

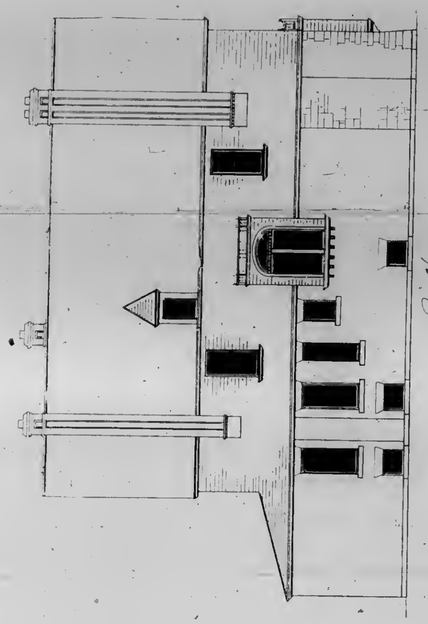
Eastlake Patent Shingles

METALLIC ROOFING CO., LIMITED.
MANUFACTURERS
706 Craig Street, MONTREAL. 82 Yonge Street, TORONTO.

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

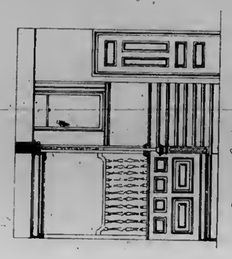
Some Wayside Sketches.

DRAWN BY E. Wilby



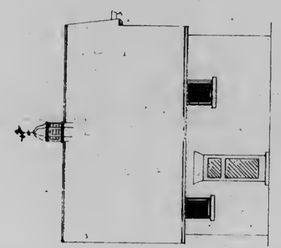
Side Elevation.

Design for a House & Stable. Submitted by Colonel for Canadian Architect & Builder's Comp. June 1890.



Detail of Gallery

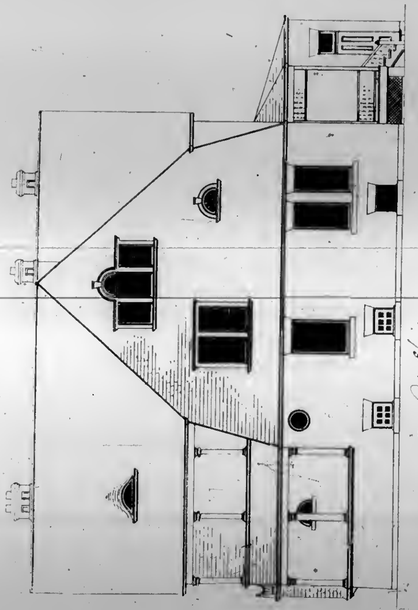
Scale of Feet



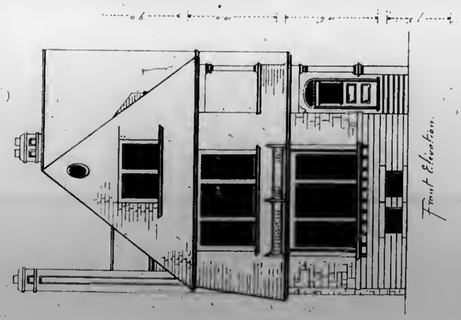
Side Elevation.

Front Elevation.

Scale of Feet

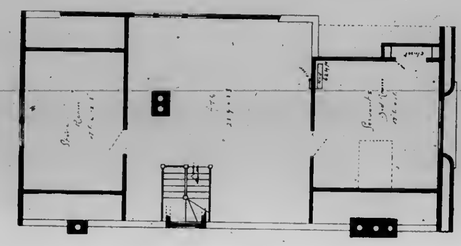


Side Elevation.

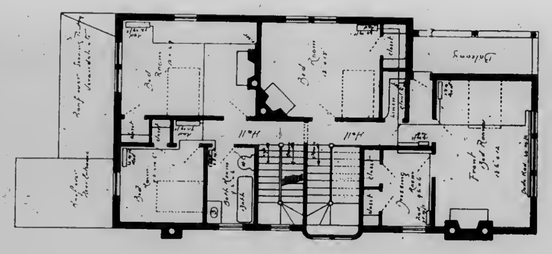


Front Elevation.

Design for a House & Stable. Submitted by Colonel for Canadian Architect & Builder's Comp. June 1890.

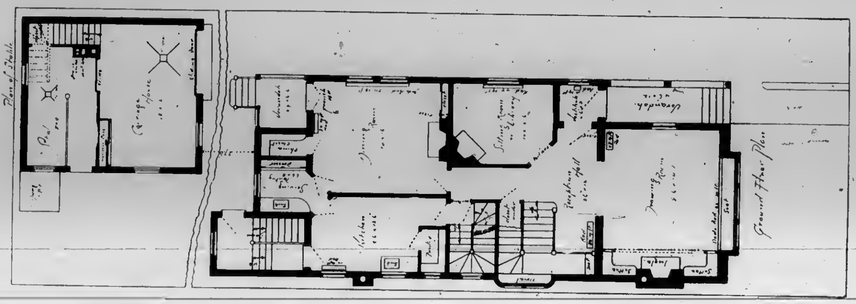


Basement Plan.

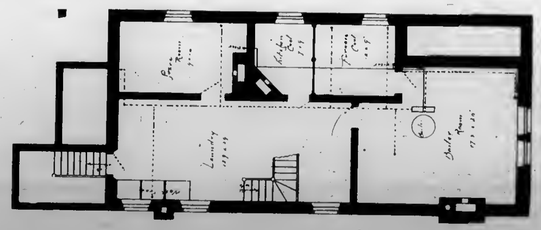


Scale of Feet

Second Floor Plan.



Ground Floor Plan.



Basement Plan.

CANADIAN ARCHITECT AND BUILDER.

VOL. VII.—No. 4. APRIL, 1894 PRICE 20 CENTS $2.00 PER YEAR.

THE
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 15th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITORS ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	EDMUND BURKE, Toronto.
1ST VICE-PRESIDENT	L. E. BELCHER, Peterboro'.
2ND VICE-PRESIDENT	W. A. EDWARDS, Hamilton.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI,	Ottawa.
FRANK DARLING,	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:
W. A. LANGTON — Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	J. NELSON, Montreal.
1ST VICE-PRESIDENT	CHAS. BAILLAIRGE, Quebec.
2ND VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
SECRETARY	JOSEPH HAYNES, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. GENDRON,	Montreal.
J. B. BERTRAND	Quebec.
ERIC MANN	Montreal.
J. VENNE	Montreal.
G. E. TANGUAY	Quebec.

AUDITORS—THEO. DAOUST, J. F. PEACHY.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.	FRED. WAKEFIELD.
WM. PARK, 1st Vice-President.	WM. BOOTH.
GEO. OAKLEY, 2nd Vice-President.	JAS. ISAAC.
DAVID WILLIAMS, Treasurer.	H. LUCAS.
JOHN ALDRIDGE.	JAS. THOMSON
JAS. CRANG.	H. MARTIN.

JOHN L. PHILLIPS, Secretary.

NOTICE OF REMOVAL.

Subscribers and advertisers are asked to note that on the first of May the branch office of the **CANADIAN ARCHITECT AND BUILDER** in Montreal will be removed to the New York Life Insurance Building.

THERE seems to be evidence that building in New York, which was so dull at the end of last summer that many offices closed up altogether, is becoming active again.

WE have received a letter of recent date from a contractor in Vancouver, B. C., containing some practical suggestions, and requesting that more space be given in this journal to such matters as more particularly concern the builder, naming mortars, concrete, stone setting, hoisting machinery, etc. We are now preparing some articles on these and similar lines, and in the course of the year will give our Vancouver friend and his fellow contractors reason to consider our promises in the January number well remembered.

MRS. CORNELIA COSTER, of New York, has died leaving a will which directs that the whole of her estate of a million dollars shall be applied to erecting a sepulchral monument to her memory in Woodlawn cemetery. If these are the terms of the will it will require some agility on the part of the law to sanction such a liberal interpretation as would admit of the erection of some memorial to fill a useful purpose. An exact fulfilment of the instructions would, if carried out in good taste, be a combination of conditions not usually required of architects to keep down the size of the structure without failing to spend the money on it.

THE Citizens' Advertising Committee of Toronto, who have undertaken to watch over the attractiveness of the city, have turned their attention in the right direction in resolving, at their meeting on April 7th, to endorse the immediate improvement of the island lagoons, and the construction of miniature waterways and electric launches. The island is a great natural advantage and boon to Toronto now, and one cannot pass through the lagoons without being impressed with the possibilities of further development. But, in dealing with an opportunity of this kind, so much depends upon treatment that it is to be hoped that whatever body takes the matter up will take good advice. It is only an artist who can improve on Nature by studying her effects and giving her improved opportunities to produce them. It would be easy with a crude idea conceived chiefly on paper, to make of the island a place less attractive than it is now in the beauty of its partial wildness.

THE lecture on "Current Architectural Styles" recently delivered in the hall at the School of Practical Science, Toronto, by Mr. Helliwell, and published in the CANADIAN ARCHITECT AND BUILDER last month, has received much favorable comment. Our attention has been called, however, to a peculiar omission from the examples of recent work shown on the canvas to illustrate the lecture, and the names of architects whose work is worthy of study, viz., that not one Canadian architect was mentioned nor a single view of Canadian work shown. This omission was the more noticeable from the fact that a large number of contemporary English and American architects were mentioned and recent examples of their work shown. Whatever explanation there may be to offer for the omission, we would suggest that it was hardly fair to the architects of Canada and their work. Perhaps it was owing to the lecturer's

modesty, but if so we would encourage a feeling of more pride and assurance as perfectly justifiable in regard to the work of Canadian architects, who have no reason to discount their work or allow others to do so, and no opportunity should be unused of letting this be understood, whether in Association work, private practice or a public lecture such as the one referred to.—We trust we shall have other lectures of a similar kind, in which we shall see and hear more about Canadian architects and examples of their work.

AN electric launch from the World's Fair has been introduced upon the Grand Canal at Venice and the trial has been pronounced successful. This time it cannot well be said that progress is not an improvement for, apart from the fact that the graceful movements of the electric launch will be more in harmony with the style of Venice than were the steamboats which are to be displaced, the damage to the marbles of the palaces from the contamination of the atmosphere by smoke, which Ruskin deplored, will be removed. The silent progress of the electric launches is also in harmony with the quiet of a city in which there is neither wheel or heop and in which the noise of the little steamboats was an intrusion. But, and here there is another side to the question, the steamboats on account of their necessarily large size, were confined to the Grand Canal (where in truth they have been a great comfort) but a storage battery electric launch can be built small enough to navigate the small canals, and the gondola is in danger. The gondola amply exhibited its inferiority at the World's Fair where it plied over the same ground as the electric launches. But this very inferiority may save it. To those who had seen the gondola at home and watched constantly with increasing delight the ease and rapidity with which it threads its way through the traffic on the narrow canals, the lumbering appearance it presented on the lagoons of the World's Fair was a surprise and disappointment. The apparent speed of the gondola at home turns out to be only relative to the obstruction it meets and the absolute speed of the electric launch may turn out to be too fast. It is perhaps safest to hope that it will, for we know that with the gondola the local flavour which should be present with the architecture, is safe.

ARCHITECTS in all countries will watch with a lively interest the developments in the struggle which the American Institute of Architects are making to bring about a reform in the manner of furnishing designs for United States Government buildings. With the exception of a few comparatively unimportant buildings, the designs for many years have been prepared in what might be termed the Government's machine shop for designs, known as the Supervising Architect's office. The people's money has been lavishly employed for public buildings, and the architects through their Institute show very clearly that many millions of dollars have been expended with the grossest extravagance and to no purpose but that of providing for the needs of political favorites. It is now about ten years since the A. I. A. began the present fight against the existing system. They so far succeeded that in March, 1893, a bill which had been passed by Congress was signed by the President and became law, providing for the opening of government designs to competition. For the last twelve months the A. I. A. have been making strenuous efforts to have this new law put into operation, but so far without success. The bill seems to have been passed without a mandatory clause, and its operation is largely discretionary with the Secretary of the Treasury Department. There has been a considerable amount of correspondence between the present incumbent of that office and the President of the A. I. A., in which some strong language has been used, and the result at this time looks like a deadlock between the government and the Institute as will be seen from the following letter from the Treasury Department to the President of the American Institute of Architects :

WASHINGTON, D. C., March 15th, 1894.

MR. D. T. C. BURNHAM, President A. I. A., The Rookery, Chicago, Ill.

SIR:—Your very offensive and ungentlemanly letter of the 7th instant is just received, and you are informed that this Department will have no further correspondence with you upon the subject to which it relates, or any other subject.

Very respectfully,

(signed) J. G. CARLISLE, Secretary.

The letter from MR. BURNHAM which is characterized by the Treasury Department as offensive and ungentlemanly is written in very plain language and amounts to an expression of the opinion on the part of Mr. Burnham, that while the head of the Governmental Department addressed professes to be in sympathy with the architects and favorable to the new law, he is casting about for excuses to prevent its being of any effect. It is unfortunate that the controversy has been brought to such a conclusion. It may have been injudicious of Mr. Burnham to have written so candidly, but after reading the full text of the correspondence as published in the *American Architect* of the 7th inst., we think he is quite justified in holding the opinion which he has expressed.

THERE are many buildings in our cities built just on the street line or very close to it, and so roofed that dangerous snowslides are of frequent occurrence, and at other times icicles are formed overhanging sidewalks so that if not removed they are a menace to the safety of passers by. A lesser evil, although a very disagreeable one arising from the same cause, is the falling of water from choked down pipes and overflowing eave troughs, in such quantities that people are driven from the sidewalk in places to avoid a drenching. In some cities there are regulations intended to provide for the proper disposal of roof water, but there is not sufficient care exercised for protection from snow and ice. On business streets, or any other, no part of a roof should be constructed in such shape that persons on the sidewalk below would be in any danger of a sudden fall of snow or ice. For dwelling houses the simplest prevention is to keep them far enough away from the street line to insure snow or ice from the roof falling inside private ground. If people wish to risk their own heads or those of callers, by allowing snowslides to make a target of the front steps they may be entitled to that privilege, but the line should be drawn when it comes to endangering in this manner all who are obliged or may happen to pass their property. On business streets where buildings are of considerable height and in solid blocks, showy roof architecture counts for comparatively little, and it would be in the interest of public safety if there were regulations making avalanches of snow and ice from roofs to sidewalks an impossibility. In this climate roofs sloping toward the sidewalk, with cornices and eave trough overhanging the street line, should not be allowed. Whenever there are buildings so constructed and situated that there is danger of the kind mentioned, and we are prepared to point out many such, especially in the city of Montreal, the authorities should compel owners to put suitable snow guards on roofs.

BUSINESS people in all parts of the Dominion have been greatly interested during the past few weeks in the revised schedule of customs duties, as proposed by the government at Ottawa. In many respects the changes are not as great as some would advocate, but it is probable that those who favor the strongest measures of tariff reduction, were they in power, would be obliged to proceed cautiously. Those interests connected with new building work in its various branches will not be directly affected by the new tariff except in a slight degree, as the changes are few and small. In some cases there should be changes where there are none. We will mention only as an instance of this, the item of plate glass, on which the duty is entirely too high. This is an important item among building materials, and as the duty is in no sense protective but all for revenue, the charge of 30 per cent. should be reduced by one half. We will be glad to receive any expression of opinion from interested persons relative to the duty on this or other building materials. An increasing and continued activity among the building trades must come from demands for present necessities which are comparatively easy to estimate, and from a general feeling of strong confidence in the future prosperity of the country. Expectation of new tariff legislation always creates uncertainty and interferes more or less with steady industrial progress. As the extent of cause for this feeling of uncertainty and hesitation is generally magnified to undue proportions, building interests will no doubt be enhanced by the knowledge of what the new tariff is to be, and by the greater confidence it will inspire in the stability of the business of the whole country. Let architects, contractors and all interested in building work keep up united action on any questions affecting their welfare, and which may be entitled to more consideration, legislative or otherwise. In alluding to questions involved in tariff regulations we would urge the most careful attention to the great need for a thorough change in provisions for valuing and collecting duty on imported designs and plans. So far, the result of the operations of the customs regulations in this respect appears to have differed very widely from that which the government intended. This is a matter which concerns not only the architects, but manufacturers and supply dealers as well. Canadian architects are familiar with domestic resources for materials of all kinds, and may be depended on to specify for nothing requiring importation unless in special and unavoidable instances. The relative positions of Canadian and foreign materials and manufactures is reversed when plans and specifications are prepared outside of the Dominion. The more firmly just claims in these respects are pressed the greater will be the respect and business commanded by our own people. On these lines there is still much need for thorough organization and persistent effort.

THERE are now about one hundred and sixty men at work at the new Toronto City buildings, and the number will be increased next month to over three hundred. Mr. Lennox, the architect, predicts that the building will be completed in about three years. An electric hoisting machine, operating a group of three derricks, has recently been added to the plant. As this is perhaps the first attempt to use electricity for this class of work in Canada, the result will be looked for with interest. When steam is superseded by electricity for this purpose, as it no doubt will be in a short time, the general public will appreciate the change through the absence from the streets where large building work is in progress, of the steam, smoke and noise of the old style engines.

ONTARIO ASSOCIATION OF ARCHITECTS.

The examinations of 1893 held in March resulted as follows:—

Final Examinations.—Passed, A. E. Wells.

Second Intermediate.—Passed, J. P. Mac Laren; conditioned, S. F. Smith.

First Intermediate.—Passed, C. J. Burritt, J. A. Heaman, M. White; conditioned, C. P. Band, J. L. Havill, C. P. Meredith, G. E. Stevenson.

THE ROYAL CANADIAN ACADEMY.

The annual assembly of the Royal Canadian Academy was held in Ottawa on the 30th day of March, and was largely attended by members and associates.

On the evening of the 29th the annual exhibition, held in the National Gallery, was opened by His Excellency the Governor-General, a large number of artists, their patrons and friends being present. The president, Mr. R. Harris, read a short address on the progress and aims of the academy, after which the assembly was addressed by His Excellency the Governor-General, and the exhibition declared open.

On the forenoon of the 30th March the last meeting of the Council of the academy for the year 1693-94 was held. At this meeting Messrs. D. B. Dick, of Toronto, and J. Hammond, of St. John, N.B., who had been previously elected as members of the academy, submitted their diploma pictures—Mr. Dick the perspective drawing of the new library for the University of Toronto, and Mr. Hammond an oil painting, "Herring Boats," both pictures being then on exhibition in the gallery. These were accepted, and both gentlemen were admitted to full membership. The Council also resolved to purchase several pictures then on exhibition for presentation to the National Gallery.

The following selections were made, viz., "A Song at Twilight," by F. S. Challener; J. L. Graham, "Across the Sea"; "St. Levan's Church, Cornwall," by F. M. Knowles; "A Brotles Interior," A. C. Williamson; "Bass Rocks," by J. M. Barnsley.

In the afternoon of the same day the general assembly was held, and after the reading of the reports and other routine business the meeting proceeded to the election of two painter academicians, the ballot resulting in the election of Mr. Cruikshank and Mr. Greer, of Toronto.

The following were elected as associates, namely, Franklin Brownell, Ottawa; W. E. Atkinson, Toronto; A. C. Williamson, Toronto; J. L. Graham, Montreal.

The following were elected officers for the ensuing year:

R. Harris, Montreal, president.

A. C. Hutchison, Montreal, vice-president.

J. Smith, Toronto, secretary-treasurer.

H. Langley, auditor.

The following members were declared the Council for the ensuing year: D. B. Dick, J. Hammond, O. R. Jacobi, L. R. O'Brien, T. Mower Martin, J. Griffiths, W. Raphael, T. S. Scott, A. H. Howard, F. M. Bell-Smith, A. D. Patterson, G. A. Reid.

In the evening the members and associates dined at the Russell House, and spent a very pleasant evening together.

It is generally admitted that the pictures exhibited on this occasion surpass in merit, as a whole, those of any previous exhibitions. Great care and judgment appears to have been exercised by the Hanging Committee in making suitable selections from the large number of pictures submitted for their approval. We are pleased to know that a number of the pictures have been purchased by residents of Ottawa, who have thus greatly encouraged the artists in their labors.

ILLUSTRATIONS.

ART INSTITUTE, MOUNT ALLISON LADIES' COLLEGE, SACKVILLE, N.B.—EDMUND BURKE, ARCHITECT, TORONTO.

THE art collection, consisting of some 400 canvasses and 100 pieces of statuary, to accommodate which this building is being erected, is a private collection gathered in St. John, N. B. It was given to the Mount Allison college at Sackville, on condition that suitable buildings be erected. The drawing and painting classes connected with the institution will also be housed in the same building, ample provision being made for a large number of pupils. The studios will be lighted by large windows facing north, while the galleries will be lighted entirely from the roof. The buildings will be faced with a light olive local stone. The decorative panels relieving the walls will be of terra cotta, with medallions bearing the names of noted painters and sculptors. The cost will be about $54,000.

DESIGN FOR A COUNTRY OR SUBURBAN HOUSE—BY "DEMOS."

The house is designed to face south, and it is assumed that the site is such that there is abundance of light and air on all sides. The ground floor comprises parlor, library, dining-room, and kitchen, etc. An alcove, with fireplace, forms a feature in the library, and the verandah suggested forms a valuable addition to the house. Upstairs there are four bed-rooms and a bath-room, besides a small room which would serve for sewing or dressing room. In the attic there is ample space for three bed-rooms and a lumber room.

The regularity and compactness of this plan is such that the house might be heated by a hot air furnace very cheaply and effectively.

The cost of this design in execution is estimated at from $2,500 to $3,000, varying according to local conditions.

ST. LAURENT, ROUEN, FRANCE—FROM SKETCHES BY ANDREW T. TAYLOR, A.R.I.B.A., MONTREAL.

RELIEF ORNAMENT, AND WHERE TO USE IT—ELLIOTT & SON, TORONTO.

THE BATTLE CEMENT WORKS AT THOROLD.

From a special Trade Edition of the St. Catharines Standard, we extract the following particulars concerning the above works, and their founder and present owners:—The extensive quarries covering an extent of forty-four acres, are situated on the east side of the new canal. A steam drill is kept in operation the whole year round, convenient tracks running from the quarries to the kilns, where the burning is done, and is then brought to the mill, situated on the old canal, where it is manufactured. Almost the first introduction of the cement manufactured by this firm was its use in the Victoria tubular bridge at Montreal. It was also used exclusively in the building of the old Welland canal and also in the new Welland canal. It was also extensively used in the construction of the great St. Clair tunnel between Port Huron and Sarnia. Forty hands altogether are employed. The mill is a three-story frame structure, fitted up with all the latest appliances necessary for carrying on the business, and is 150 × 50 feet in extent. The founder of the business, the late John Battle, was born in 1851, in the town of Ballymote, Sligo County, Ireland, coming to Canada in 1842. He settled in Thorold where he lived for half a century, lacking one year. He began life as a day laborer on the canal, but being industrious and frugal he soon accumulated sufficient to purchase a team, and so went on till he became one of the richest men in the district. The sons, Matthew, David, and James, are all natives of Thorold, where they are all highly respected. The latter gentlemen, is freely spoken of as the coming Conservative candidate for the House of Commons.

LEGAL DECISIONS.

William Knox versus Armstrong & Cook, real estate agents, was an action in which William Knox, architect, of Cleveland, formerly of the firm of Knox & Elliot, Toronto, sued in the Toronto Courts to recover $200 for plans supplied to the defendants. The defence set up was that the houses were to cost $3,000, and to be finished by Dec. 1st, 1890, the architects to receive 3½ per cent. The plans they prepared were for houses that would cost $3,500 or $4,000. It was necessary to get new plans and the contract set up, was recinded by the plaintiff. The defence also put in a set off to the effect that Knox owes them on an old contract to buy two lots on Spadina avenue, in 1889, and also, that they hold an unsatisfied judgment, March 20th, 1893, for $202.30 writs which are now in the sheriff's hands. The set-off was put at $318.02. Judgment was given for the defendants.

These United States patents have been granted: Hot water generator for stoves, Aleck Saunders, Goderich; wood carving machine, Aleck Saunders and John Story, Goderich.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

TORONTO INTERNATIONAL EXHIBITION, 1897.

400TH ANNIVERSARY OF THE DISCOVERY OF CANADA BY JOHN AND SEBASTIAN CABOT.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—A suggestion has been thrown out by the Board of Trade of Toronto and by some of the daily papers concerning the above subject, but in such a spiritless way as to make it appear that the prime movers had but little anticipation of a satisfactory result being realized. It has occurred to the writer that the CANADIAN ARCHITECT AND BUILDER, with its wide circulation, is a most excellent medium for arousing sympathy, if not enthusiasm, for the project, and for helping to set the ball rolling.

There are two prime considerations in connection with any International Exposition, viz.:

1. Probable financial cost,
2. Probable financial return,

and these of course may be legitimately subdivided ad infinitum.

With respect to the cost of a prospective Canadian International Exposition—at the outset the fact of the Columbian Exhibition having cost upwards of $33 000,000 all told need not concern us in the least, either as to comparison or as to a final squelcher of the enterprise. The question simply is, are we able to produce an exhibit of creditable pretension that will pay? Let us forget for the moment the recent magnificent and unparalleled display and let us consider the approximate cost for us.

It was certainly thought in most circles that the Paris Exposition, which cost a trifle over $8,000,000, was such a tremendous success that America could scarcely hope to equal it, certainly not surpass it. But the wonder of the world was that the Columbian Exhibition not only equalled the Paris Exposition, but as far surpassed it as Paris surpassed the great exposition of 1851. Now, surely if the centre and pivot of European arts and culture considered the expenditure of $8,000,000 sufficient to startle the world, one-third of that amount would be more than creditable to a nation of five millions or so. Again, if the total expenditure of the Columbian Exposition was in round numbers say $33,000,000, then about one-twelfth part of that would be the amount in proportion to our population. And again, if Canada should expend about the same amount as was expended by Great Britain for the initial exposition of 1851, or for some of the following international expositions, it should and would be considered a very marvellous effort, and the money would more than return to us in many ways as an advertisement alone. The amounts of comparison are as follows, viz.:

One-third the cost of the Paris Exposition, '89.		$2,750,000
One half the cost of Columbian Exposition, '92.		2,750,000
Cost of London Exposition, 1851.	.....	1,450,000
" " Paris "	1855.....	1,700,000
" " London "	1892.	2,300,000
" " Paris "	1867.....	4,000,000

So that looking at either of the above examples of cost, to expend either of which amounts would be sufficient for Canada, the affair does not really assume such formidable and insuperable difficulties as one might have supposed. Take the average of the above as a basis upon which to consider what the cost of a Canadian International Exposition should be, and in round numbers the amount is $2,500,000, and even this amount is more in comparison for us than was $33,000,000 for Chicago, for we have at least a good $1,000,000 worth of buildings and land already in shape, while Chicago had to expend over $4,000,000 for works which we do not need so much to consider, i. e.,

Dredging.....	$ 600,000
Electrical plant.....	1,000,000
Docking.....	268,000
Statuary and fountain.....	725,000
Sewerage.....	925,000
Railway of Illinois Central Railway tracks and other Railway works.....	650,000
Total.....	$4,169,000

and scores of other large amounts. Can this country raise the amount required? and how? and would it be worth while so to do? are the all important questions. Off-hand then, suppose that

Toronto guarantees.....	$ 750,000
Ontario Government.....	400,000
Dominion Government.....	650,000
Other Provinces.....	250,000
Subscription in stock.....	750,000
	$2,800,000

Is there anything out of the way in such a position? The amounts are not gifts, but loans and guarantees. The stockholders would have their amounts returned in full with a dividend—the others probably in full. Supposing the cost of maintenance, premiums, judges, &c., should be say another $1,000,000—this would make a total of $3,500,000, which with our splendid nucleus at Exhibition Park, would carry us through in triumph.

Compare for a moment the extent of ground: We have more area in acres at Industrial Park than had many of the most successful International Exhibitions. The grounds at Exhibition Park may be easily added to so as to make at least 150 acres. Paris, 1867, had about 87 acres; Paris, 1878, had about 100 acres; Paris, 1889, had about 173 acres; London, 1862, Paris, 1855, London, 1857, all less than 25 acres.

Supposing an exhibition to be held in 1897, the works would be in preparation for three years, and Toronto's grant spread over that number of years, or $250,000 a year, would be no heavy burden considering the substantial benefits which would accrue to the city. It can readily be perceived that the above amount would be full enough to provide magnificent and adequate accommodation. Already the live stock buildings are perhaps unequaled on the continent, and with a small expenditure can be permanently made so. The main building ought in any event to be enlarged, and this could be done with advantage by adding T shaped ends in size about 200×125 feet. A large and commanding Liberal Arts Building should find place at the north limit of the park, in size about 800 feet by say 250 or 300 feet, if the ground would allow. If all the small buildings were removed from the space north of the present main building and placed in some other part of the grounds, large new permanent Art and Horticultural buildings could be erected there to take up all the space, or nearly so. Two large buildings ought then to be erected south of the present main building and drive having a splendid avenue or court between them of 250 feet. These large structures would be approximately—for the western one, say 450×150 feet, and the eastern one 450 feet square.

Enlarge the poultry and dog houses so as to be the finest in America, or at least three times their present capacity. Remove the annex to some other portion of the grounds, and add to it by making a part of an H shaped building and with some few other minor additions, it will readily be seen how easily and economically we may avail ourselves of our resources.

It is a matter of great importance and interest to know that 30 or 40 acres additional may at any time be added to this very attractive park at an estimated cost of from $250,000 to $300,000 by building a jetty or pier southward in continuation of Dufferin street for about 1,000 feet and continuing same at right angles eastward for 2,000 feet, then sloping the bank and partially filling in the enclosed area, making artificial lagoons and islands with fountains. The islands would preferably be parallelogram in shape, as being easily formed. The islands and piers would be shaped with cribbing, and upon two of them Marine Exhibition and a permanent Aquarium, also perhaps an Electric Building, could be advantageously placed. The layout of the grounds as suggested, with the new water front with buildings thereon, backed in the high ground with the immense new Main Building, would make a most beautiful view from the lake.

There is really no need to fight shy of such an exposition, either as to considering our inability, or cost, or extent of ground required—for it must also be borne in mind that while no doubt many foreign nations will exhibit, they will not desire to do so so largely in Canada as they did in the United States. Further ground might still be required for concessionaries, and this can also be obtained to good advantage and at small rental by taking a central strip 300 feet wide out of the property north of the railway tracks to King street, which could be let out as a Hive or Midway Baisance if you like, with of course special admission fees, thereby materially adding to the revenue. Access to this would be by a wide bridge over the railway tracks in line with the present main north drive.

The average attendance at Chicago and Paris was considerably over 100,000 per day. The smallest paying attendance for one day at Chicago was 10,701 the largest 729,203.

As Toronto is well situated in the line of travel we might well expect and count on an average attendance of at least one fifth of the Chicago Fair say 21,000 per day, which, with the receipts from the Midway Plaisance or Hive, and exhibition fees, &c., would give a much larger revenue than the calculated expenditure. And even if some extra expense was incurred and all the guarantee was not returned to the corporation and governments, save that the stockholders receive 10 in full with a dividend, what would it matter so long as the great result was a gain to Canada?

The arts and sciences would be stirred as by no other means; many millions would be brought into the country; manufacturers would be helped and more especially would the gain be great for the capital of Ontario. We have a magnificent country, a well governed Christian province, a beautiful city, and if all were well advertised who can doubt what a stimulus would be given to trade.

The result of such an exhibition would not be in the nature of a boom, with the following natural collapse, but a grand stable advertisement, much in the same way as our Industrial Exhibitions, only on a vaster scale: and following Industrial Exhibitions would be enormously helped, having so much more extensive and beautified grounds to operate in. To the painstaking Directorate of the Industrial Exhibition, the Board of Trade, and all others interested, therefore, this article is humbly submitted in the hope that the agitation may be kept up until something solid is produced.

HERBERT G. PAUL.

LETTER FROM THE SECRETARY OF THE NATIONAL ASSOCIATION OF BUILDERS.

166 Devonshire Street, Boston, Mass., April 3rd, 1894.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—Enclosed please find list of such organizations in Canada as come within the meaning of our term "Exchange," as per my records. As to the standing and condition of these organizations I know nothing, their existence is all that comes within our statistics.

The other organizations in our records comprehend associations among architects, plumbers, plasterers, masons, carpenters, painters, lumbermen, steam and hot water fitters, electricians, etc.

I take the liberty of sending you by this mail a copy of my report to the last convention, to correct the statement in your editorial columns, clipping enclosed. You will observe by comparing your statement with my report that there is no foundation in fact upon which to base your observations. There seems to be little room for the implication that we are trying to claim affiliation from the Canadian Association. The "half dozen" you mention as being in affiliation are evidently the result of more incorrect information, as none of your exchanges are connected with our association. Yours truly,

WM. H. SAYWARD, Secretary.

[The list of Canadian organizations to which Mr. Sayward refers in his letter is as follows:

Builders, Contractors and Dealers Exchange of Hamilton, James and King William streets; secretary, William Hancock. Contractors' and Builders' Association, Hamilton, Ont., secretary, C. L. Smith, 177 West avenue north. The Builders' Exchange of London, Ont., Masonic Building; secretary, Herbert Simpson, 814 Dundas street. Montreal Contractors' Association, 99 St. James street; secretary, A. LaPierre, 107 St. Hubert street. Contractors' and Builders' Association of Ottawa, St. Andrew's Hall, Elgin street; secretary, William Northwood, 56 Rideau street. Builders' Association of Rat Portage, secretary, William R. Gerrie, Fifth and Main streets. The Builders' Exchange of Toronto, 16 Victoria street; secretary, John L. Phillips. The Builders' Exchange of Windsor, Ont., secretary, D. Willis Mason.

Several of these organizations, we regret to say, exist in name only. They should be made to form the nucleus of a strong, active and useful Dominion Association or of associations of a provincial character. EDITOR C. A. AND B.]

TORONTO BUILDERS' EXCHANGE.

25 George Street, Toronto, 30th March, 1894.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—In your last issue there appears a letter signed "Material Man," which embodies some reflections on the *esprit de corps* of the Builders' Exchange, and as its anonymity places each of the "supply" members under the possible imputation of its authorship, a general disclaimer may not be out of order. I have written the Secretary of the Exchange calling his attention to the misstatements in the letter. Unfortunately there is no supply section in the Exchange, and this is solely due to the attitude of such persons as "Material Man," who will not frankly approach their so-styled fellow members, but assail the Exchange generally in such anonymous wails to the public as this letter in question contains. The efforts for five years past to form an association have failed owing to the anonymous violations of such conditions as could be agreed upon, and the present anonymous violation of good taste fairly represents the difficulty of combination. Let "Material Man" materialize himself and endeavor to organize his "fellow members." This he cannot do anonymously, nor outside the limits of the Exchange.

Yours sincerely,

ALBERT E. S. SMYTHE.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—In the last issue of the ARCHITECT AND BUILDER a "Material Man" complains of not being fairly dealt with under what he terms regulations of the Builders' Exchange, and calls the attention of the Board of Directors to a matter of which I am sure they know nothing. Being a member myself, I can safely say that there are no such regulations of the Exchange, and therefore it is useless to call the Board of Directors' attention to it. If this "Material Man" is a member of the Supply Dealers' Section, why does he not complain to them or call on the secretary (who is ever courteous), and explain matters to him, and if he has been wronged it will surely be made right. If "Material Man" has such interest in the benefits of membership as he speaks of, he could have those interests better protected by making himself and his wants known at the Exchange than by writing "sore head" letters to the press, for even if such conditions as he refers to did exist the Board of Directors would want something more definite to work on than anonymous letters.

Yours truly,

T. CANNON, JR.,
95 Marion Street, Toronto.

THE COURT HOUSES AT WINNIPEG MAN., AND TACOMA, W.T.

LOMBARD STREET, WINNIPEG, MAN., March 22, 1894.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR, In the March issue of your paper your Winnipeg correspondent does me infinite honor in likening my little court house in this city, costing $70,000, to the edifice in Tacoma, costing—as appears from a telegram I have this day received upwards of $300,000.

Dear me, what a wealth of detail could have been lavished on my small effort for the other $230,000! Even its alleged squattiness could have been obviated.

To quote your correspondents own words, "great minds have the same thoughts." I thank him humbly, very humbly, for his commendation, but I very much fear that, emanating as it does in this instance from an unsuccessful competitor, his opinion is deprived of much of its value.

Trusting to your courtesy in publishing the above letter, I have the honor to remain, your obedient servant,

CHAS. H. WHEELER.

[A portion of Mr. Wheeler's letter has been omitted as being foreign to the matter under discussion, and having a tendency to arouse personalities which contributors to these columns are requested to avoid.—EDITOR C. A. AND B.]

HOISTING MACHINERY.

THERE is probably no non-productive machine about a shop that earns as much, to put the matter paradoxically, writes J. H. Allen in the Illustrated Carpenter and Builder, as the crane. When we see a group of men working until every muscle is strained to the very limit of its endurance in attempting to lift a heavy casting into position on a lathe or planer, all in default of a suitable hand hoist wherewith one man could do the work in one-tenth the time with one-thousandth the actual exertion, we are disposed to look upon the proprietor of that shop as being an old fogey who is so far behind the times that it is a hopeless task for him to so much as make the attempt to catch up.

There is no shop so small, no business so poor, that should not have its complement of cranes and hoists. First of all there should be the self-sustaining hoist with a capacity equal to the heaviest of the probable requirements. When we come to the cranes they may be a simple ring in the ceiling into which the hoist is to be hooked, or the elaborate travelling crane. But for the small shop there are a multitude of simple designs that can be made at a low cost and which will serve their purposes most admirably. The most common is the straight bar, slightly curved up at the outer end, and suspended by a stay to the post, about which it swings. Old railroad iron seems to be the most suitable material for such a swinging jib. It has the advantage over the plain flat bar, in that the head and flange give it a lateral stiffness, so that it is not likely to buckle, and the unnecessary metal which it contains receives a compensation in the very low price at which it can be bought. Such a jib can be hung to a post or to the wall; the only care that need be taken is that the horizontal pull should be carefully calculated, so that it may not exceed the resistance of the wall and pull it down. It seems superfluous to call to the attention of our readers that the greater the distance between the point of attachment of the upper end of the stay and the heel of the jib, the less will be the horizontal pull on the wall.

Sometimes, however, there is no post or pillar near at hand, and the jib must be held by its own swinging post. Belts and machines may be thickly strewn around, and yet when the trolley cannot be made to serve, the swinging jib crane can usually be worked. It goes without saying that there must be some space in the floor and the ceiling above for stepping and fastening the post. So we first locate this, and then proceed to put in the longest jib that will swing over the desired arc and clear the belts. Of course, this is not long enough to pick up our work and put it where we want it; so we devise an extension jib. This can be done by building our main jib in two parts and carrying a set of rolls flush with the bottom and top, and running our extension between the two parts, and taking the upward and downward thrusts on the rollers. If they are well put up and kept level, one will be surprised at the ease with which the heavily-loaded extension can be worked in and out, and the load swung in and around the belts, that at first sight would seem to preclude all possibility of the use of a crane.

When we pass beyond the domain of the simpler tools, it is doubtful if it will pay any proprietor to construct his own hoisting tools, unless he does it to keep his men busy in a dull season and to avoid breaking into the efficiency of his working force.

If the need arises for a peculiar construction of crane for doing a special piece of work, it is probable that someone has had the same need before, and that the shop of some crane builder will have the pattern to furnish just exactly what you want. The height of hoist, the weight to be hoisted, and the power available can all be combined, and the result will be a tool especially suited to your wants.

The first travelling crane with which we had to do was one of our own designing, and of home manufacture. Its capacity was ten tons, and its span 40 ft. A railroad shop received the benefit. It was operated by hand, it moved slowly, and the general manager thought it no good. But when he learned that with this infant the time required for putting a cylinder on the planer was dropped from an hour and a half with four men to five minutes with two he looked interested. When the time of taking an engine cab from its place and putting it on the painting scaffold was cut down from three hours to twenty minutes, he ceased to gibe at our little tool made of four by six pine sticks; and when he saw a boiler come travelling down the shop far above the impediments of the floor, he owned the tool to be a handy one, and before it had been in the shop a year, he OK'd a requisition for a power tool that would lift thirty tons and cost a very pretty penny. Such is the educational influence of small things.

WATERPROOF WALLS.

A USEFUL little brocure entitled "Szerelmey and Walls," says Building News, describes the cause and cure of damp and decay in masonry. The rationale of dampness in walls is interestingly illustrated by two experiments. The proportion of water soluble in air increases with the temperature, and thus it happens that when the air is cooled, being unable to hold the water it did when it was warmer, dew or mist is formed. A damp atmosphere is really present when the air cannot hold in solution the water it contains. Then there are some substances like chloride of lime, which have a great attraction for water, and withdraw from the air the moisture it contains. Walls of absorbent materials are always damp, even in a comparatively dry air. With the varying state of the atmosphere, moisture is continually passing in and out of stone, really causing disintegration of the particles. As most of our readers know, Szerelmey's process was, after a long series of tests, and on the report of experts—amongst them Professor Faraday, Sir Roderick Murchison, Sir Charles Barry, and others—unanimously pronounced the best, and was tried on the Houses of Parliament. The ashlar walls of the Speaker's Court, to which the process was applied more than a quarter of a century ago, are in good condition. In 1875 the Szerelmey process underwent revision, and a new product, called "Szerelmay Stone Liquid No. 101" was introduced, and the older compositions are no longer made. By interposing a waterproof layer or coat between the wall and the source of damp, the water is arrested. An internal treatment is useless; so are substances which chemically combine with the masonry, or injure the stone. Ample evidence is accorded which shows that the liquid can be used for porous stone, brick, plaster, and similar walls. The stone liquid is laid on the outside of the wall with a common brush by any painter, and it sinks easily into the wall and waterproofs it. It is first stirred, then rubbed on, and Szerelmey's steel-wire brush is recommended. This stone liquid has now been in use for 18 years, and the reports appended numbering so, selected from scientific men, the clergy managers of public companies, architects, builders, and painters show the efficacy of this remedy, which has been established by the test of time.

STUDENTS' DEPARTMENT.

"CANADIAN ARCHITECT AND BUILDER" STUDENTS' COMPETITION.

SEVERAL additional designs have been received in this competition. In a number of instances, however, students have expressed dissatisfaction with the proposed method of deciding the competition, and in the case of some this objection was so strong as to prevent them from taking part. In view of this, it has been thought desirable to abandon the idea of deciding the competition by a vote of the students, in favor of the method heretofore pursued in competitions of this character. The designs submitted will therefore be referred to a commitee of three architects to be selected by the Toronto Architectural Guild, who will adjudicate upon them, and whose report thereon, together with the design that shall be given first position, will be published in the May number of this Journal.

In this connection, will the author of the design with the nom de plume "Toledo," kindly forward his name and address to this office, in order that he may be entered on our list of subscribers, and the subscription which he forwarded placed to his credit.

INTERCOMMUNICATION COLUMN.

This column is intended to afford a means of correspondence for students, builders, and all our readers desiring information they cannot otherwise obtain. Questions for which an immediate reply is required should be marked "Urgent." Names and addresses of correspondents must be sent with their communications, but these may be signed with initials or otherwise for publication.

QUESTIONS.

[14]. Would it be safe to build a chimney of a factory of sandstone? The height would be probably 200 feet. Is the stone strong enough not to crush in the lower courses?—ASPIRANT.

[15]. Could you solve for me this problem in foundation work? The site for the proposed building is half limestone and half clay. The limestone crops out at an angle, roughly, of 45°, and the clay seems to lie on the tolerably smooth side of the limestone. So far as I have been able to test the formation there does not appear to be any ledge on the limestone which would serve to hold the clay; none at any rate for a depth of 20 feet. I fear lest the clay should slide on the limestone with the weight of a building. What kind of a foundation ought I to use?—PREDICAMENT.

[16]. What is the weight of snow in a slushy condition? How much extra weight ought to be allowed for in the construction of a large flat roof in addition to the ordinary allowance for snow, where it might be difficult to get the snow off before it thaws? FROSTY.

[17]. Is there any rule, or where could I find a rule, for making a sun-dial? I think an answer published in your columns would tend to make the sun-dial more popular.—J. L. T.

[18]—1. Will you kindly let me know if there is such a thing as a durable paint by means of which brick could be given their natural whitish colour, and if so, should the brick be rubbed level before the paint is put on? 2. What paint should be used to blacken the mortar used occasionally in putting up brick buildings.—CHARLES SCHURLER, Mildmay, Ont.

ANSWERS.

[9]. "Budding Architect"—Here is a suggestion: 1. "Ferguson's Hist. of Architecture," Students' Edition; 2, "Notes on Building Construction," S. Kensington, latest edition; 3, "Building Construction," Clarke; 4, Binns' "Orthographic Projection"; 5, Paley's "Mouldings"; 6, Gwilt's "Encyclopedia."—OLD BOY.

[10]. J. B. M.—It would hardly be possible to give an answer to your question which would be certain to answer; the only way is to try one or two remedies. Coal tar, applied with a large flat brush, boiling hot, in two or three coats would probably waterproof the stone sufficiently. Boil two or three gallons at a time and set it alight when boiling. Stir continually while blazing. This will reduce the volume, and as it cools it becomes pasty, in which condition it is ready for application, but it must be boiled up for use.

[11]. My suggestion of a "reading club," or "circulating architectural journal club," or whatever it might be called, has not apparently met with a favorable reception. I should have suggested such papers as The Building News, The Builder, and such papers as are not regularly taken by the principals in our offices, but unless there is in next issue a demand for such a "club," I shall drop it. The expense need not be more than a dollar per member.—G.

[12]. A simple and thoroughly effective way of preventing the rushing of snow off a roof is the placing of iron hooks at intervals of 4 feet all over the roof in rows about 2 ft. or 3 ft. apart. These hooks hold up the snow so that it thaws gradually, and when it slips, it does so in sections, which make little noise and fall lightly.—B. X.

[8]. "Architect"—The answer given by "Architectus" to your question on "telling good cement from bad," is not satisfactory, the methods he suggests being too crude and out of date. Use cement of home manufacture, then you can get at the maker if they are not as satisfactory as represented. "Faiza" on the manufacture and use of Portland cement is a work you should read.

ANS.—[18.]—1. Do not rub the surface of brickwork before painting, except with a dry brush to remove dust or loose dirt. Good lead and linseed oil paint will be the most durable for the kind of work mentioned. The best color effect will be obtained by a practical painter mixing the tints to suit the condition of the work. This will vary with different bricks and locations: First coat with pure oil or very little color, followed by two coats in the ordinary way. 2. For mortar color the only safe thing is to use one of the best brands of the manufactured article, which may be obtained from firms whose names will be found in our advertising pages.

USEFUL HINTS.

RESIN is utilized for making the varnish used by Venetian blind manufacturers for painting their blinds. This varnish is mixed with the desired color, mostly green, and when painted gives a hard gloss enamel surface.

Radiation of heat is diffusion of heat by projection of it into right lines into space, from a body having a higher temperature than space surrounding it, or body or bodies enveloping it.

In painting houses situated at the seaside, a good deal of trouble is frequently experienced because of the action of the salt and fog upon paint, especially when it is first applied. A practical painter recommends that no paint shall be applied to work situated at the seaside until the sun is well up, in which case the wood will have had a chance of getting dry. Ochres or earth paints should not be used for priming as they are likely to be attacked by mildew, especially where boiled oil is employed as the vehicle.

Animal and vegetable substances with fine fibres, such as air, cotton, felt, wool, fur, are the slowest or worst conductors of heat, owing chiefly to their interstices being filled with air, which is a still worse conductor. Wood, sawdust, chalk, sand, stone and brick are slow or bad conductors of heat. Brick work, of either common brick or fire brick, is a bad conductor of heat. Non-conducting coverings, for preventing radiation from steam pipes, steam cylinders and steam boilers, are composed of materials which conduct heat slowly.

The painter is often credited with a great deal of the shortcomings of the carpenter, and this fact renders all contracts for painting more or less uncertain. A price may be given in that would yield a profit if the paint were applied to properly finished work, but when it is applied to wood that is knotty and sappy, or full of cracks and holes, it of course has to be made good before the paint can be put on, and this means considerable labour and expense. Such defects are more likely to occur in cheap work than in high-class work, so that in estimating on inferior jobs it is always well to leave a broad margin to cover such items.

The best method of comparing two samples of pigment together for tint and brilliance is as follows:—Procure two glazed porcelain tiles, one black for whites, pale yellows, greens, and pale colours generally; the other white for blacks and dark colours generally. A little of the sample is taken upon the point of a pallete knife and placed on the tile, and a similar quantity of the "standard" samples taken and placed close to the sample on the tile; the two heaps are then pressed by means of the knife so as to obtain a flat, smooth surface on the samples, and by holding them up nearly on a level with the eye and looking along the surface of the heaps of colour; by these means any difference in the shade of the two samples can readily be detected.

In a paper on the purification of the air in public buildings and dwellings, read before the Society of Arts by Mr. Wm. Key, an apparatus was described for filtering and washing the air. It consists of a screen formed by stretching some thousands of cords of suitable material from the ceiling to the floor of the air chamber. The cords touch each other and are interlaced horizontally with copper wires, which are drawn tight to give the screen a flat surface, so that it has the appearance of coarse cloth. Air passing through is broken up into minute streams, and is washed free from impurities by water trickling down the cords. Experiments showed that not a particle of the densest fog passed through the screen, the air being filtered "bright and clear, perfectly sweet, and free from odor." Dust particles were not so perfectly removed, but it was noticed that after removal of fog, the air was so much brighter and clearer than usual as to suggest that the artificial production of fog might ensure the complete removal of very minute dust particles.—Scientific American.

The effect of different beds in making compression tests of stone has been investigated by Prof. Malverd A. Howe, of the Rose Polytechnic Institute. Cast iron, soft pine, sole leather, sheet lead, and tar board were tried, and the results indicate that to obtain the best idea of the comparative strength of stones, the specimens should be cut with perfectly parallel plane ends and tested between parallel iron or steel plates. As this calls for considerable labor and expense, other materials may be used, but the results were not accurate. Sheet lead seems to distribute the pressure well, but lowers the strength, as registered, by an undetermined amount, depending on the structure of the specimen. Pine splits so easily as to be undesirable. Tar board was found to distribute the pressure very well, but raises the registered strength of the specimen; in spite of this defect Professor Howe believes it to be the most reliable bed for commercial tests of the five materials examined. This conclusion is based upon but 80 experiments, but is considered warranted by the uniformity of results and conditions.

CHARACTERISTICS OF VARIOUS WOODS.—It has long been known that certain woods possessed capabilities fitting them for particular classes of work; but a concise table of collected data on this point will be found useful. The woods noted for elasticity are: Ash, hickory, hazel, lancewood, chestnut (small), yew, snakewood. Elasticity and toughness: Oak, beech, elm, lignum vitæ, walnut, hornbeam. Even grain (for carving or engraving): Pear, pine, box, limetree. Durability (in dry works): Cedar, oak, poplar, yellow pine, chestnut. Furniture: Beech, birch, cedar, cherry, pine, whitewood. Best Furniture: Amboyna, black ebony, mahogany, cherry, maple, walnut, oak, rosewood, satinwood, sandalwood, chestnut, cedar, tulipwood, zebrawood, ebony. Building (ship-building): Cedar, pine (deal), fir, larch, elm, oak, locust, teak. Wet construction (as piles, foundations, thames, etc.): Elm, alder, beech, oak, plane-tree, white cedar. House building: Pine, oak, whitewood, chestnut, ash, spruce, sycamore. Machinery and millwork (frames): Ash, beech, birch, pine, elm, oak. Rollers, etc.: Box, lignum vitæ, mahogany. Teeth of wheels: Crab-tree, hornbeam, locust. Foundry patterns: Alder, pine, mahogany.—Illustrated Carpenter and Builder.

The death is announced of Mr. Thomas Cuthbertson, the well-known architect, of Woodstock, Ont., which occurred about a fortnight ago.

WINNIPEG.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The Provincial Government have decided to erect a new Court House at Portage la Prairie, and build an addition to the jail there. Mr. George Browne, architect, has charge of the work. The buildings are to be of local brick, on stone foundation, with trimmings of Calgary stone, and heated with hot water. The present court house was erected in the early days, and is now in a very dilapidated condition as well as inconveniently situated, being at the extreme east end of the town, some distance from the business portion, owing to the latter having moved west after the fire swept the then business centre a few years since.

Building promises to be brisk in the "Portage" this summer, for besides the above buildings, there are to be erected two brick school buildings, a large store for the Hudson's Bay Company, and a post office as well as several residences. Mr. Smith Curtis is at the head of an excellent scheme for widening the water power of the Assiniboine river, and turning the useless slough into a useful lake which would make the town a favorite summer resort, and provide a delightful place of retreat for the weary worker.

The fine weather we have been enjoying the last week or two, has helped to stimulate one another into good works, or at least to project them, for parties who propose building, are now rushing their plans forward, in order to have the contracts let before there is a rise in prices, which is supposed will take place as soon as the season opens up.

If an arrangement can be made with the Dominion Government for the support and education of the deaf and dumb, of the Territories, they will be brought there and the deaf and dumb building will be enlarged to accommodate them, an appropriation of $10,000 having been made for that purpose at the last session of the Provincial Legislature.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Messrs. Dunlop & Heriot, architects, have designed for St George's church in this city a new and graceful tower to be over 100 feet high and in the perpendicular style, detail in the early decorated style to which the church belongs.

The Hon. Mr. Nantel, Minister of Public Works for this province has instituted an action for $10,000 libel against a weekly paper of Quebec which insinuated that the expenses of his present trip to the Holy Land were being defrayed by the contractors of the Montreal Court House.

It was recently enacted by the Legislature of this province that every advocate, notary, physician, dentist, land surveyor, civil engineer, veterinary surgeon, artist, painter, musician, sculptor, and architect, practising his profession within the limits of the province, shall pay an annual tax, the amount whereof shall be that indicated in the following tariff:—If he has his principal office or place where he exercises his profession: *a*. In the city of Montreal or Quebec, six per cent. on the rent or annual value of such office or place; *b*. In any other city or town, $6; *c*. In any other municipality, $3.

The following requirements for specifications for concealed incandescent wiring in houses under construction have been adopted by the Montreal Electric Club, and are recommended for use by Canadian architects:—

1. All wire used must be rubber covered and equal to either Habirshaw, Grimshaw or Bishop.
2. No gauge smaller than No. 16 B. & S. shall be allowed to be used.
3. Wire for 52 volt current, on two wire principle, loss not to exceed two per cent.
4. All joints to be well made and properly soldered, and shellaced, covered with a layer of rubber tape, also with an outer covering of good black friction tape.
5. Place necessary cut outs as required by Board of Fire Underwriters rules, the same to be on slate or porcelain bases and double pole.
6. Where wires pass through walls and floors they are to be protected by an extra covering in the shape of a durable and moisture proof insulating material, excepting soft rubber tubing, equal in thickness to the insulation on the wire.
7. Where wires run along ceilings and walls, they must be kept at least two and one-half inches apart; where passing through holes in the walls and flooring, each wire must have a distinct hole for itself.
8. All speaking tubes, gas pipes, and metallic substances of like nature are to be avoided, but where it is necessary to cross same, the wires must be bridged over with wood or hard rubber tubing. If the pipe is for hot water or steam, an air space of at least 4 in. is to be allowed between wires and pipes. All wires crossing water pipes should pass over said pipes if possible or be protected from drip.
9. Outlets for single pole switches may be left where there are not more than 8 amperes to be controlled; where there are more than this quantity the outlets must be arranged for double-poled switches.
10. No staples or metallic fastenings will be allowed for holding wires in place.
11. Outlets must be taped when passing through plaster.

Place outlets as follows:

The Electric Club in a circular to architects, add the following by way of suggestion:—

We might also suggest that electric work (even electric bells) be placed on a separate tender. This will not stop any reputable plumber, who does electric work, from tendering on either electric light or electric bell wiring, whilst it will stop subletting the electric bell work or electric light work, thus causing a double profit to be added to same by those plumbers who do not. The above remark we have thought in season seeing that it is customary with some architects to place electric bell and annunciator work, and sometimes electric light wiring, even, in the regular plumbers' specifications along with gas and steam fitting.

PUBLICATIONS.

"The Progress of the World" of the April Review of Reviews contains a timely discussion of the question why the English game of politics is more exciting than the American game. Other topics are, the Seigniorage bill, filibustering in Congress, the outlook for bimetallism, the Wilson bill in the Senate, the Senate report on Hawaii, the triumph of the Brazilian republic, the fight against the House of Lords, the Russo-German commercial treaty, the death of Louis Kossuth, and many matters of international interest.

A siccative material is any compound which, added to linseed oil, either hot or cold, hastens its drying qualities, which are naturally slow, and renders its use in painting and varnishing practicable and efficient. Liquid drier is simply a concentrated boiled oil. The most reliable form of drier is a compound of bases having the property of several oxides and series of salts.

QUEBEC MECHANICS' LIEN ACT.

On the 8th of January last the Legislature of the Province of Quebec gave its assent to the following amendments to Chapter 46 of 57 Victoria, relating to the privileges of builders, labourers, workmen and suppliers of materials, which are here printed for the information of contractors doing business in Quebec.—

1. Paragraph 7 of article 2069 of the Civil Code is replaced by the following:

"7. The claim of the labourer, workman, supplier of building materials and builder (chief contractor), subject to the provisions of articles 2013."

2. Article 2013 of the said Code is replaced by the following articles:

"2013. The labourer, workman, supplier of building materials and the builder (chief contractor) have a right of preference upon immovables, to the amount of the increased value given by the work done or materials furnished, over any other creditor except the creditor having one of the privileges mentioned in the first six paragraphs of article 2009 (1) and shall further have a preference over all chirographic creditors upon the said immovables.

"2013*a*. The privilege of the labourer, workman, supplier of the materials and builder (chief contractor) ranks as follows:—

1. The labourer;
2. The workman;
3. The supplier;
4. The chief contractor.

"2013*b*. The right of preference or privilege upon the immovable exists as follows:

1. Without the registration of the claims in favor of the debt due the labourer, workman, supplier of materials and the builder (chief contractor), during the whole time they are occupied at the work or while such work lasts, as the case may be; and with registration, provided it be registered within the thirty days following the completion or the cessation of the work;

2. But such right of preference or privilege shall exist only for two years from the date of the registration, unless a suit be taken in the interval, or unless a longer delay for payment has been stipulated in the contract.

"2013*c*. The preservation of the privilege is subject to the following conditions:

1. The labourer and workman must give notice, in writing, or verbally before a witness, to the proprietor of the immovable, that they have not been paid for their work, for each term of payment due.

Such notice may be given by one of the employees in the name of all the labourers or workmen who are not paid.

2. The supplier of materials shall, before delivery of the materials give notice in writing to the proprietor of the immovable, of the contracts made by him for the delivery of materials, and mention the cost thereof and the immovable for which they are intended.

3. The sub-contractor shall, within eight days from the signing of the contracts, also inform the proprietor or the *bailleur de fonds*, of either of them, as the case may be, or his agents, of the contracts he has entered into with the chief contractor.

"2013*d*. In order to meet the privileged claims of the labourer, workman and supplier of materials, the proprietor of the immovable may retain an amount equal to that which he has paid or will be called upon to pay, according to the notices he has received, as long as such claims remain unpaid.

"2013*e*. In the event of a difference of opinion between the creditor and the debtor with respect to the amount due, the creditor shall, without delay, inform the proprietor of the immovable, by means of a notice which shall also mention the name of the creditor, the name of the debtor, the amount claimed and the nature of the claim.

The proprietor retains the amount in dispute until notified of an amicable settlement or a judicial decision."

3. Article 2103 of the said Code is replaced by the following articles:

"2103. The privilege of the persons mentioned in article 2013 dates, in the cases mentioned in paragraph 1 of the article 2013*b*, only from the registration, within the proper delay, at the registry office of the division in which is situated the immovable affected by the inscription of a notice or memorial drawn up according to form A, with a deposition of the creditors sworn to before a justice of the peace or a commissioner of the Superior Court, setting forth the nature and the amount of the claim and describing the immovable so affected.

2. In registering such memorial, it is sufficient to mention, opposite the official number of the cadastre which describes the immovable, if the cadastre be deposited, or opposite the title of the registered deed, if the cadastre be not yet deposited, the name of the claimant and the amount due at the time the memorial is filed.

3. The memorial shall be made out in duplicate, one copy of which shall remain in the archives of the registry office and the other be delivered to the creditor with the registrar's certificate thereon.

4. The creditor shall, within three days from the registration of the memorial, give a written notice to the proprietor of the immovable, or to his agent if he cannot be found.

"2103*a*. The sale to a third party by the proprietor of the immovable or his agents, or the payment of the whole or a portion of the contract price, cannot in any way affect the claims of persons who have a privilege under article 2013, and who have complied with the requirements of articles 2013*a*, 2013*b*, 2013*c* and 2013 of this Code."

4. All articles of the Civil Code inconsistent with the provisions of the Act are repealed.

FORM A.

Form of notice or memorial.

A. B. (*name and residence of claimant*), do hereby declare that I have worked upon the immovable of (*name of the proprietor*), at the following works (*nature of the works*), (or I have supplied, *if he be a supplier, etc., as the case may be*) since (*give the date*); that the amount due me is (*amount of the claim*); that the immovable on which I have worked is described as follows: (*Number of cadastre or description by metes and bonds as much as possible.*)

Sworn before me, this day of 18 | (*Signature*) A. B.

C. D., Justice of the Peace.

(1) PRIVILEGES ARTICLE 2009 of the CIVIL CODE.

1o. Law costs and the expenses incurred for the common interest of the creditors.
2o. Funeral expenses, such as declared in article 2003 (that is limited to the station and means of the deceased) when the proceeds of the movable property have not proved sufficient to pay them.
3o. The expenses of the last illness, such as declared in article 2003, and subject to the same restriction as funeral expenses.
4o. The expenses of tilling and sowing.
5o. Assessments and rates.
6o. Seignorial dues.

THE HARMONY AND FUNCTIONS OF COLOUR IN ART. *

By Andrew T. Taylor, A.R.I.B.A.

The love of colour is natural to man. All savage and barbarous peoples have in common the love of bright colors. Pioneer traders and explorers in Africa and in the South Seas, knowing this, always take care to supply themselves with gaudy calicos and bright coloured beads for purposes of gifts, or of barter. A child is attracted by colour perhaps more quickly than by anything else. It is only as we emerge out of childhood whether of the individual or of the nation we become more fastidious in our harmonies of colours.

Imagine if you can all colour taken out of the world, we would still have the same beautiful shapes which are lavishly strewn around us in mountain and valley, in tree and rock, in wild flower and grass, in bird and fish and animal, but with what a difference—the light would have died out of them; the whole surface of nature would be neutral tint—an ashen grey. Nature would come out in old Quaker costume. Our colour sense rejoices in the polychromatic feast continually spread before it, and there is no purer enjoyment than the contemplation of the rich colouring of nature, ever varied and ever varying with the changing year.

Do we ever stay to enquire why nature is so lavish with her beautiful colours? No doubt the colours of many of the flowers have their useful purpose, such as attracting insects and bees and humming birds, who in the beautiful ordering of nature are thus unknowingly working out its great laws. And we know that at certain periods the plumage of some birds assumes a brighter and more gorgeous hue; but after allowing for all this there is infinite beauty and variety of colour which we can only accept gratefully as the creation of a Beneficient Giver to minister to our pleasure and enjoyment and gratify and delight the love implanted in us for beautiful things. There are people so utilitarian as not even to allow this, and who would fain argue that every variety of tint and shade in leaf and blade and mountain side has its direct use, and only to be justified on that ground.

As *Punch* jocularly but with great truth asks—"Are we to deny the existence of any good that is not visible, that is not tangible, that cannot be measured with a tape or weighed in scales?" and goes on to say—"There are people who would find the universe none the poorer had Praxiteles carved nothing more immortal than an occasional cold fowl; had Homer swept his lyre, not in commemoration of the fall of ancient Troy, but to celebrate the rise of a new soap; and had Titian lavished all his wealth of glowing colour and gorgeous hues upon the unretentive surface of some suburban pavement." It is not for such people, however, that nature spreads her colours upon her palette, but for those who having beauty in their own natures, feel a responsive chord vibrating to that of nature around.

It seems prosaic and callous to analyze the colours and tints instead of being content to enjoy them as we see them in nature, or in some great picture, but we shall be able more intelligently to enjoy them if we understand something of the principles which underlie the harmonies of the colours, for nature has rules for her colourings as well as for her economy, and we shall be able in the measure in which we understand them, to reproduce in our homes and our own handiwork something of the same gratification and pleasing emotions which we feel in nature—often without understanding the reason for it. This knowledge I need not say has been very much neglected, with the result that we all deplore, but which might have been expected, viz., in harmonious arrangements of colour in dress, home decorations and in all our surroundings. It will be my endeavor to state some of the elementary principles underlying harmony of colour, and if time permits, attempt to show their application to our general art.

The source of all colour is light acting upon the retina of the eye; without light we can have no colour. White light was once supposed to be a primary element, but as you all know, it has long been known to be composed of a number of colours which cannot be divided into fewer colours than three, and these are therefore called the three primary colours. This was first clearly shown by Sir Isaac Newton in his solar spectrum. The reason for it may be stated thus: Although light travels with immense rapidity, being at about the speed of about 186,000 miles in a second, yet a sensible time is occupied in this transmission, as we know that light takes about 8½ minutes to come from the sun to our earth. The velocity of light is also affected by the media through which it comes. For example, a beam of light made to pass through a glass prism is retarded by the different thicknesses of the glass, so that if the light, after passing through the prism be thrown on a white screen or even onto any object, a variety of colours will be obtained.

The vibrations composing white light are unequal and posses different degrees of energy; the red and orange are the most powerful, the green and yellow come next, and the blue and violet are the weakest of all. These coming through the medium of the atmosphere, keep together, and even passing through ordinary glass are not much affected, but in passing through a prism the weaker vibrations are more deflected out of their course than the others, while the stronger ones take the nearest way to their straight course; thus red and orange are the least refrangible rays, then come yellow and green, and blue and violet are the most refrangible. It has been found that, for example, violet light is caused by vibrations of about the 57,000 part of an inch long; as these vibrations are reduced the violet changes to a bluer light and soon to green, and then yellow and orange, until we get the uncompromising red with vibrations of about only the 39,000 part of an inch. So that, to speak more scientifically, light is simply vibrations of different intensity, and acting upon the retina of the eye, produces sensations which we call colours. The different sets of nerves of the retina respond to certain vibrations of light and produce the sensation of red, or yellow or blue. But that is not all. Natural bodies have the power to select and absorb certain of the vibrations and to reject the others; these rejected vibrations are received upon the retina and produce the colour which we ascribe to the object. There is really no original color in any object.

The splendid colors of the feathers of certain birds, as of the peacock, the lustre of beetles' wings, the sheen of mother of-pearl and certain precious stones, are only due in a very few instances to any actual coloring matter in themselves; in nearly all cases they are caused by the reflection and refraction of the rays, owing to minute inequalities and folds and marks on the surface of the feathers or shells. This has been imitated by Japanese metal workers who employ the same methods to get iridescence and variety of hue in their articles made of iron and copper. It would be going out of the scope of this paper to pursue this part of the subject further, but I have tried to indicate enough to enable you to understand what I have now to say.

Sir David Brewster's arrangement of the colors has been long accepted as correct, viz., red, blue and yellow as the three primary colours, but of late Winsch's and Young's theory has been taken up, adopted and advocated by men of acknowledged position in physics, such as Helmholtz, Maxwell and Rood. Even they are not agreed as to the exact hues, each varying slightly, but roughly speaking it may be said that they agree on adopting red, green and violet-blue as the three primaries. There is, however, in this selection a measure of arbitrariness, and there must be a certain liberty allowed. But to understand this aright, a distinction must be made between lights and pigments; experimenting with rays of light they found that blue and yellow lights do not produce green when mixed, but they also found that blue and yellow pigments when mixed *do* produce green. How is this? In this way: There is no actual colour in the pigments, their colour arises from the absorption of certain rays. What they do *not* absorb gives the colour, it is those rays we see by reflection. In Young's theory they recognize three primary colour *sensations*; in Brewster's we have three primary *colours*,—a very important distinction. For a purely theoretic study of the subject of colour we should adopt Young's theory, but for our purpose and for practical study, we will follow Brewster's theory. These rays, red, blue and yellow, cannot be further divided, or as it is called decomposed. These colours or rays, however, are not equally strong. If you wish to harmonize so that each is neutralized or destroyed, you must take them in the proportion of *three* parts of yellow, *five* of red, *eight* of blue, making together sixteen parts. These three primaries in the state of transient colours, such as for example in the colours of the prism, when recomposed, will produce white light. Any *two* of these colours mixed in their proportions, give what we call secondary colours. For example, three yellow and five red will produce orange, and orange will harmonize with blue, the remaining primary colour, in the proportion of 8, making 16. Also five red and eight blue will produce purple, which will harmonize with the remaining primary colour, yellow, in the proportion of 3, making 16.

Also eight blue and three yellow will produce *green* which will harmonize with the remaining primary red in the proportion of five, making 16.

Now we have got red, blue, yellow, the three primary colours, and orange, purple and green, the three secondary colours, and we got the secondary colours by mixing two of the primary colours together.

To obtain the *tertiary* colours we proceed to mix two of the secondary colours together. For example, orange and purple will produce the tertiary colour *Russet-brown*, and will harmonize with the remaining secondary green in the proportion of 21 russet to 11 green.

Also purple and green will produce the tertiary colour *olive*, and will harmonize with orange in the proportion of 24 olive to 8 orange.

Also green and orange will produce the tertiary colour *citrine*, and will harmonize with the remaining secondary, viz., purple, in the proportion of 19 citrine to 13 purple.

We have thus got the primaries, the secondaries and the tertiaries, and you will observe that as we get to the tertiaries, the tendency is to destroy the strength of the colour, and to make them neutral, because the whole three primaries are in them.

Every colour has got its complimentary colour, that is its opposite contrasting colour, which will make it look best and most agreeable to the eye, and it is very important to know the complimentary color of each. How shall we know that? Very easily. Bear in mind that any scheme of colour is never satisfactory that has not got all the three primaries in one form or other, and this will enable you to know what is the complimentary colour or shade to any colour you may have.

Thus, take yellow, the brighest of all colours, and nearest light—to get a harmonious scheme of colour you want the other two primaries; these are red and blue, which make *purple*; and purple, therefore, is the complimentary of yellow, and is also almost the darkest of hues,—the contrast therefore is as light to dark.

Again take red, which is a warm, exciting, hot colour, the other two primaries are blue and yellow. These mixed together make *green*, and green is the complimentary colour of red, and it is also the most soothing and quieting to the eye,—the contrast is therefore between exciting and quieting. We find this in the red flowers and green leaves and red fruits and green foliage.

Again take *blue*, which is the coldest colour—the other two primaries are red and yellow, which mixed together make *orange*, and orange is the complimentary colour of blue, and it is also the warmest colour. The contrast is between coldness and warmth. We find this in nature in the blue sky and the warm sunshine. You can prove this by a simple experiment. Take a piece of white paper and put a red spot in the middle, gaze fixedly at it for a minute in a good strong sunlight; remove or cover the red spot and you will see a green spot instead of the red, the green being the complimentary colour of the red, being made of the other two primary colours, blue and yellow.

The reason for this curious phenomenon is this: The eye tires quickly of one colour. The particular nerves excited by that colour become wearied and fatigued, and in the ratio in which this happens, so the other nerves become correspondingly excited towards the complimentary colour to that which fatigued the other nerves, and you see as I have described. As the wearied nerves recover their tone the hues blend into their proper relations again. You may take a similar experiment with the sun when low down in the sky—say at sunset—after gazing fixedly at it, you will see a purple disc, purple being the combination of red and blue, the remaining primaries after the yellow, and so with the other colors.

You will please bear in mind that each shade of colour has its complimentary, and as there are hundreds of shades, I can only give you the general principle on which the harmony of colours depends.

In making these experiments and mixing colours and shades, which I hope you will all do for yourselves, you will please bear in mind that the colours you deal with are not pure, and that it is only an approximation to the pureness that you can get, so that your experiments can never be absolutely correct, but you will get something near to it. The theory is, of course, built on pure colours as in the spectrum.

I need not say that you will hear colors spoken of as warm or cold, and when you hear this you will know that all orange and yellows and reds are warm, and all blues, grays and the blue greens are cold, and the colours become cool as they have blue in them, and warm as they have red or yellow.

Now we will go a little further. There is what is called simultaneous contrasts of colour and may be either *contrast of depth* or intensity, as when two tints are placed together, and the *contrast of hue*, making an apparent change of colour when certain shades are put beside it. This arises from the fact that all colored bodies reflect a certain amount of their complimentary rays, and also of white light. For example, take two patterns of the same colour, the one light and the other dark, and put them together, the one will appear lighter and the other darker by contrast; and if you take two different colours of unequal intensity and put them together, you will find not only one will be lighter and the other darker, but each will be slightly affected by the complimentary colour of the other. That is the reason that colours often look different when placed on a wall with other colours than they did on the sample. You will also find that by putting two complimentary colours together they will both look fresher and richer and give the most agreeable impression; on the other hand, if you put colours which are not complimentary together, both are injured and hurt, and a disagreeable impression is felt. For example, take red and green—both look their best, but if you put red and orange or red and purple, both will be injured.

(To be Continued.)

* Paper read at a meeting of resident members of the Province of Quebec Association of Architects, at Montreal.

A TEST OF FIRE DOORS.

H. Clarkson, of Topeka, Kan., has been experimenting with fire doors. The following is an account of the tests made:

"The shutters experimented on were of small size and consisted of wood covered with tin and other light metal. Two thicknesses of mortised boards with the grain of the wood in the two sections placed at right angles were used for the interior and were nailed tightly together. Several kinds of covering were tried. One was a single thickness of black iron, the second two thicknesses of galvanized iron, the third one thickness of tin, the fourth two thicknesses of tin, the fifth two thicknesses of tin lined with asbestos, and sixth a single thickness of tin lined with asbestos.

"The outer coverings were all made air-tight and the nail heads covered. The sample shutters were put into an improvised furnace and subjected to a heat of 1,600 degrees for forty-five minutes with very good results. All of the samples came out in good shape except one, in which a layer of metal was placed between the wooden layers inside. The edges and corners of the others were in perfect form and were not warped out of shape. The wood inside, of course, was turned to a perfect charcoal, but as it could get no air did not burn up.

"The heat to which the samples were subjected is hotter than shutters would receive on building, for there it would only be on one side.

"The samples were afterward sawed in two and it was found that the tin lined with asbestos was probably the most satisfactory of all. One great advantage, besides its not warping, in this kind of shutter is that in case of fire within, the tin and wood can be cut through with an axe. Later experiments will probably be made with full-sized shutters."

TRANSVERSE STRENGTH OF BRICK MASONRY.

THE following abstract of a series of experiments on the transverse strength of brick masonry made by Messrs. M. A. Earl and A. B. Loomis, of the engineering department of the University of Illinois, and published in a recent number of the "Technograph," a student's publication, is, therefore, of considerable interest.

In these experiments eight beams and two piers were broken. The beams were broken as simple beams with a concentrated load at the center, and the piers were first broken as cantilever beams and afterward as simple beams. The conditions and results of the several tests were as follows:

Beam No. 1 was built of two thicknesses of stretchers like an ordinary double wall, with the third course from the bottom headers. There was also a bond at the ends. Its depth was 14.7 ins. and the distance between the supports 43.75 ins. Its age when broken was 28 days. The beam failed at the center, about as much from lack of cohesion in the mortar as from mortar separating from the brick. This statement will apply to all the beams. One brick was broken by tension. Since the weight of the beam, 350 lbs., acts as a uniform load, its effect is the same as 175 lbs. at the center. Hence the breaking load = 1,652 + 175 = 1,827 lbs. The modulus of rupture, therefore,

$$\frac{6\,M}{d^2\,b} = \frac{6 \times 1827 \times 43.5}{4 \times 7.75 \times 217.56} = 70.7.$$

Pier No. 1 was pulled over as a cantilever beam. Age 28 days. Failed by mortar separating from brick. Weight of pier, 295 lbs. Force to break, 205 lbs. applied 42.5 ins. from joint of rupture. Maximum tension per sq. in.

$$\frac{M}{I} \cdot \frac{W}{S} = \frac{205 \times 42.5 \times 11\frac{1}{2}}{2 \times 1\frac{1}{2} \times 7\frac{1}{2}(11\frac{1}{2})^2} \cdot \frac{295}{7\frac{1}{2} \times 11\frac{1}{2}} = 49.3$$

Beam No. 2 consisted of pier No. 1 broken as a simple beam. Length between supports, 43 ins.; depth, 7½ ins.; width, 11½ ins. Weight, 295 lbs. Load to break; concentrated, 160 lbs.; weight of beam considered at center, 148 lbs.

$$S = \frac{6\,M}{b\,d^2} = \frac{6 \times 308 \times 43}{4 \times 11\frac{1}{2} \times (7\frac{1}{2})^2} = 30.7 \text{ lbs. per sq. in.}$$

In this case, and also in the pier, the unit stress is necessarily small, since there is no interlocking action of the brick as in an ordinary beam.

Beam No. 3 was built essentially the same as No. 1. Age 56 days. Length 4 ft.; depth 4¾ in.; width 7¾ ins.; distance between supports, 43 ins. Weight 350 lbs. Concentrated load, 3,273 lbs. The beam did not fail, thus showing a strength of at least 117.2 lbs. per sq. in.

It was then turned on the flat side and broken with a concentrated loud of 1,507 lbs., or 122.4 lbs. per sq. in.

Beam No. 4.—Age, 49 days; depth and width consisted of the same number of courses as No. 1; depth, 15 in.; distance between centers, 122 ins.; width 7¾ ins.; weight, 1,000 lbs. Five bricks broke when the beam failed. When this beam was broken deflections were taken at the center by means of a level and rod. These are given in the following table:

Deflections, in.	Differences.	Weights applied.
0.00	0.00	0.00
0.05	0.05	....
0.96	0.01	+ 200 lbs.
0.07	0.01	+ 400 "
0.11	0.04	+ 600 "
0.17	0.06	+ 800 "
0.23	0.06	+ 1,000 "
	Beam broke.....	+ 1,224 "

At the vertical joints the mortar separated from brick; at the horizontal joints the mortar failed in cohesion. Strain, 181 lbs. per sq. in.

Beam No. 5.—Depth, 15 in.; width, 7¾ ins.; distance between supports, 55 ins.; weight 500 lbs.; age 61 days; breaking load applied at center, 1,678 lbs. Strain, 91.2 lbs. per sq. inch.

Beam No. 6.—Width and depth the same as No. 5; distance between supports, 55 in.; age, 62 days; breaking load, 2,070 lbs.; weight of beam, 500 lbs. Strain, 115.5 lbs. per sq. in.

Beam No. 7.—Age, 62 days; distance between supports, 44 ins.; depth, 7¾ ins.; width, 3½ ins.; center load, 378 lbs.; weight of beam, 80 lbs.; strain, 153.8 lbs. per sq. in. The beam was not broken.

Beam No. 8.—Two courses high and two courses wide; depth, 4¾ ins.; width, 7½ ins.; distance between supports, 45 ins.; weight of beam, 125 lbs.; breaking load, 200 lbs.; age, 62 days; strain, 112.7 lbs. per sq. in.

Beam No. 9.—Lower section as No. 2; built as piers; distance between supports, 37 ins.; width, 7½ ins.; depth, 11½ ins.; age, 62 days; weight of beam, 270 lbs.; center load, 970 lbs.; strain, 54.3 lbs. per sq. in.

Beam No. 10.—Age, 35 days; distance between supports, 6 ft.; depth, 14 ins.; width, 8 ins.; center load, 1000 lbs.; weight of beam, 670 lbs.; strain, 99 lbs. per sq. in.

A summary of the results of the tests giving the modulus of rupture for the several beams is given in the following table;

No of beam.	Age. days.	Strength of mortar at that age in lbs. per sq. in.	Modulus of rupture of beam in lbs. per sq. in.	Remarks.
3	56	50	117.2 to 122.4	Broken sidewise
4	49	48	181	Mortar 1 to 2 by vol.
5	61	52	91.2	"
6	62	52	115.5	"
7	62	52	153.8	"
8	62	52	112.7	"
10	35	45	99.0	"
9	62	52	54.3	"
2	28	40	49.7	Mortar 1 to 2 by wgt.
1	28	40	70.7	"
Pier	28	40	49.3	"

The table shows, roughly, that the beams built as regular masonry have a modulus of rupture of about twice the tensile strength of the mortar used. With the best construction it may be even three times the tensile strength of the mortar, as shown by beams Nos. 4 and 7. When built as piers, with no interlocking action, the modulus of rupture is about the same as the tensile strength of the mortar used. The experiments on deflections with beam No. 4, while not enough to draw any certain conclusions from, would seem to show that brick masonry is elastic, and that up to a certain point the deformation is proportional to the stress applied. The result of experiments in the past, while showing a certain transverse strength, have not been definite or uniform enough to furnish reliable conclusions. While the nature of this subject does not permit of its being carried in an experimental way as far as might be desired, without considerable expense, it is suggested that much can yet be done toward finding the strength actually obtained in brick buildings. The tearing down or failure of such buildings affords an excellent opportunity for this, and it is to be hoped that experiment and observation will be turned in this direction.

FOUNDATIONS.

No foundation is more ineligible for a heavy structure than one that is rocky, especially if the rocks are in small masses, or if a sufficient surface is offered of one mass, in strata which dip considerably: in the former case, from the rottenness of the soil in which rocks are generally bedded and which consists for the most part of their detritus; and in the latter, from the liability of stratified rock to crack and slip, against which no precaution is available. Dry gravelly soils, again, are not only loose and infirm, but are exceedingly liable to vacuities of various extent, which are hardly sufficiently provided against by piling; wet gravel is generally more compact and may be better trusted both with and without piles. A deep compacted sand will be found firm if a sufficient surface of it be embraced by the footings, which should be wider in that than most other cases. In large and deep beds of alluvial deposits the heaviest building may be laid with security, if precautions be attended to for the equal distribution of the pressure throughout. The city of New Orleans, in a delta at the mouth of the Mississippi, rests on a bed of mud, which is held together by a bonding of trunks and arms of trees, but on a broad level bed below. Here the only precaution taken in erecting a structure of the greatest magnitude is to make the trenches for the walls wide and level, and to floor the whole of their surface with thick planks properly bonded; on these the footings are laid, and if any settlement occurs it is of the whole edifice and no injury accrues to any part of it at any time. Clayey and chalkey soils are generally understood to form the best natural foundations; in these, under ordinary circumstances, no preparation is required, though for very heavy and unequally pressing works, such as bridges, which are placed on piers made as small as they possibly can be, piling has been considered a necessary precaution. Indeed, except perhaps on an extensive horizontal bed of firm compact rock, no foundation can be considered better than that afforded by piling in a deep clay

NOTES ON RECENT ADDITIONS TO OUR KNOWLEDGE OF PORTLAND CEMENT. *

By John Purser Griffith.

In his address to this institution five years ago the author made the following allusion to Portland cement: "The introduction of Portland cement has revolutionized the construction of marine works, and provides, when judiciously employed, the most useful cementing agent at our disposal. Cement concrete has naturally grown rapidly in favour on account of the facility with which it can be moulded into blocks or deposited *in situ* under water; and of late years it has been used in almost every work of magnitude in some form or another. Recently we have been startled by accounts of serious failures of works constructed with Portland cement concrete, and what may almost be termed a panic has taken the place of previous unqualified confidence. All manner of theories have been started to explain the deterioration of the cement. Additional tests have been suggested to detect these so-called dangerous properties, and numerous persons are to be found ready to predict the ultimate destruction of all works in which Portland cement has been used. It would be more profitable to investigate carefully each particular failure; to trace back the history of the work, the mode of construction, the proportion of cement used, and especially the manipulation of the concrete. My own experience leads me to think that we have nothing to fear if the material is fairly treated and a reasonable amount of common sense used." These remarks referred especially to Portland cement concrete which had occurred at the Aberdeen graving dock. As the details of these failures and others of more recent date have been made public by responsible engineers, and we are not dependen ton unauthenticated information, we are now at full liberty to discuss them, and any such discussion must be productive of good.

The reports of the disasters at Aberdeen produced a scare, resulting in what may be called the magnesium bogey. Chemical analysis of the disintegrated concrete showed the presence of magnesium hydrate in large quantities, and the conclusion jumped at by many engineers was that magnesia in the cement was the source of all evil. Tests were introduced to remedy this, and it was proposed, on high authority, that under no conditions was cement to contain more than 1 per cent. of magnesia. With one stroke of the pen English engineers proposed to remove from the category of cements useful for marine works the bulk of those used in the United States of America. With one stroke of the pen English engineers propose to nullify the experience of Chatoney, Vicat and Gilmour, who maintained that cements such as the Rosendale cements, which contain large quantities of magnesia, resist the dissolving action of the sea-water better than those composed only of the silicate and aluminate of lime.

It is satisfactory to know that further research and consideration has materially modified these views, and that it is now more generally accepted that the injury has been caused by the percolation of sea-water, than to the presence of magnesia in the cement. The effect of the flow of sea-water through Portland cement concrete appears to be identical with the effect of sea-water on lime mortar. This latter effect has been very fully explained by Dr. B. B. Stoney in a paper he presented to this institution many years ago "On the Action of Sea-Water on Lime Mortar," which may be found in vol. vii. of our *Transactions*.

The great lesson we have to learn from these failures is, that our concrete must be made impermeable. That appears to be the sum and substance of the various discussions on the subject, with which those of us who are members of the Institution of Civil Engineers must be familiar. At the beginning of the last session a most valuable paper on Portland cement was read in London by Mr. H. K. Bamber, a chemist evidently acquainted practically with the manufacture of Portland cement. The conclusions drawn may be briefly stated as follows: The cement should be very finely ground, not alone as making it an economical cement, but a safer and more reliable cement. The cement should be mixed with the full quantity of water it can take up. It was the author's privilege to have the opportunity of discussing these points with his friend the late Mr. Harry Napier Draper, who became so interested in the subject that he brought to bear on it the full powers of his cultured mind. Unwilling to approach the subject merely on information gained second-hand, he determined to manufacture Portland cement in his laboratory from its known chemical ingredients. This he succeeded in doing after several instructive failures. For our purpose it is sufficient to know that his experiments proved to him the need of subjecting the clinker to a sufficiently high heat and afterwards pulverizing it to the greatest possible extent. Mr. Draper's next step was to take a number of analyses of Portland cement which had been published. In these he found that the lime, silica, and alumina, which form the active constituents of the cement, averaged about 89 per cent. of the weight of the cement. Accepting Le Chatelier's theory, that the potentially active components of cement were tricalcic silicate and tricalcic aluminate, Mr. Draper proceeded to construct a rational formula on this theory, which would approximate to the known analysis of Portland cement. In Mr. Draper's formula lime represents 63 per cent. of the cement.

If this be true then cements containing this amount of lime could not be considered as over-limed—the lime being chemically combined. He next examined the reactions which followed mixing such a cement with water, and was able to confirm the views of Le Chatelier that by the addition of water a certain quantity of calcium hydrate was set free, though all the lime in the original cement was in a state of combination. Mr. Draper considered this freed calcium hydrate an important factor in the efficiency of cement, as it slowly combined with the siliceous sand, and also absorbed carbonic acid, forming the protective film noted by some writers. One of the most interesting points brought out by Mr. Draper's investigations was that if 89 per cent. of the cement consisted of tricalcic silicate and tricalcic aluminate, in the proportion indicated by his formula, and that the hydration reactions of Le Chatelier were correct, no less than 41 per cent. of water would be required to complete hydration. To those of us who are practically acquainted with the gauging of briquettes of neat cement, a proposition that we should use 41 per cent. by weight of water to mix the cement at first sight seems difficult to understand. We must, however, remember that Mr. Draper was referring to cement which throughout its bulk was potentially active.

Now, when we are speaking of the Portland cement of commerce, we must bear in mind that high authorities on Portland cement have agreed that the residue left after sifting cement through a sieve of 5,000 meshes per square centimetre, or 32,000 meshes per square inch, is practically inert, or at any rate sluggish in hydration. Now, in our English cements, with very few exceptions, from 30 to 50 per cent. by weight will be rejected by a sieve of this fineness. You will see, therefore, that this cement, instead of requiring 41 per cent. of water, will only demand about 20 per cent. for mixing into briquettes. Practical experience has shown us that this is sufficient, and the rules so generally laid down in this country that cement should be mixed with the minimum quantity of water has led to this proportion of water being generally adopted and adhered to, although the grinding of cement has improved. There is abundant evidence to show that briquettes immersed in water gradually increase in weight by the additional absorption of water beyond what was used in mixing the cement. It seems more than probable that this is caused by the slow hydration of the coarser particles. This gradual hydration of the coarser particles leads to their expansion, and this expansion is accompanied by the setting up of internal stresses in the briquettes or cakes. These internal stresses neutralize or negative the tensile strength, producing either a reduction in the strength of the briquettes or cracks visible to the eye.

In making briquettes with a deficiency of water you will frequently find that a very much higher stress is obtained at the early tests than if the proper quantity of water were used; this may be followed in later tests by a falling off in the strength of briquettes, while the briquettes mixed with an excess of water shows a large increase in strength. Much greater pressure can be exerted in putting cement into the moulds if it is in a granular condition than if it is plastic, and the high seven days' results may be due to the particles of cement being brought into closer contact when little water is used than when a larger quantity is employed. At the same time the stress set up by the hydration of the coarser particles will, of course, produce more injurious results in the dense under-watered briquettes than in those which were guaged with a large quantity of water. These points may possibly be made clearer by the following experiments with neat Portland cement, mixed with 20, 25, 30, 35 and 40 per cent. of water by weight:

Percentage of water by weight.....	20	25	30	35	40
Breaking stress per square inch, after 28 days, in lbs	840	685	540	385	375
Breaking stress per square inch, after six months, in lbs.....	804	830	680	530	515
Increase in strength per cent.....	—	24	26	38	37
Decrease in strength per cent.....	4	×	×	×	×

Such results have led some of us to think that a cement giving moderate breaking stresses at seven days and gradual increments at later periods, is a safer cement than one giving high results at seven days and little or no increase afterwards. This is a subject requiring further careful study, as there is much to be said for the contention of many German authorities, that a cement which attains at seven days 90 per cent. of its strength, at 28 days is superior to another attaining at seven days only 50 per cent. of its strength at 28 days. Free lime had been charged with most failures, due to the cracking of cement; but it seems difficult to understand how free lime could escape immediate hydration when guaged with what appeared to the eye a sufficiency of water. It has been very reasonably asked, if the slow hydration of the coarse particles is the cause of failure, how comes it that for so many years we have, with great success, used cements which were much coarser than those now in the market, and that these disasters have apparently increased as the grinding of the cement has improved? We must face this criticism, and endeavor to explain what we must admit to be a fact. The author's belief is that the old cement-makers burnt their cement more highly than is now done, that the clinker approached more closely to a state of fusion, and that the coarse particles were so vitrified that

* Paper read before the Institute of Civil Engineers of Ireland.

absorption of water, unless they were reduced by grinding, was almost impossible.

There is also another possibility—namely, that these comparatively large particles became surrounded by a watertight skin or coating of cement, which stopped their further hydration. The author is inclined to believe that the cements of the present day are not as highly burned as formerly, and that the slow hydration of the coarser particles is thereby facilitated. There are many leading authorities in Germany who stoutly maintain that the "idea that lightly-burned cement should be rejected is an erroneous opinion, if the present state of cement making and testing be considered, and that no cement is more reliable than one which gives good results, even when lightly burned." The meaning of this is that they recommend foregoing some of the advantages of high burning if it will ensure them a really finely-ground cement. Before we adopt any such proposition we must be prepared to insist on our cement being ground to the present German standard.

The time appears to have come when we may reasonably ask for finer cement than is now generally sold in the English market. We can get cement make in England at present which will entirely pass through the sieve of 2,500 meshes per square inch, leaving a residue of about 8 per cent. on the 5,800 sieve, and about 30 per cent. on the 32,000 sieve. But the author knows of no cement in this country which approaches in fineness some of the cements of Germany; for cement can be obtained in that country so fine that only a residue of from 3 to 10 per cent. remains on the sieve of 32,000 meshes per square inch, and, in some instances, so fine that it all passed through this sieve. To get such cement we must abandon high weight tests, as such a finely-ground cement will not weigh more than 70 lbs. per cubic foot in its dry uncompressed state. In this connection it may be worthy of remark that in the standard tests for Germany no tests are laid down for weight or specific gravity and it is a matter of considerable doubt whether we should retain such tests in this country, or even adopt a chemical test, as has been so strongly recommended by some chemists and engineers.

"Free lime" has long been the dread of engineers using Portland cement, and as a safeguard, many authorities have considered it desirable that cement should be stored for a considerable time and spread out in thin layers to "cool," or "air slake" It has been maintained that by so doing the cement is made safe for use, and that there will be no danger of its expansion and cracking. There are high authorities and scientific experts who now are equally positive that such treatment is not only not required with a high-class cement, but is actually injurious to it.

In the light of what has been discussed in this paper it is worth while examining these conflicting views. What are the effects of cooling cement with which we are familiar? First, the cement takes longer to set; second, the cement loses its strength; third, the cement increases in volume and consequently loses in weight. This "air-slaking" means the absorption of moisture and carbonic acid by the finest ground portions of the cement, rendering them inert and thus weakening the cement. If this air-slaking is continued sufficiently long the cement will become worthless, the coarser particles gradually absorbing moisture and carbonic acid. An examination of various analysis shows the presence of both moisture and carbonic acid in varying proportions. It seems more probable that air-slaking is a safeguard against under-burned and badly-ground cement than against the presence of so-called free lime. In such a cement the finely-ground portion of the cement would set rapidly, while the coarser particles hydrating at a later stage would swell and crack the cement. Air-slaking would, however, prevent this by rendering the finest portions of the cement inert through the absorption of moisture and carbonic acid, thus leaving only the coarser portions to act as cement. The natural result is, of course that after such cooling the strength of the cement is reduced. The true remedy seems to be the manufacture of a cement so finely ground as to be uniformly active, and if this cement is highly burned the results will probably be all the better.

In conclusion, the lessons we may learn from recent additions to our knowledge of Portland cement are: First, the paramount importance of fine grinding; second, the absolute need of using sufficient water to ensure the complete hydration of the cement; and, third, the necessity of making concrete exposed to the action of sea-water impermeable.

Mr. M. Ryan, brickmaker, of Smiths Falls, Ont., has made arrangements to operate all the machinery in his brickyard by electricity.

The Toronto Lock Co., who make an announcement in the advertisement pages of this paper, have lately commenced the manufacture in Toronto of the finer grades of builders' hardware.

With regard to ink erasers, Mr. James F. Hobart, of Brooklyn, N. Y., writes: In recent issues of Carpentry and Building, "J. W. G." and "S. P. G." recommend as good ink erasers broken glass and half worn sandpaper. They will do the work, but better results may be obtained by using a bit of rubber that has been prepared for erasing ink by having incorporated with it during the process of manufacture fine emery or other abrasive material. Separate pieces of ink eraser rubber can be had, or there may be purchased at any stationer's neat bits of polished wood with a piece of ink eraser projecting from one end and an ordinary pencil eraser from the other. After using the ink eraser it is well to go over the work with the ordinary rubber, in order to remove the grit that may remain.

USE OF LIME IN MORTAR.

There is a common superstition, which probably retains its hold upon builders solely through the profit that they find in maintaining it, but which, says the American Architect, sometimes really imposes upon laymen, to the effect that cement mortar is improved, in cold weather, by the addition of lime to it. As the mason ingenuously explains to his employer, the heat developed by the lime, in slaking, keeps the cement warm, and thus prevents it from freezing; and, on this theory, the advent of a frosty day is utilized by multitudes of sharp builders to load the mortar, which they have agreed to make of sand and cement only, with a quantity of lime, which saves cement, and makes the mortar easy to work, but destroys its water-proof qualities and injures its strength and hardness more or less, according to the quantity used. It is hardly necessary to say that the influence of the lime in "warming" the mortar is purely mythical. Lime mortar, without cement, is not much injured by freezing, while cement mortar is totally ruined, so that a mortar containing a large portion of lime would be harder, after freezing and thawing, than one containing cement only; but it would gain the qualities of lime mortar only as it lost those of cement mortar.

The fact is, that the only time when it is desirable to add lime to mortar, which the contract requires to be made with cement, is in the summer. In very hot weather, cement, particularly of the quick-setting sorts, will sometimes harden in the mortar-tubs before it can be used. The average workman chops up the lumps, and re-tempers them, with more water, but this proceeding destroys half the value of the cement, and it is preferable, under such circumstances, to add a small quantity of lime to the cement, at the first mixing. A very small dose of lime will retard the cement long enough to make it manageable, without materially injuring its properties, and circumstances sometimes render it absolutely necessary to resort to such an addition, in order to be able to work the cement at all. In winter on the contrary, the object to be aimed at is to accelerate the setting of the cement as much as possible, so as to place it beyond the reach of injury from frost, which, if kept out for twenty-four hours, has little effect on good cement. In order to secure this rapid setting, however, all traces of lime, which is a powerful retardant, must be kept out of the mortar, and the bricks or stones which are to be set with the mortar must be thoroughly warmed before they are laid. To warm the mortar is perfectly useless. A bed of mortar, spread on one cold stone, and with another cold stone lowered into it, will freeze completely through in a few seconds, even though it may have been boiling hot when it was spread; and we have seen in a warm day, with the temperature well above the freezing-point, stonework in cement mortar freeze almost as fast as it was laid, simply because the stones had been cooled down during the cold day and night previous, and had not time to get warm. It is obvious that, roughly speaking, it would require four tons of mortar at a temperature of forty degrees Fahrenheit, to raise a single stone, weighing one ton, from zero to thirty-two degrees, so that the whole mass would be just on the verge of freezing; yet the masons would have us believe that by adding a little lime to the mortar, they enable a hod-full of it, not only to raise above the freezing point the temperature of a large mass of masonry from a point in the neighborhood of zero, but to hold it there, notwithstanding the temperature of the surrounding air, until the cement has had time to set. By warming the stones, or bricks, the conditions are reversed. A heated stone will keep the mortar in which it is laid above the freezing point as long as it remains itself above that point, and as either stone or bricks lose heat very slowly, it is easy to build in the coldest weather, a wall which will retain, in the interior, a temperature above the freezing point long enough to make the cement in which it is laid secure against frost, except in the superficial portions; and with suitable coverings, these may also be protected. Mr. O. W. Norcross, one of the most ingenious and careful of builders, warms foundation-stones with a jet of steam, before laying them in cement in cold weather, but this is an expensive process, if thoroughly carried out, as the heat penetrates very slowly into the mass of the stone; and a better way is to pile the stone or brick over a furnace of some sort, in which a moderate fire can be kept night and day. We have once or twice made use of the low flat furnaces used by the workmen for heating pebbles who lay coal-tar concrete. Three or four thousand bricks can, with care, be piled over one of these furnaces, the chimney coming up through them, and by renewing them as fast as the hod-carriers take them from the pile, the masons can be constantly supplied with hot bricks, which will make excellent work with cement mortar, in the coldest weather; and as the furnace is tight, there is no danger of spoiling the appearance of the bricks by smoke.

A majority of the contractors of Montreal have acceded to the demand of the carpenters' union for a nine-hour day at 20 cents per hour. The new scale of wages will come into operation on the 1st of May.

The Mayor of Toronto has expressed himself as being in favor of the amalgamation of the Central School of Art with the Toronto Technical School. The art school is seeking to have the yearly grant from the city increased from $500 to $2,000.

PERSONAL.

Mr. Thos. F. Walker, of 237 Sumach street, Toronto, a well known contractor, died in Montreal on the 15th of March.

Mr. Thomas, a prominent and highly respected contractor, of Hamilton, Ont., died in Chicago last month. Deceased carried out the contract for the stone work on the City Hall and Bank of Hamilton, at Hamilton.

SHAVINGS.

Reports from London, Ont. indicate that building operations will be brisk in that city during the present season.

During 1893, the Toronto plumbing inspectors issued 946 permits, visited 1,331 buildings, made 9,235 inspections, including more than 1,400 smoke tests.

Mr. Lennox, architect of the new city buildings, Toronto, recently presented a statement to the council showing that since the city took charge of the work $198,600 had been spent. On an average 250 men had been employed daily, 250 cars of Credit Valley stone, 43 Cleveland, and 136 of New Brunswick, 2,352,580 bricks and 6391 barrels of lime has been used. Two and one half stories have been erected.

WM. J. HYNES,
Contractor and Plasterer.
Relief Decorations in Plaster, Staff or Papier-Mache.
97 Winchester Street.
Shop, Esplanade, foot of Jarvis Street.
Telephone 3474.

ARCHITECTS and ENGINEERS
APPLY TO
THE NEW COLOR PROCESS CO.
214 ST. JAMES ST., MONTREAL,
for Instantaneous Reproductions in Colors of Drawings and Plans
IT WILL SAVE YOU . . . . . .
MONEY Copies on Manilla Paper 4c. per sq. foot.
LABOR No recoloring by hand.
TIME We print without the aid of the sun.
ERRORS We give exact fac-similes.
TRACING CLOTH
We print direct from originals on paper.
DISSATISFACTION
We guarantee on formly perfect work.
Originals sent from a distance returned with copies same day as received.

Hayes' Patent Steel Lath . .

HAS NO EQUAL IN ANY PARTICULAR

. . . Used in more important buildings . . .
. . . THAN . . .
all other styles of metal lathing combined.

SOLE MANUFACTURERS
THE METALLIC ROOFING CO.
OF CANADA, LIMITED.

BRANCH OFFICE:
706 Craig Street
MONTREAL

HEAD OFFICE:
82 to 90 Yonge Street
TORONTO

Send for Samples and Prices

S. KNECHTEL

- - - MANUFACTURER OF - - -

TURNED * MOULDINGS

Rope, Spiral and Bead Mouldings
and all kinds of Spiral Turnings

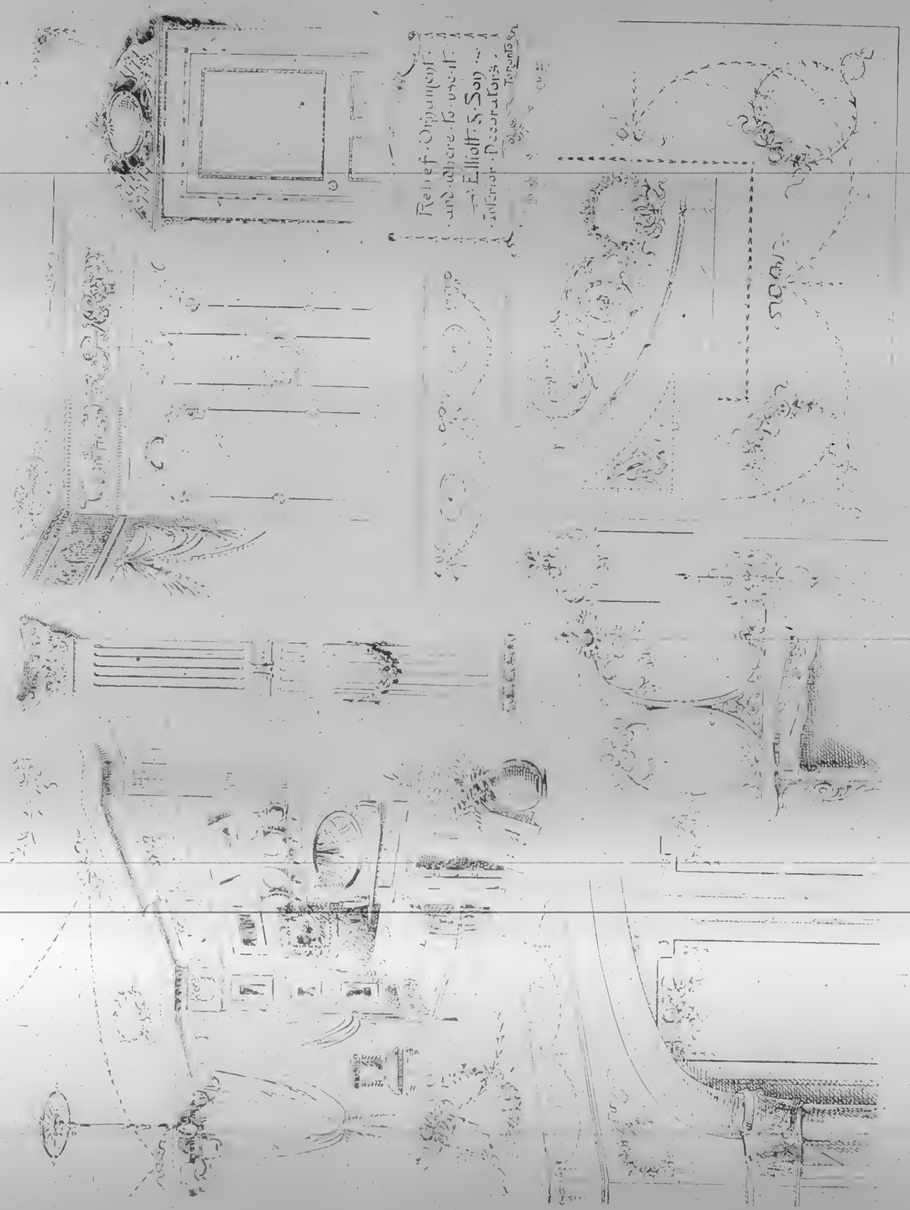
Newels . . and . . Balusters
Table Legs, etc., etc.,
IN STRAIGHT, TAPERING OR IRREGULAR FORMS.

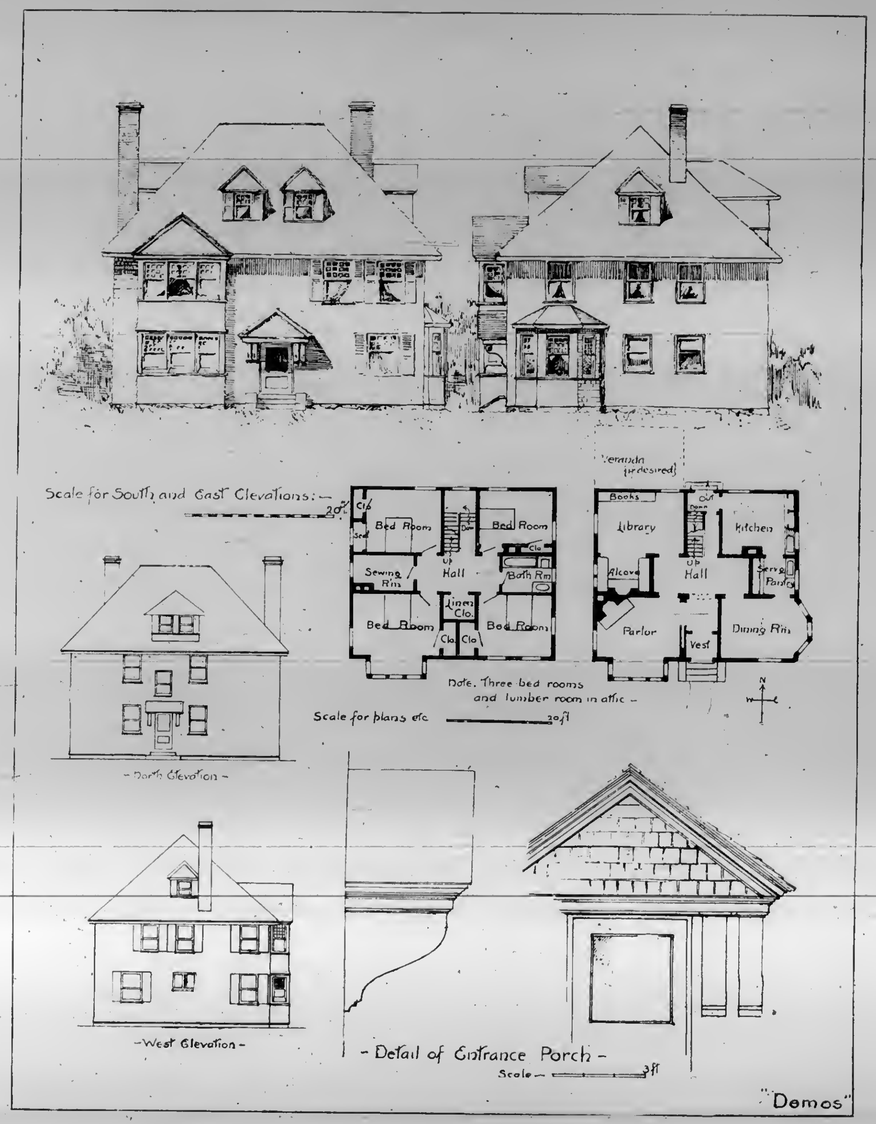
All work executed from Architects' Details.

SEND FOR CATALOGUE.

MAPLE HILL - ONTARIO

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers.


Relief Ornament
and adhere to wood
Elliott & Son
Interior Decorators
Toronto



DESIGN FOR A COUNTRY OR SUBURBAN HOUSE.

ST. LAURENT ROUEN, FRANCE.

FROM SKETCHES BY ANDREW T. TAYLOR, F.R.I.B.A.

CANADIAN ARCHITECT AND BUILDER.

VOL. VII.—No. 5. MAY, 1894 { PRICE 20 CENTS $2.00 PER YEAR.

THE
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	EDMUND BURKE, Toronto.
1ST VICE-PRESIDENT	J. E. BELCHER, Peterboro'.
2ND VICE-PRESIDENT	W. A. EDWARDS, Hamilton.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI	Ottawa.
FRANK DARLING	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON — Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	J. NELSON, Montreal.
1ST VICE-PRESIDENT	CHAS. BAILLAIRGE, Quebec.
2ND VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
SECRETARY	JOSEPH HAYNES, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. GENDRON,	Montreal.
J. B. BERTRAND	Quebec.
ERIC MANN	Montreal.
J. VENNE	Montreal.
G. TANGUAY	Quebec.

AUDITORS—THEO. DAOUST, J. E. PEACHY.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
WM. PARK, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JOHN ALDRIDGE.
JAS. CRANG.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
JAS. THOMSON
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

IN connection with the illustration of the Art Institute at Sackville, N. B., which appeared in our April number, the cost of the building was given as $54,000 instead of $24,000.

THE Executive Committee of the American Institute of Architects has unanimously approved of the course of their President, Mr. D. H. Burnham, in conducting his recent correspondence with the U. S. Treasury department, to which we refered in our last issue.

WE congratulate the Toronto Public School Board and the citizens generally on the action of the City Council in passing an appropriation of fifty thousand dollars for new school buildings to be erected this year. The Council could very properly have granted the total amount—seventy-six thousand dollars—asked for by the Board for buiding purposes, but considering the financial policy of this year, they did well by the Public School Board.

A DEPUTATION representing the labor societies waited on the Minister of Public Works at Ottawa recently and requested among numerous other things that the contract system in the construction of public works should be abolished. The report of the Commission in the Curran Bridge investigation and the experience of Toronto and other cities which have attempted to substitute day labor for contract work, should be a sufficient answer to the deputation in question.

THE Dominion Government in their latest revision of the tariff have reduced the duty on wire nails from 1½ to 1 cent per pound. Rolled iron or steel angles, channels, structural shapes and special sections, weighing less than 35 pounds per lineal yard, not otherwise specified, are to be charged 35 per cent. ad valorem, but not less than $10 per ton. On iron bridges and structural iron work the duty is made 30 per cent. ad valorem, but not less than one cent per pound.

IN our next issue we shall lay before our readers one of a series of articles prepared for the purpose of presenting some special subjects in a manner to make them of interest from the contractor's point of view. We expected to be able to publish the first of these in this number but found our space would not permit. These articles will be illustrated, and will deal with such subjects as the handling of large contracts, shoring for reconstruction of heavy buildings, modern appliances pertaining to contractors' plant, etc.

IT is to be regretted that no arrangement has yet been arrived at between the Ontario Government and the City of Toronto for the improvement of the avenue from Queen Street to the new Parliament buildings. From the city's standpoint there is no place where an equal expenditure would add more to its attractiveness. For the interests of the province it may be said that the opportunity for beautiful parliament buildings has been lost, but the situation of the buildings is one of great natural advantage, and careful treatment of the surroundings and approaches would add to their attractiveness. This work should not be delayed. The authorities should also consider in this connection the advisability of continuing the avenue directly south from Queen street through to Front street opposite the new Union Station. There are none but very cheap buildings in the way of such an extension and the new street frontages would be worth the whole cost. This would make the entrance to Toronto by way of the Union Station one such as few cities could boast.

THE commissioners appointed to investigate the management of the Lachine Canal and Curran Bridge affairs have reported that the whole business has been conducted with looseness, extravagance and questionable methods generally. This work has been carried on by day labor instead of being contracted for, and the Government is thereby loser of about two hundred thousand dollars. The responsibility is charged by each upon the other as between the Department of Railways and Canals and the local officers. The lesson to be learned from this affair is that no government, corporation or individual can have work of any kind done so economically by day labor as by contract; and when works of considerable magnitude are undertaken without the safeguard of a contract, the door is thrown open an I invitation given for loss and scandal to enter.

A PERUSAL of the new building by-law of the City of Hamilton, an abstract of which appears in our Hamilton correspondence, shows the newly appointed Building Inspector's duties to be multiform in character. In addition to seeing that in future construction work shall be done in the manner prescribed by the by-law, he is also assigned the duties which ordinarily belong to Plumbing and Health Inspectors. We take it therefore that the proposal for the appointment of a plumbing or sanitary inspector which has several times occupied the attention of the Council, will now be abandoned, and the salary of such an official saved. The clauses of the by-law forbidding the construction of eave troughs and down pipes in such a manner as to admit of water dripping upon the heads of persons passing along the streets and flowing across the pavement beneath their feet, is commendable, and might well be made to apply to building construction on the business streets of Montreal and other cities. The clause compelling the placing of snow guards on roofs is one the necessity for which was made mention of in these columns recently. The by-law seems in most particulars to be well adapted to the requirements. It will be the duty of the Building Inspector to see that it is not allowed to become a dead letter.

THE building season is now sufficiently advanced to make it clear that the volume of work for the year will be only moderate, and that it will be fairly distributed over the country. There is a good demand for work in the line of alterations and repairs outside of the mason's and bricklayer's trades, but the trades mentioned derive the least benefit from this class of work. There seems to be a peculiar combination of circumstances operating to retard increasing business activity pending further developments in some of the factors in the situation. Among the influences compelling great caution may be cited, the unsettled tariff discussions at Ottawa and Washington, the question of England's embargo on Canadian cattle being removed, the near approach of elections, etc. The wonder is that business of all kinds in Canada has not been more seriously disturbed during the past few months. Such improvement in the conditions as may reasonably be expected cannot much affect the volume of business in the building trades for this year. Therefore, while it is necessary for us all to give the best possible attention to the work in hand and to the immediate future, we would suggest that the greater interests of all connected with the building trades lie beyond the months remaining of 1894, and that the true basis for future development is to be found in the question of immigration. Canada's greatest need is a much larger agricultural population, always having regard to kind as well as numbers. Only as agriculture is developed can building industries be maintained. Although without any immigration there will be a certain amount of growth and demand for building work we should be very stupid to lose sight of the opportunities plainly before us. Canada has all the manufacturing, mercantile, and transportation facilities for conducting the business of a much larger population than she at present possesses. In fact, these very facilities have been developed largely in anticipation of increased immigration. With such an immigration the building industries would be taxed to keep up with the requirements. No other class of business would receive equal benefit from this source. The government is making strong efforts to induce immigration, but the results so far this season are disappointing. We must not be discouraged if the returns seem slow, but rather let us be determined to devise the necessary means to accomplish the desired object. If those engaged in the various branches of the building industries were thoroughly alive to their own welfare and prepared to unite on this question they would find themselves possessed of brains and influence sufficient to materially assist in the solution of the problem.

IT is to be feared that the building contractors of Canada are dropping behind the business men in nearly every other line of equal importance, in their lack of organization for the advancement and protection of their common interests. We have plenty of contractors who as individuals are good and live business men, but as a body they are not known except in a comparatively small way. The existing organizations among builders are few, but are deserving of commendation for their good work and are examples worthy to be followed. The Toronto Builders' Exchange is no doubt the leader, and is destined to steadily increase its usefulness so long as its affairs continue to be guided by capable hands. If contractors have not yet thought it worth while to organize more extensively from the standpoint of general progressiveness, it is about time that they should combine for purposes of common defence. We notice that the trades unions are working aggressively in season and out of season to secure recognition, and there is no doubt that they gain ground in this way. Among their latest successes is the securing of municipal legislation making it compulsory that in civic work contractors shall pay union wages. They are now seeking to have this stipulation inserted in all contracts for public works from those of School Boards up to those of the Dominion Government. We do not say nor do we think that trades union agitation is all conducted with wisdom, but the trades unions are alive, and they are gainers by their activity. There is legitimate work for them and for others to do through organization. The architects, too, are making progress by means of their associations, and they have interests that make it necessary for them to carry on and enlarge their association work. The work and business of contractors is hedged about with many protections for other people. In the first place there are the contract drawings and specifications; next the superintendence of the architect or clerk of works; then trades union rules, municipal building regulations and the Employers' Liability Act, with penalties of all sorts to protect everybody from the contractors. These things are all quite proper up to a certain limit, but there exists no doubt a contractor's side to the business. Doubtless there are instances in which a contractor may suffer an injustice simply because single handed he is unable to put up the costs in expensive law suits. Suppose that such a contractor had the assistance of an organization in testing his case in a manner similar to the method followed by the architects of France. In that way wrongs would be righted, and every such test case would help to remove friction and to stop bad practice all around. This is only one way in which contractors can work together to advantage. In the arbitration method for the settlement of labor troubles or their adjustment by Government Commission, contractors cannot afford to take their chances single handed any more than in suits at law. There is work to be done on behalf of the contractors that none but themselves can do, and we would urge them to greater activity in this direction. Wherever union labor is found there should united contractors be found also. By this means alone can all interests be properly counterbalanced.

ILLUSTRATIONS.

BANCO DI SAN SPIRITO, ROME.—DRAWN FROM PHOTO, BY J. C. B. HORWOOD.

C. A. & B. COMPETITION FOR DRUG STORE.—DESIGN SUBMITTED BY "ITALIA" (MR. MELVILLE MILLAR), AWARDED FIRST POSITION.

DESIGN FOR COTTAGE TO COST $1,000.—SUBMITTED BY "DEMOS."

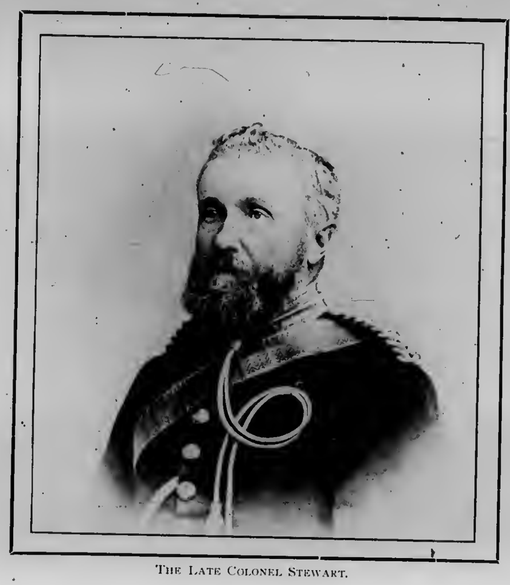
This cottage, to cost about $1,000, contains seven rooms and bath room, and is designed to face the east. To be of frame construction on stone foundation. Walls to be clapboarded, as shown, or hung with shingles. Roof to be shingled.

THE LATE COLONEL STEWART.

IT has become our painful duty to chronicle the death of Col. John Stewart, of Ottawa, the contractor for the new Toronto Drill Hall. His death, which occurred at his son's residence in Toronto, on the night of the 4th of May, was totally unexpected, being due to heart disease with which deceased had for some time been afflicted.

The subject of this notice was born at Dungiven, Londonderry County, Ireland, on the 11th January, 1835. After leaving school he learned the joiner's trade. In 1857 he emigrated to Canada, and settled in Ottawa, which, during the remainder of his life, was his home. After working at his trade for several years, he received in 1862 his first contract, which was to build a residence for the Governor-General's secretary. In 1868 he formed a partnership with Mr. Stockand, which was dissolved in 1874.

Deceased rapidly achieved a prominent position as a contractor of more than ordinary skill and integrity, and was entrusted with the carrying out of many important undertakings. Amongst these may be mentioned the extension of the Western block of the Dominion Parliament Buildings, the construction of the Mackenzie tower, the Supreme Court buildings, alterations on the Grenville canal, experimental farm buildings at Brandon, Mounted Police riding school at Regina, the new Drill Hall at Toronto. Upon the latter building, now nearing completion, he was engaged, when death so suddenly closed his career.



THE LATE COLONEL STEWART.

The late Col. Stewart filled with credit to himself and advantage to the community, a number of public positions. In 1878-9 he occupied a seat as alderman in the Ottawa City Council, and was a member of the Board of Works and other important committees. He was an ardent military man, having risen from the ranks to the position of Colonel of the Ottawa Field Battery.

Deceased was twice married, his second wife and eight children being his survivors.

The obsequies, which took place at Ottawa, were of a military character, and were also marked by many tokens, floral and otherwise, of the high esteem in which the deceased was held throughout the country. His portrait in the uniform of a Colonel of the Ottawa Field Battery, is herewith presented to our readers.

RAISING.

There is no part of the construction of a frame building which requires more care or accuracy, says Owen B. Maginnis, than the raising of the frame. I therefore trust that my remarks on this subject will be carefully read as they will be found very applicable in practice. Placing cellar girders: These will require to be lifted into the place on top of the piers built for them in the cellar, or set perfectly level and straight from end to end. Some prefer to give their girders a slight crown of say ½ inch in the entire length, and it is a wise plan, because the piers generally settle more than the outside walls. When there are posts instead of brick piers used to support the girder, the best method is to temporarily sustain the girder by uprights made of 2 x 4 joists resting on blocks on the ground below. When the superstructure is raised these can be knocked out and the permanent posts placed, resting their bottom ends on a broad flat stone, to form a base or foundation footing. If the supporting posts or piers be not placed or built until after the building is erected, then carpenters should exercise good judgment when jacking the girders up, to place them under it and not raise them so much as to strain the building, and it is always desirable to obtain the crown mentioned before. The practice of temporarily shoring the girders, and not placing the permanent supports until after the superstructure is finished, is favored by good builders, and it would be well for carpenters to know just how it should be done. Setting the sill: After the guide is in position the sills are placed on top of the cellar walls, rounding side up and hollow side out, and are very carefully fitted together at the joints and levelled throughout. The last operation can either be done by a sight level or by following the simple method I am now about to describe: Place ⅞-inch blocks at intervening distances on the length of each side, also one at either end, and set a long parallel straight edge on them, also set a true level on the upper jointed edge of the straight edge. The sill must be wedged up, or lowered down until the air bubble in the level tube is exactly in the centre, and each piece must also be wedged up or lowered till the blocks all touch the bottom edge of the straight edge. In all cases the whole length of the sill should bear solidly on the stone work, and it should either be bedded in mortar or made solid with chip pieces of slate, stone wedges or furrings, and these should not be inserted less than two feet apart. Sills are generally kept back ⅞ or one inch from the face of the stone-work, to make the sheathing come flush with it, and allow the water table to project the thickness of itself (usually 1¼ or 1⅜ inch) to keep the water off the stone. Sills must be taken out of wind, that is to say, they must be level all around, so that when the carpenter sights them with his eye (the other being closed) the surfaces will show as one line. All sill joists will require to be toenailed or spiked to draw them closer together, and the running joists should be nailed dovetail fashion. When sills are made up of two thicknesses of plank, as they sometimes are, they will need to be solidly spiked together, to form one with dovetailed nails. As some of my readers may not clearly understand what is meant by "dove-tailing" nails I will here state that a carpenter dovetails nails when he drives two with the points inclining to or from each other, so that they form, as it were, a "dovetail."

WATERPROOF CELLARS.

A cellar can be so constructed as to be waterproof if the bottom or the floor is first covered with cement, the walls built thereon laid in cement and the exterior of the walls covered with cement.

This makes practically a watertight basin. The cement used must be the best Portland cement, one part; clean sharp sand, one part. After a cellar is built it is not so easy to make it waterproof. Still it can be done. Cover the exterior of the wall with the above cement, ditto the bottom, and work the cement in under the bottom of the wall.

If these directions are followed, you will succeed. But if cheap materials are used, and the work badly done, you will be sure to fail.

BRITISH COLUMBIA.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

THERE is very little in the way of building news to report at present as architects and builders in this province in common with those in other countries are feeling the effects of the world-wide commercial depression.

The only piece of news I can think of at present is in connection with the new post office and customs house in Victoria. Things being so quiet, the Council of the British Columbia Institute of Architects thought it would be beneficial to the provincial architects if the new public buildings were open to competition among them, and therefore on the 19th February of this year wrote to the Minister of Public Works—Hon. Y. A. Ouimet—pointing out the advantages, etc., to be gained by such a course; reminding him of the fact that for the Victoria Legislative Buildings, for which 65 plans were submitted, we had two in the first five in the Province, and it is now being carried out by a local man. This letter, by an oversight, I suppose, was never acknowledged, although it was backed by our two senators and four of the local members. The only intimation that the request has been refused is contained in the enclosed cutting which appeared in the Ottawa Correspondence of the Victoria Colonist on 1st April. The paragraph speaks for itself:—

"Col. Prior and Mr. Earle have been busily engaged in the departments during this week. Both are anxious to push the officials of the Public Works department, so that a start may be made on the new public buildings at Victoria as soon as the next fiscal year commences. The architects of the department are busily at work on the plans, the application of the B.C. architects to be allowed to compete amongst themselves for the preparation of the plans and specifications having been summarily refused, as was to be expected. While, doubtless, professional men in your Province would have been glad to have had the opportunity to have made the drawings of the new buildings, when it is considered what a precedent would have been created if the request had been granted, little wonder that the Government refused it. A staff of architects, under the charge of Mr. Fuller, is kept at the department for the purpose of carrying out this kind of work. Mr. Fuller himself is one of the most competent men on the continent of America. Against a large field of competitors he won the first premium with his plans of the present Parliament Buildings in this city, and after that beautiful building was completed Mr. Fuller was successful in gaining the first prize for his plans of the present capitol at Albany. The fact that he was successful in securing these important prizes in his profession is conclusive proof as to his ability. Mr. Fuller has made a rough sketch of the proposed building at Victoria, which it is expected will cost from $250,000 to $300,000, but when I spoke to him a little while ago he was then inspecting the grades of the street in the vicinity of the site before getting down to real work. The two members from your city are satisfied that the Government will put up a building which will be as much a credit to the Dominion as it will be to the city."

HAMILTON, ONT.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The City Council have appointed Mr. John Anderson City Building Inspector, at a salary of $650 per year.

I forward to you for publication as a matter of interest to your readers in this and other cities the clauses affecting architects and contractors contained in the new Building By-Law which has recently been adopted by the City Council of Hamilton.

2. The Council shall from time to time appoint a competent, practical and discreet man to be inspector of buildings and of fire limits and private drains.

3. The duties of the Building Inspector shall be as follows:

(a) He shall receive and take good due care of all plans and descriptions of buildings deposited with him under the provisions of this By-Law and record the same in a book to be kept in his office for that purpose, and shall keep such book properly indexed and open for inspection and reference, and issue permits in accordance with the terms of this By-Law, and he shall also record in a book to be kept by him all reports and complaints made to him as Building Inspector.

(b) He shall inspect all buildings while being erected, altered or enlarged within the City, and all scaffolding put up or used in connection therewith, and also the erections placed by the builder or contractor upon any street, lane or alley adjacent to any such building or any obstruction or want of repair in any such street, lane or alley caused by the deposit of building material or by the carrying on of the works.

(d) He shall inspect the drains of all buildings in the course of erection, and also all drains made or re-laid from any buildings already erected and see that such draining is done in a thorough manner, and shall keep a record, of every inspection, and of his decision and action thereon in a book to be provided by the Corporation for that purpose, and shall make in such book a small diagram showing the location of each drain therein referred to.

(e) He shall inspect the drains connected with or leading from or situate in any building or premises in the City of Hamilton when requested by the Medical Health Officer, or by the Sewer Committee, or the chairman thereof, to do so, and if he finds the same to be out of repair or not properly constructed, or otherwise defective, or the drains not properly trapped or ventilated, he shall notify the owner or owners thereof in writing, calling their attention thereto and calling on them to re-construct, alter or repair the same.

4. It shall also be the duty of the Building Inspector to enforce the provisions of this by-law, and that he may able to do so in all respects, the Street Commissioner shall notify him of the intended construction or reconstruction of any pavement where conductors or gutter pipes are to be connected with the sewers under section 35 of this by-law, and also of any violation which may come under his notice of the provisions of this by-law affecting the streets, sidewalks, pavements or sewers of the city.

5. All that part of the City of Hamilton embraced in the following limits or boundaries shall hereafter constitute and be known as the fire limits of the City of Hamilton: Commencing on the westerly limit of Wentworth street at its intersection with the lands of the Grand Trunk Railway Company, thence southerly along Wentworth street to the lands of the said Company, formerly belonging to the Hamilton & Lake Erie Railway Company, thence in a northwesterly direction along the northerly limit of said lands to Young street, thence westerly along Young to Ferguson avenue, thence southerly along Ferguson avenue to the John street mountain road, thence in a southwesterly direction along said road to the point where that road is intersected by the short road leading up the mountain in a southwesterly direction from the head of John stree, thence in a straight line in a northwesterly direction to Aberdeen avenue at its intersection with the James street mountain road, thence westerly along Aberdeen avenue to Locke street, thence northerly along Locke street to King street, thence westerly along to Dundurn street, thence northerly along Dundurn street and in continuation of the line of that street to the lands of the Grand Trunk Railway Company, thence in a straight line in a southeasterly direction to Barton street at its intersection with the east side of Oxford street, thence easterly along Barton street to Queen street, thence southerly along Queen street to Clarence street, thence easterly along Clarence street to Hess street, thence easterly on Cannon street to Railroad street, thence northerly on Railroad street to Mulberry street, thence easterly on Mulberry street to Bay street; thence northerly on Bay street to the southern limit of the lands of the Grand Trunk Railway Company, thence easterly along the southerly limit of the lands of the said Company to the place of beginning.

6. No person shall commence the erection of any building or part of a building, of the cost of more than $100, within the City until he shall have deposited with the Building Inspector a ground or block plan showing the level of the cellar and basement thereof with reference to the grade line of the adjoining street or streets as laid down or recorded in the office of the City Engineer, and also a description showing the materials with which the walls of the building are to be constructed, and has obtained a permit from the Building Inspector to proceed therewith. Every contractor or builder shall produce to the Building Inspector for inspection whenever required by him, the plans of any building which such contractor or builder may be erecting within the City Limits.

7. Every building, or part of a building made, constructed or placed within the said fire limits, shall be built with outer walls of iron, stone or brick, and when such building or part of a building is built with outer walls of iron, such walls shall not be less than one eighth of an inch of iron in thickness; when the outer walls are built of stone or brick, and such building or part of a building is more than one-and-a-half and less than three storeys in height, the outer walls shall be at least eight and one half inches in thickness, and when three storeys in height, the outer walls of the first and second storeys shall not be less than twelve inches in thickness and of the third story not less than eight and one half inches in thickness, and when more than three storeys in height the outer walls of the first story shall not be less than sixteen inches in thickness and of the second storeys not less than twelve inches and of the upper storey not less than eight and one-half inches in thickness,

(a) Every mansard roof shall for the purposes of this by-law be considered as a story, and such storey must be divided by brick or stone partition walls as hereinafter provided when such partition walls are extended to the story next below it.

(b) Every building within such fire limits which is to be divided into one or more stores, tenements or dwellings, and whether the same is being newly constructed or is being altered or rebuilt, shall be so divided by brick or stone partition walls running from the front to the rear of such building and extending from the foundation to the full height of each partition, such partition walls to be not less than eight and one-half inches in thickness, if not extending more than three storeys in height, but if extending beyond that height, such partition walls up to and inclusive of the third storey shall be not less than twelve inches in thickness and the partition walls above the third storey shall not be less than eight and one-half inches in thickness, and all such partition walls where they divide the top storey of a building shall be continued and built up to a height of twelve inches above the roof.

(c) Where any hall or large room is to be constructed on an upper storey, and is to extend over two or more of such stories, tenements or dwellings, the party walls shall be carried from the foundation to the top of the floor joist of such a hall or room, and the flooring of said hall or room where passing over the tops of such partition walls shall be solidly bedded upon a half inch coating of asbestos mortar.

(d) In all cases the ends of any and all joists resting in or upon any wall or partition shall be at least four inches apart in each direction and any space intervening between the ends of such joists shall be filled with brick and mortar.

(e) No wall or part of a wall of any tower within the City Limits shall be built upon any wooden beam or wooden girder or support.

(f) Every elevator shaft shall be constructed with brick walls not less than eight and one-half inches in thickness, with iron doors to each opening, commencing at the lowest point reached by such elevator and extending at least five feet above the roof of the building, and the roof of each elevator shaft shall be formed by a skylight.

8. Any one or two storey frame building already erected may be bricked up with four-inch brick walls within said fire limits, if placed on a stone foundation,

9. All roofed buildings within the fire limits shall be finished externally with tin, iron, zinc, copper, slate, tile or felt and gravel, or with shingles laid in hair mortar, not less than one quarter of an inch in thickness, or with shingles laid on fire-proof felt or with some other material of an incombustible nature, and no roof of any building already erected in the said fire limits shall be re-laid or re-covered except with materials hereinbefore enumerated.

10. Nothing herein contained shall be so construed as to prevent the erection within the said fire limits of any building constructed of material other than with walls of iron, stone or brick, not exceeding 216 square feet in area and 16 feet in height at the highest part of the roof thereof, or to require such building to be roofed in the manner hereinbefore directed, provided such building shall not front upon any street; nor shall more than one such frame building be erected on the same lot or premises. No building with outer walls other than of iron, stone or brick, shall be built within the area bounded by Ferguson avenue on the east, Hunter street on the south, Bay street on the west, and Cannon street on the north; or within the area bounded by Ferguson avenue on the west, Main street on the south, Wellington street on the east, and King William street on the north.

11. No building or part of a building within the fire limits, other than with main walls of brick, stone or iron shall be raised, enlarged or removed to any other place within the same, nor shall any such building be removed into the fire limits; nor shall any wooden building within said limits which may hereafter be damaged to the extent of fifty per cent. of the value thereof be repaired or rebuilt, nor shall such building, where the damages are less than fifty per cent. of its value, be so repaired as to be raised an additional storey, or so as to occupy a greater space than before the damage thereto, but nothing herein contained shall prevent any one from putting a stone or other substantial foundation under any existing wooden building, such foundation not to be more than four feet above the established grade of the adjoining street, nor shall it prevent any one from removing a wooden building towards the rear of the lot on which it stands, provided it is not placed within two feet of the land of any adjoining owner, or of any other wooden building on the same lot or premises.

12. Any owner or contractor who shall build or aid in the erection of any building or any part of a building within the fire limits, or shall remove or assist in removing any such building, or shall repair or assist in repairing any damaged building contrary to any provisions of this By-law, shall be subjected to the penalties hereinafter imposed.

13. Any building or erection which may be constructed or placed in contravention of this By-law may be pulled down or removed, at the expense of the owner thereof, by or under the direction of the Building Inspector, but it shall be the duty of the inspector, before pulling down or removing such building or erection, to obtain the consent of the Market Fire and Police Committee or of the Mayor to his so doing, and to give two days' notice to the owner or builder requiring him to pull down or remove such building or erection.

14. All public buildings, hotels, halls, theatres, factories and schools more than two storeys in height shall be provided with two or more fire escapes, securely fastened to the outer walls of such building, hotels, halls, theatres, factories or schools, and connected with one or more windows in each storey except the first.

16. Every chimney within the limits shall be carried to a height of not less than six inches above the ridge or deck of any roof carried by or connected with or abutting upon the walls to which said chimney is attached, and where a chimney is used to carry away smoke or noxious vapors from any manufactory where an engine and boiler of more than twenty-horse power are used, such chimney shall not be less than seventy-five feet in height above the level of the street adjoining such manufactory, and shall be built entirely of brick, laid with good mortar.

17. No timber shall be placed within one foot of the inside of any oven, copper still, boiler or furnace, nor within four and a half inches of the inside of any flue.

18. No person shall hereafter place any furnace or stove in any house or building in the city, without leaving twelve inches clear from any wood-work immediately above such furnace or stove, and nine inches from any wood-work opposite the sides of the same, and no person shall place, or maintain or use any furnace upon or over a wooden floor unless there is immediately underneath the furnace and extending a distance of four inches on each side beyond the outer walls of such furnace a bed of concrete not less than six inches laid in mortar, and there is also an air space of at least three inches between the furnace and such bed.

(a) All open fireplaces or grates shall have the hearth laid upon trimmer arches of brick or upon iron girders.

19. No pipe or funnel conveying steam or hot air shall be fixed next any public street or highway on the front of any building, nor shall any exhaust steam pipes be allowed to enter any sewer, nor shall any funnel, pipe or flue for conveying fire or smoke be fixed on the inside of any building nearer than twelve inches to the face of any timbers or roofs, ceilings or partitions; nor shall any such funnel, pipe or flue pass through any timber framing, or partition of wood, or wood or lime, or through any wooden floor, in any house, outhouse, fence or building whatever, within the said City, unless there shall be a space of at least six inches clear between the said funnel, pipe or flue and such framing, partition or floor, and unless the same shall pass through a chimney of stone, or brick or mortar, or shall be encircled by a rim of solid stone, or brick or metal, not less than three inches wide, and equal in thickness to the full finished thickness of the framing through which such pipe shall pass.

24. When any building, buildings or scaffolding in course of erection within the City limits shall be considered unsafe by the Building Inspector, he shall at once notify the owner, contractor or agent to make the same safe and secure, and every person notified, who fails within twenty-four hours to comply with such notice, shall be subjected to all the penalties of this By-law.

27. No person shall deposit or place in any public street, land or alley in the city any material to be used in the erection of any new building, or the repair or alteration of any old building, at a cost of over $100, until a plan and description in accordance with the requirements of section 6 of this By-law have been deposited with the Building Inspector, and such person has obtained from the inspector a permit in writing in the form appended to this by-law for the placing of such material in such street, lane or alley, and in all cases where such plan and description have been so deposited, and it is necessary to use any portion of such public street, lane or alley, for the placing of such material, the Building Inspector shall give a permit in the form appended to this By-law.

28. No person shall, either personally or through any one acting for him or with his authority, deposit or place any building material in or upon any public street, lane or alley within the limits of the city, except for the purpose of building or repairing, and in every case such building material shall be so placed as not obstruct the surface drainage of such public street, lane or alley, or the free use of any public hydrants, or to occupy more than is necessary of such public street, lane or alley, and in no case more than one-third the width thereof in that portion of the city bounded by Catharine, Hunter, Bay, and Cannon streets, and in that part of King street between Catharine and Wellington streets, no more than one-half thereof in any other part of the city, the space so occupied not to extend along such street, lane or alley, further than the frontage or depth of the lot so being built upon except that it may extend in front of the lot on either side, so long as the occupant of such adjoining lot may consent thereto; provided always that if the owner or tenant of the real estate on the opposite side of the street, lane or alley shall require at the same time to use any portion of the street, lane or alley for the deposit of building material, then, in such case each party shall be restricted to use one-fourth of such street, lane or alley instead of one-third as aforesaid in that portion of the city bounded by Catharine, Hunter, Bay and Cannon streets, and in that part of King street between Catharine and Wellington streets, and to the use of one-third of such street instead of one-half thereof in any other part of the city, but every lane or alley must be kept open for traffic to a width of not less than eight feet, and such material shall not in any case be allowed to remain in any public street, lane or alley, for any longer time than may be reasonably necessary for the completion of the work for which such building material is being used.

29. Every person who shall deposit or place any building material upon any public street for any of the purposes hereinafter mentioned in that part of the city bounded by Catherine, Hunter, Bay and Cannon streets, or in that part of King street between Catherine and Wellington streets, shall, while any part of the material remains upon such street, enclose and keep enclosed the ground thereby occupied with a close board fence of a uniform height of not less than six feet, the public sidewalk to be left clear in all cases where it is not necessary to occupy it, and to be roofed over, wherever necessary, at a height of not less than eight feet above the level of the sidewalk with two thicknesses of one inch boards, and where it is necessary to occupy the sidewalk with building material, a plank sidewalk three feet wide shall be made by the person depositing the building material, such sidewalk to be made immediately outside of the said fence, and the ground covered thereby shall be reckoned as part of the space which the person depositing the building material is allowed to occupy.

30. Every person who shall deposit or place any building material upon any public street for any of the purposes hereinbefore mentioned in any part of the city other than that portion thereof bounded by Catherine, Hunter, Bay and Cannon streets, or that part of King street between Catherine and Wellington streets, shall, while any part of the material remains upon such street, enclose and keep enclosed the ground occupied thereby with a board fence at each end of sufficient height and strength to fully protect the public from injury or danger therefrom, and if the public sidewalk shall be enclosed within such fences, he shall make a sidewalk three feet wide immediately outside of said enclosure, and the ground covered by such sidewalk shall be reckoned as part of the space which the person depositing the building material is allowed to occupy.

31. The fence, roof and sidewalk mentioned in the preceding paragraphs of this section shall be removed by the person by or for whom they were erected as soon as the building material enclosed thereby has been used or removed, and he shall also thereupon put the street and sidewalk where such material has been deposited in as good repair as it was before such material was placed thereon.

32. Whenever any person or persons, whether contractors or proprietors, shall be engaged in the erection or repairing of any building or other structure whatever within this city, and shall cause or permit any building material to be placed on any public street, lane or alley in the said city, and whenever any person or persons who shall be engaged in constructing any sewer or laying any gas, water or other pipes or conductors, in or through any of the streets, lanes, alleys, highways, sidewalks or other public places in said city where persons pass and repass, whether by appointment of the city or its agents, or its contractors, or otherwise, it shall be the duty of all such persons to protect the public from injury therefrom by placing a sufficient number of red lights upon such materials, rubbish, goods, wares and merchandise, heaps, pits, excavations or any other thing so caused or permitted by them to be or remain in or at any of the places above mentioned, and in such manner as to enable the same to be distinctly seen by all passers by and to continue such lights from dusk till daylight, during every night in which any such obstructions are allowed to remain in or at such place, and if such materials or obstructions are enclosed by a fence such lights shall be put on or above the fence, and no person shall, without the consent of the person or persons placing such lights, put out, remove or obstruct the same, or any of them, between dusk and daylight.

33. No person shall allow building material of any kind under his control to remain in any public street, lane or alley after dark without being closely piled, and being also sufficiently lighted in the manner hereinbefore required, or to remain in any public street, lane or alley, in any other manner or for any other purpose, or for any longer time than is permitted by this by-law, nor shall any person put any fence or obstruction or allow any fence or obstruction under his control to remain in any public street, lane or alley, in any other manner or for any other purpose, or for any longer time than is permitted by the provisions of this by-law.

35. No owner or occupant of any building shall place or construct, or authorize the placing or construction of any eavetrough, conductor, water-pipe or gutter pipe so as to permit or cause the water from the roof of such building to escape upon, flow over or run across or upon any public sidewalk, and the owners of buildings hereafter erected or built shall connect all conductors or gutter pipes upon that part of the building abutting upon any street with the sewer upon such street, if any there be, and whenever the pavement upon any street, not being a wooden sidewalk, is being constructed or reconstructed, the owners of all buildings abutting upon the street shall connect with the sewer, if any, upon such street every conductor, water pipe or gutter pipe, the water from which would otherwise flow over or upon such pavement.

36. No porch, or bay window, or steps, or other structure shall encroach upon or extend over the line of any street or alleyway.

38. Before any part of a private drain or sewer laid or constructed in or from any building or buildings in the City of Hamilton shall be covered up, or enclosed, or hidden from view, it shall be the duty of the drain layer, or other person or persons having charge of the laying or construction of such drain or sewer, to give notice in writing to the Building Inspector, or at his office, that such drain or sewer is ready for inspection by him, and he shall thereupon, without delay, inspect the same, and it shall be unlawful for any drain layer or other person or persons to cover up, or enclose, or hide from view any part of such drain or sewer until the Building Inspector has approved of the same, except in cases where from the presence of quicksand or from the nature of the soil it is impossible to keep the drain or sewer open for inspection.

(a) No brick or wooden drain shall be allowed within any building, but all drains within any building shall be of heavy cast iron pipe or of salt-glazed vitrified sewer pipe. Cast iron pipe when used within any building shall be oil finished inside and outside, with joints caulked with oakum and molten lead. All cast iron pipe when laid beneath the surface within any building, shall be not less than one-third of an inch thick. Vitrified sewer pipes when laid within any building shall be of the make known as *double strength*, and shall be of a thickness of not less than one-tenth the diameter of the pipe; the flange shall be not less than one and three-quarter inches deep; all flanges shall be carefully filled with the best Portland cement. The upper surface of any sewer pipe shall be not less than four inches below the foundation of any wall under which it passes.

39. If on examination of any private drain or sewer it is found that the same is out of repair, or is not properly trapped or ventilated, or is in a condition that is likely to be dangerous to health, the Building Inspector shall give notice in writing to that effect to the owner of the premises with which such drain or sewer is connected, and if for thirty days after receipt of such notice such owner or owners shall have refused or neglected to make all proper repairs or alterations he or they shall be liable to the penalty imposed by this by-law, and such penalty may be imposed for every day after the expiration of thirty days that such refusal or neglect shall continue.

41. Any person or persons guilty of a breach of any of the provisions of this by-law shall, for every such breach be subject to the penalties imposed by chapter seventy-one of the Consolidated By-laws of this City.

The management of the Toronto Technical School have decided that the drawings made by the students of that institution should be exhibited at the Toronto Industrial Exhibition.

The Grand Trunk Railway Company against whom the courts recently gave a verdict for $3,500 in a suit brought by Mrs. Dr. Oldright, for injuries sustained by falling into an excavation at the new Union Station, will now fight the matter out with the contractor, Mr. McDermid. Mr. Justice Street in the previous case expressed the opinion that the contractor was not liable for the accident.

The Engineering Society of the School of Practical Science, Toronto, have elected officers for the ensuing year as follows:—President, A. E. Blackwood; Vice-President, I. Armstrong; Recording Secretary, J. C. King; Librarian, F. H. Guernsey; Corresponding Secretary, F. J. Robinson; Treasurer, T. D. Wright; Fourth Year Representative, R. H. Angus; Third Year Representative, R. J. Campbell; Second Year Representative, E. P. Lea; Representatives on Varsity staff, Editor, J. E. Moore; Business Manager, E. W. Macpherson.

WINNIPEG.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

As the remarks made by your correspondent in his letter for March, re New Court House Addition, Winnipeg, together with Mr. Wheeler's letter, which appeared last month, have aroused public interest in the matter, no doubt the following paragraph, with which the Free Press, April 5th, 1893, closed a long article on the subject, will prove interesting reading to your western subscribers :

"Some interest is felt by the legal profession in the plans of the new court house, as well as the site. Of the plans submitted that of Geo. Browne is generally regarded as the most suitable, and it is said, should be the one selected. Influences are at work, however, in Government circles, so the Free Press is informed, that give the loudest Government shouter the inside track. But it is regrettable that in a large and permanent addition to the architecture of the city, business methods should not prevail, and the best man and best plan be selected."

The wet weather we have been enjoying, or otherwise, has delayed building operations, which is most unfortunate for the working men, who have been looking forward to the spring work to enable them to earn something for themselves and families, after their enforced idleness during the winter months.

After much discussion the Winnipeg School Board passed a resolution last night, authorizing the Building Committee to obtain plans for an eight room school building, to be erected on the site of the present Argyle school, the latter having been found too small to accommodate the increasing number of scholars. It is an encouraging sign of the times—the way the "infant industry" flourishes notwithstanding high tariff, low price of wheat, and questionable freight rates. No matter where one goes, children seem to be increasing and multiplying, and the everlasting cry for "more school accommodation" is joyfully heard by all connected with the building trades, though other taxpayers are inclined to think the industry should be restricted.

The Portage la Prairie School Board have instructed Mr. Browne to prepare plans for three schools, one frame building, to contain one room ; two brick buildings, one to contain two rooms, another to contain four rooms, arranged with hat and coat rooms, and heated with hot air ; cost $15,000.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The new building for the Bank of Toronto, at the corner of St. James' and McGill streets, has just been completed, and the owners have gone into occupation. The building occupies one of the most advantageous site in the city, and Messrs. Taylor & Gordon, the architects, are to be congratulated on having made good use of the opportunity offered by the location for the erection of an imposing and pleasing structure. The building is designed in the Romanesque style and is built of imported red sandstone. The exterior is enriched with a large amount of carving, the credit for the execution of which belongs to Messrs. Holbrook & Mollington, Toronto. The banking room is large, airy, and exceedingly well lighted. The floor is laid with mosaic. The walls, to a height of eight feet, are lined with colored marble, with which the decoration of the upper portion and ceiling is made to harmonize. A very handsome semi-circular counter, in which marble, antique brass, plate glass and grille work have been judiciously employed, is a striking feature. The wood-work is in mahogany. The upper portion of the building has been suitably fitted up for office purposes.

Enquiry amongst architects, real estate dealers, etc., indicates that while the number of buildings to be erected this year will probably fall short of 1893, the amount of money to be expended is likely to equal, at least, that of former years. The new lien act will operate to check speculative building and operations by small contractors, which is not, generally speaking, regarded a misfortune. On this point Mr. Lacroix, the city building inspector, says : "This enactment will result in eliminating a certain number of these contractors, who, without any care as to how they will attain their object, begin a building, not knowing if they will be able to finish it. These contractors cause endless annoyance to the proprietors, the architects, the workmen and the dealers in building materials. If this law causes them to disappear, it will assuredly be so much to its credit." Building for residence purposes will be less in extent than usual, but in character will show improvement, and will be largely confined to the west end of the city.

Some of our local architects have done very little architectural work for several years past, their services having been in demand as valuators in the case of property required to be expropriated by the city for street widening purposes. This work is said to have proved very remunerative, particularly in the case of the city's valuators. One firm of architects are said to have received in fees in one year for work of this kind not less than $20,000.

Among the important buildings to be put under construction the present season are the new Canada Life offices, a French opera house, Laval University, residence for Mr. Hugh Graham, academy at Cote St. Antoine, school building for St. Bridget's parish, and new market buildings.

The union carpenters of this city have gone on strike because of the refusal of the contractors to accede to their demand for a nine hour day at 20 cents per hour. Some of the employers have granted the demand, but the larger proportion have not. The feeling on the part of contractors to whom I have spoken on the subject is that they have less objection to paying the rate of wages asked for than to being subjected to the dictation of the unions as to what men they shall employ. In a word, they object to hand over to the unions the control of their business in this respect. As yet no serious injury has resulted from the strike, but should the difficulty continue much longer, the bricklayers will be forced to stop work. Meanwhile, the contractors are beginning to advertise for non-union workmen. If an understanding is to be arrived at, the present is therefore the most favorable opportunity, as once the places of the strikers become filled, the contractors will be in a less favorable mood to enter into negotiations for this object.

QUEBEC.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The report of Mr. Chas. Baillairgé, City Engineer, covering the past two years, which has recently been published, contains some information concerning the number and cost of buildings and other improvements constructed during that period, and points to the necessity for the carrying out of other works of like character in the near future.

The number of houses erected during the two years covered by the report is stated to have been not less than three hundred. The total cost of new buildings is placed at $1,841,944. The more important buildings included in this estimate of cost were referred to in detail by Mr. Baillairgé in his article in your New Year Number. This estimate of cost does not include many buildings erected by builders without the supervision of an architect. The value of these is placed at $400,000 additional. As to future improvements the Council are recommended to borrow half a million dollars to be expended on street paving. The use of granite on a concrete foundation is recommended for this purpose.

THE MARITIME PROVINCES.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

For some time the manufacturing committee of the St. John Board of Trade have been endeavoring to induce some gentleman, or company of gentlemen, to erect a pulp mill within convenient proximity to the city. On behalf of the city they offer good inducements in the way of exemption from taxes for a certain period, etc. A few months ago a French gentleman, a manufacturer of pulp machinery, was in St. John. With a number of the leading citizens he visited what were considered to be the best sites for such a mill. He expressed himself as satisfied with the inducements offered him. Since then considerable correspondence has been carried on between the Frenchman and the committee. The former is still willing to expend some $80,000 in a mill, providing the people of this city take a certain amount of stock. The matter is pending now. There would be no difficulty in obtaining a site where a sufficient quantity of wood could be procured to last for many years.

Last summer, and, in fact, the summer before as well, the business portion of Fairville, a suburb of St. John, was destroyed by fire. The citizens are again at work erecting shops, dwellings, etc. Quite a boom is expected there this summer.

When W. C. Van Horne, president of the Canadian Pacific Railway, was in the city a few weeks ago, he was led to consider the advisability of erecting a summer hotel here. He was interviewed on the matter and expressed himself as strongly in favor of the project. He thought an hotel, if erected on very much the same plan as the C.P.R. hotel at Quebec, would not only prove a valuable acquisition to St. John, but that it would be a paying investment to all who should take stock in it. In fact, so favorable was Mr. Van Horne to the proposed scheme, that a number of sites were picked out and the probable cost computed. It was the opinion of the C.P.R. president that a building such as he should wish to see erected for the purpose would not cost less than $500,000. In the first place the hotel would occupy one of the most valuable sites in the city. Its capacity would be sufficient to accommodate one hundred guests. It would be thoroughly furnished and everything in connection carried on on modern and up-to-date principles. A number of the leading business men of the city have volunteered to take stock in the hotel to a considerable extent, and from what has recently come to hand there is every reason to believe that the scheme will not end in talk.

The numerous and expensive buildings which are being run up in Sackville, N.B., this summer has caused quite a boom.

Two new stone quarries have been opened at Westcock, near Sackville, this spring. It is said that those who are interested in the quarries at Woodpoint and vicinity are also at Westcock and endeavoring to get a branch line built to connect with the I.C.R. at Sackville. The present method of shipping the stone on scows to Sackville and from there by rail is very unsatisfactory and the new branch will meet with encouragement.

A. H. McC.

STUDENTS' DEPARTMENT.

C. A. & B. COMPETITION FOR A DRUG STORE.

This is not a very satisfactory competition. The competitors have interpreted the conditions liberally in various directions and have not in spite of this presented as good designs as might have been expected.

"Italia" is without doubt the first. Considering the limited space at his disposal, too much has been made of the dispensary. The space left for customers between the counter and the show window is barely five feet. The second step at the shop door is a serious mistake, and the shop entrance door is too small. The arrangement of the dwelling place and its separation from the shop so as to secure without awkwardness the independence of each, is well managed, and the free communication from kitchen to cellar an excellent idea. But the sizes of the rooms in the dwelling house will not bear too close inspection. An extremely small kitchen is not impossible for use and has even a point in its favour, but an extremely small dining room has nothing that can be said for it, particularly when it is on the wrong side of the house. The dining room should have taken the place of the parlour and been brought out to the hall line. It would then have been sufficiently wide, though still only 11 feet, and would get the eastern instead of the western sun. The parlour would then be the smaller room and we may suppose it a reception room and the dining room to be the family living room. At the bottom of this difficulty is the external centralization of the front windows on the first floor which was quite unnecessary either for an Italian effect or to relieve the beam over the shop window, which latter end indeed is not achieved. The fenestration of first floor should be arranged to suit the rooms inside and then there would be no need of the elliptical windows in which the designer has taken refuge. Had the chimney been placed on the north wall instead of on the east it might have been used to give a better finish to the north wall. "Italia's" design, though it requires a good deal of criticism, is worth criticism. The others are not only less worth criticism but from the scantiness of the drawings furnished with the best of them give less opportunity for it.

Between "Toledo," "Eros" and "Pill Box" it has been necessary to discriminate by a careful comparison of points. As a result it seems best to give the second place to "Toledo" and the third to "Eros."

"Toledo" has placed a good example before him, and though his efforts between the lintel of the shop window and the cornice storey are misdirected the result though defective in design is not offensive to the taste.

"Eros" has managed to reduce the apparent height of his shop window without reducing the light or opportunity of display. In general taste and design he has a slight advantage over "Pill Box" and is therefore placed third.

"Pillbox" makes a neat drawing though in this as well as in his design he is perhaps not following the best examples. His design is at the bottom common enough and he can only get away from it by enrichments which are inappropriate and only land him in bad taste.

"H2 SO4" also deserves mention rather from the neatness of his drawing than from any solid merit in his somewhat showy design.

"Windsor" is strictly commonplace and apparently makes no effort after a truer kind of design.

"Builder" and "Canadian" are too fantastic both in plan and elevation.

The author of the design signed "Italia" which has been awarded first position, is Mr. J. Melville Millar, Montreal. The design signed "Toledo" awarded second position, is by Mr. Walter Siddall, Toronto. "Eros," who has been placed third would oblige by forwarding his name and address to the editor, as it has seemingly been mislaid.—Ed. C. A. & B.]

STUDENTS' NEGLIGENCE.

It has been remarked in connection with the training of our rising architects, and very truly too, that they have not the advantages that their confreres in England have. By these "advantages," generally speaking, is meant, ancient buildings, the use of libraries and a general higher tone of art in all their surroundings, than is possible in a young country. But there is one particular advantage, that by most students, themselves, here, would be regarded as a disadvantage, but which in after years they may come to regret very much they were without in their younger years. It is simply this, that students of professions in England must pay for their education, instead of, as here, being paid while they acquire it.

Let us for a moment compare the ways in which the two systems work. The principal who takes a pupil in England receives a premium, in return for which he gives a portion of his time to the youth and puts within his reach such practical information as he may gather for himself from visits to the works in progress, and again the pupil desires to make the most of his time and to profit by the opportunities put in his way. He does not hesitate to ask for information, because it is his right to receive it, and he is paying for it, and the more questions asked, the more there are to ask, because in no way does the eye of the mind become more effectually opened than by questions.

Here, the principal, who has to pay his pupils while he is trying to make them worth their pay, is placed at an immense and unfair disadvantage. The student, in general, thinks more about his pay than acquiring knowledge, and as has been shown over and over again by our students, do what you will to help them in their studies, not ten per cent. of them show any desire to profit by your actions on their behalf outside their office hours.

Students' Architectural Clubs have been started over and over again by the real, bona fide students ; every one has died an untimely death, and the cause of the decease has not been entirely owing to the departure of their worthy fellows for wider spheres of work and experience. It has been because there were none to take their places, and keep up the weekly meetings —none who would, for their sole advantage, respond to the efforts of the many practising architects who took the trouble to prepare lectures and to go down and deliver them at no small sacrifice to themselves, to the two or three earnest young men bound on progressing, and the empty chairs of a couple of dozen who ought to have been there. Many a time has it been said to these students, "Why do you not ask questions ?" It is not possible, in a lecture, that the subject should be fully explained to every quality of mind in the hearers ; some part or other must require further elucidation to make it clearer to this or that one," and so on, but from our experience, despite all the opportunities given, we might say that at least half of the students who have had these advantages, never asked a single question. Had they had the advantage of paying good round sums for their professional training, we would guarantee they would be more eager to help themselves ; and as to those in the past, so with those in the present, a time will come when they will one and all say, "How unfortunate it is that I was not forced to make more of my time as a student :—daily I neglected opportunities because I did not see the advantages, and was not forced in any way to use them."

The results of the annual examinations bear out the same facts. The majority of the students who present themselves come up utterly unprepared, and instead of the majority passing, it is the minority only who are successful. We would warn students that these are days in which only the thoroughly proficient can make even a living out of his profession ; the competition is overwhelming ; he who starts on the battle of life unqualified must succumb, and if he does, he has only himself to thank or to blame. It is to be feared that few of the present generation of students will make any mark in the world when they go out from us, and as long as they work only for their pay, there will be little improvement in the race.

INTERCOMMUNICATION COLUMN.

This column is intended to afford a means of correspondence for students, builders and all our readers desiring information they cannot otherwise obtain. Questions for which an immediate reply is required should be marked "Urgent." Names and addresses of correspondents must be sent with their communications, but these may be signed with initials or otherwise for publication.

QUESTIONS.

[19]. I should be obliged if you could tell me the strength of wire ropes as compared with ordinary hemp ropes. I notice that contractors in town use wire ropes a great deal in large buildings for guys and such purposes.—"Country Builder."

REPLIES.

[14]. "Aspirant,"—You might carry up your column to a height of 700 ft. with perfect safety. Average sandstone weighs about 145 lbs. per cubic foot and would require a vertical column of 4158 ft. high to crush the base stones, but they might crack under a column about half that height. It is safer not to trust to more than 700 ft., or from one-sixth to one-tenth the crushing height.—"Science."

[16]. "Frosty,"—The weight of snow, fresh fallen, is from 5 to 12 lbs. per cubic foot. A cubic foot of water weighs a little over 64 lbs. "Frosty" can therefore see, that if his snow will lie until it thaws, and his roof has to support water, he must allow for an increase of weight of from 50 lbs. to 57 lbs., according to the depth of the snow water likely to stand on the roof. For ordinary purposes, for snow moistened and compact by rain, allow from 15 to 20 lbs. per cubic foot.

[17]—"J. L. T."—Trautwine (Edit. of 1886) p 397, gives a description of the making of a sun-dial. It is too long to give here, but if you cannot get hold of the book we will endeavor at some future time to publish it.—[ED. INT. COL.]

[18] "Predicament."—We should require further particulars before we could answer your question. Your site is unusual, therefore a general answer would not suit your case. Let us know the kind of building you intend to erect, and also give a more detailed statement of the nature of the clay.—"M. P."

The following students were granted certificates of proficiency in architectural drawing at the recent examinations of the Toronto Technical school :—W. Bell, J. Michael, C. McPherson, W. R. Bale, E. Stanton.

THE HARMONY AND FUNCTIONS OF COLOUR IN ART.*

BY ANDREW T. TAYLOR, F.R.I.B.A.

(*Continued.*)

These results would be somewhat minimized and modified if you divided the colours from each other by broad lines of black or white or colours. You will find also that if your colour is put on a white ground the colour will be stronger than if you put it on a black ground, because in the case of the white ground it tends to overpower the extra white rays given out by the colour, and in the case of the black ground the extra white rays given out by the colour are increased by those reflected from the black ground.

All this is but the alphabet of colouring. You will find that there are numberless gradations of hue and tint and shade of colour, and on your perception of these and skill in using them will depend your refinement of colour. Many never get beyond the use of the primaries and secondaries and perhaps one or two tints of the tertiaries, while between white and any of the primaries a skilful colorist might make a hundred different shades.

In nature the colours of shadows are always in contrast to their lights, and of positive hues with negative shades; accordingly you find that coloured back-grounds shew out white sculpture best; of these blue is one of the best colours from its affinity with shade, and we know that the Greeks used this a good deal in their back grounds for sculpture, etc. So gold, being in close relation to light, is good for dividing up colours and very useful in decoration, and will go with any colour. This is the reason it is used so much for frames for pictures.

The subject of colour blindness is worthy of attention; and many more persons are either colour-blind or have imperfect colour vision than is generally supposed. This is a very important matter in its bearing on railway officials and employees, as often the safety of carloads of passengers depends on the engineer's correct observation of the colored signals. In France it was found lately that over 9 per cent. of the railway officials were color blind.

The commonest defect is an imperfect impression of red, and many persons can see no difference of *colour* between a scarlet geranium and its green leaves, but only a slight difference in tone. You can see how this would affect an artist for example in the mixing and laying on of his colors, or a salesman in matching ribbons and silk, and other fabrics.

It will be useful to us to know something about the colours of which we have been speaking and which some of you may be indeed using.

A knowledge of his pigments is most important to an artist. Many of the failures of pictures and their grievous change for the worse in a few years after they were painted, are due to this want of knowledge. Both Sir Joshua Reynolds and Turner were great experimenters in colors, and sometimes sacrificed safety and permanence to attain brilliancy and a particular effect. There is no doubt that many oil paintings have altered very much from this cause, and others from successive coats of varnish laid on with intermediate layers of dirt, until what we see now as works of the great masters are often but caricatures of what they were originally. Also with water colours. Recently there was quite a journalistic war as to whether water colours were permanent or faded, and I think there is no doubt that it was conclusively proved that many water colours had undergone material change by exposure to light and especially to strong sunlight, and that certain colours were more evanescent than others.

In colours for the palette you should only use those which possess the following qualification—purity and brightness, body, or on the other hand, as the case may be, transparency, and above all, durability. There are very many beautiful colours, but the necessity of the above qualifications restricts the number to comparatively few. But this is not to be regretted; the tendency is to use too many colours. Many a fine picture has been painted with only three or four tints, and Henner often paints pictures which are lovely in colour and feeling with but three colours. The more you mix colours the muddier you are apt to get them and the more difficult it is to keep purity of tone.

Although White is not properly speaking a colour, yet it is an important pigment, as it enters into nearly all the other colors and is much used in combination in oil painting and in tempera, as it gives light and vividness, as well as easy toning down. White lead is the base of most of the white, and has this defect that it is apt to turn black in time and injuriously affects some colours. Zinc white is durable, but wants the body and brightness of white lead.

For water colour Chinese white is mostly used. It is a preparation of white oxide of zinc mixed with gum arabic, glycerine, etc., and especially in body colour work, is most valuable.

The primary colour Red is, as we found, the most positive of colours. Being so, it is somewhat difficult to manage, and has to be used very sparingly. If you will notice, a touch of red here and there in a picture will brighten it up, and draw attention to itself in the most surprising manner. Nature uses red with very great reserve, and when used, takes great care to tone it down with green or other soothing colour.

Vermillion if of the genuine kind is a good durable colour, and has great body and weight, but for this reason you will find it will not readily mix with other colours.

Indian Red is brought from Bengal, and is an iron ore or peroxide of iron. It is permanent and very opaque.

Light Red is a brown ochre, burned, and is very useful for flesh tints and in landscape.

Lake is a very transparent pigment, and is of several kinds. The scarlet lake is obtained from cochineal, and washes well; it is, however, liable to fade in strong light.

The carmines are also obtained from the cochineal, and work well, but are liable to fade in strong light, and are not permanent with white lead.

Blue is the coldest and most retiring of the primaries, and cools and tones down all colours with which it is in combination.

Ultramarine is perhaps the most beautiful blue that we have, and is prepared from the lopis lazuli, a precious stone found in Persia, etc. It is very transparent and pure, and has great brilliancy and permanency. It is largely used for skies. Unfortunately it is often adulterated, its costliness being a strong temptation.

Cobalt is prepared with metallic cobalt or its oxides, and is next to ultramarine in its brilliancy, and in water colour, works even better than the other. It is permanent so far, but is affected by time.

Prussian Blue is formed from prussic acid, iron and alumina, and is a deep and strong blue of great body and transparency.

Indigo is got from plants in the East and West Indies; it is also very powerful and of great body and is transparent. In mixture with white lead it is fugitive and is not so reliable as Prussian blue.

Yellow is the remaining primary, and is the nearest to light; in varying tones it is much used in nature. It is akin to gold, and was often so used in old manuscript.

Chromes are a modern discovery, and are mostly chromates of lead. They are brilliant and beautiful, but are not safe colours, as after a time they lose their purity and become dull and heavy. They are also injurious to some blues when mixed.

Naples Yellow is a compound of oxides of lead and antimony, and was originally prepared at Naples, hence its name. It is a pleasant warm tint, is opaque and covers well, and in an oil medium is permanent and good, but will ultimately change its colour, in water colours, and must not come in contact with oxides of iron of any kind.

Yellow ochre is a native pigment found in most countries.—The ochres are very useful and practically permanent.

Raw Sienna is an iron ore, but it is very useful and is transparent, and best of all, is permanent.

Cadmium Yellow is prepared in different shades and is a strong, light, pure useful colour; it is prepared from the metal cadmium, by precipitation with solution of sulphuretted hydrogen. It is permanent and good.

Gamboge is obtained from certain trees in India, and is of a gummy resinous nature. It is a bright, transparent, delicate yellow, and is exceedingly useful, not being affected much by sunlight or impure air, but it does not show in gaslight.

Indian Yellow has been long used in India, and is a beautiful, pure yellow, but it is not lasting, and in oils is very fugitive; it has a very strong unpleasant smell, and is not a safe colour.

We will not for the present take up the secondary and tertiary colours, as they are in large measure products of the primaries, and the subject is too large to treat properly just now, but rather go on to look at color as illustrated in painting, architecture and sculpture, and first of painting.

All painting was originally a hand-maid to architecture, that is, was employed to beautify parts of a building, and was incorporated as part of the same in fresco and tempora work, and therefore, being painted for, and actually at a particular spot, its colour was made to harmonize with its position. The modern pictures, or, as we would say, easel pictures, are much more recent, and being intended to hang anywhere, are governed by no such restrictions, but have each their own key of colour, independent of everything else. It is this that makes a modern picture gallery so confusing and tiring. Every picture is out of sympathy and tone with its neighbor, and if by very skilful hanging this is in any way modified, it can never be wholly got rid of. This is also true to a certain extent in our houses; pictures are bought and hung on our wall which are out of touch and tone with their surroundings—whether it be the furniture, the hangings, or the other pictures—and consequently there must be a certain amount of incongruity. What we call oil painting was practically not known, at least in its modern form, until the beginning of the 15th century. When the brothers, Van Eyck, the Flemist painters, may be said to have discovered it. Nearly all the work done previously to that time was in distemper, and therefore more suited to permanent positions on the walls of churches and other buildings.

Vasari tells us that Jan Van Eyck, who delighted in alchemy, set himself to try various kinds of colours and oils to make varnishes, as artists at that time knew of no way in which pictures on panels could be made durable, and could be washed without losing colour. He made many experiments and at last found that oil of linseed and oil of nuts were the best for drying. He also saw that when the colours were mixed with these oils, not only were they safe from injury by water, but the colours also had more lustre, and the colours blended better than in tempora. The fame of this invention soon spread in Flanders. Even the Flemish artists endeavored to keep the secret of oil painting, and it was not until later that it was known in Italy, and stories are told of Venetian painters disguising themselves and going to Belgium to try to learn this secret. One Antonello, of Messina, was so struck by a picture in oils that had been sent from Bruges to the king of Naples, that he set off for Belgium, and by dint of giving Jan Van Eyck numerous presents and flattering him, he got the secret, and returning to Italy, settled in Venice and painted many pictures in this new method, which could be kept secret no longer, and was rapidly adopted by other artists.

Painting upon the walls had certain advantages; it could not be carried off so readily as an easel picture, nor without risk of ruining it. It is said that the king of France tried hard to get the "Last Supper" of Leonardo da Vinci, which he painted for the friars of San Maria delle Grazie at Milan, transferred to France, but the risk was too great, and it has remained in position ever since, although now but a wreck of its former self. It is pleasant to find the estimation in which great art was held at that time, for we are told that another picture that Leonardo painted about this time, at Florence, was so good that his rooms were filled for days with crowds of people going to see his works as to a solemn festival. And the story of Cimabue's Madonna is well known, how it was considered such a marvellous thing that it was carried through the streets in joyful procession to the Church of S. Maria Novello, where it still is, and when King Charles of Anjou was entertained at Florence, a sight of this picture was considered a very important part of the programme. Would that this love and appreciation for art was as general now as then—Art would need no other stimulus.

As soon as painting in the medium of oil became known, a great change came over the character of the works; the scope of subjects became greatly enlarged; mythology, ancient and current history, classical story were drawn upon, and a great impetus was given to painting generally. Greater richness of colour was attained than was before possible with tempora.

In landscape painting, as in all painting, it is of the first importance that we preserve the clearness of our colour, as has been said by a living artist: "Good painting is like beautiful language, it must express briefly, clearly, forcibly, our meaning; each finishing touch in a picture should be considered like one word in a sentence; to put a number of touches where one ought to suffice is like stammering in painting."

We come now to colour in *Architecture*, and here the same laws of harmony govern as in painting, but being on so much larger a scale, and viewed in connection with the surroundings of nature, the scheme of colour must necessarily be on a much broader and simpler key. Under the sunny skies of Italy they revel in the most beautiful colours on the outside of their buildings, which present a continual feast for the eye of the beholder. The Duomo at Florence and the older Baptistry are glorious in colored marbles, and not a little of the indescribable beauty and loveliness of Giotto's Tower there, is due to its color as seen under soft Italian skies. St. Mark's at Venice, both inside and out, is rich in coloured marble and gold mosaics, mellowed by time into beautiful hues.

It is interesting to know that in all ages, and amongst all peoples, polychromy has had an important place in architecture. Hittorph, in his investigations in Sicily and the Acropolis Selinas and other temples, and recent investigation in Greece, has abundantly proved the liberal use the Greeks made of colour on the exterior of their temples, etc. The custom also prevailed extensively all over France in the middle ages and during the Renaissance, but gradually declined in the reign of Louis XIV. Viollet le Duc, the late eminent architect and antiquarian, made a careful examination of Notre Dame Cathedral at Paris, and found unmistakable evidence that a large portion of the facade had been radiant with colour, and even in England many of our cathedrals there show also remains of colour, but the climate has dealt too rigorously with them to leave much evidence. Somehow when we took to borrowing Roman Orders and Architecture, both in

*Paper read at a meeting of resident members of the Province of Quebec Association of Architects, at Montreal.

England and France, the forms only were reproduced, and the original glittering roofs and mosaic and marble work were forgotten. Increased knowledge on this matter has led of late to colour being much more extensively used, especially in Paris, as in the Opera House, the Hemicyle, the Beaux Arts, and many modern buildings.

Somehow, in northern countries, under dull gray skies and lowering clouds, form was developed largely to the exclusion of colour, and that in the very face of nature's example, for we have only got to leave a building alone and time will soon beautify it with pearly and emerald lichens and mosses, and touch the stones and roofs and timbers with harmonious tints, such as the ruins of castles in Britain and Europe everywhere show. Even here nature will do her best if we will but let her. The monotony and dullness of the average streets of cities are very depressing, especially in manufacturing cities, where we find rows on rows of dirty soot and smoke begrimed houses.

Some years ago, in London, the average fashionable house had a dingy colored compo-cement front, and the back was too dreadful to think of; then there came a revulsion, and armies of painters appeared, and lo! the fronts of the houses blossomed out in claret color, and sage greens, and blood red, and mustard yellow, and other colors hard to give a name to, and although in some cases presenting a somewhat incongruous and piebald appearance, were yet infinitely better than the old. The next stage was better still, that of using honest material of natural pleasing colour, which would withstand the smoky atmosphere. So terra cotta and tile work and warm colour tone were and are used.

Surface applied painted work will not do, but the use of coloured materials themselves seems to be the line on which we shall achieve greatest success.

In New York there was a brown stone period, when a man could not shew himself in society unless he lived in a brown stone house, and so streets and terrace of brown stone still chill our sympathies. New York had also its white marble period, when to live in a white marble house was considered the acme of bliss, and so leprousy looking erections took courage and reared their heads in the streets. Now more pleasing arrangements of material and colour are in vogue—red brick and red stone and warm cream colored stone meet the eye in all the newer quarters, and in combination with the green of the trees and grass, present very pleasing pictures. And to come nearer home, a cut gray limestone house was considered amongst ourselves as the sign of eminent respectability, but fortunately of recent years, red brick and terra cotta and red and buff stone, have been largely employed, alone or in combination, and I cannot but think to the beautifying of the city and the advantageous breaking up of the monotony of our streets.

In more genial and equable climates, where the houses are ugly and commonplace, they are often redeemed and made even beautiful by a veil of green ivy growing up to the top, or by Virginian creepers, or by balconies and window sills full of plants and flowers. It is surprising how a few bright flowers on an outside window sill will brighten up a whole front of a house, and give pleasure to every passer-by. Here it is only in summer that we can attempt such a thing, and alas, the ivy is not available to cover the ugliness of some of our houses. We do not want the exterior of our houses to be like harlequins, but neither do we want them to be like quakers or Gray nuns. We should take a lesson from nature, who never is in monotone, and even where you fancy she is, on closer inspection you will find it made up of a large variety of hues, but all in perfect harmony.

Oriental art differs essentially from ours in its bright melody of colour; they use colours externally of a richness and brightness that would make our hair stand on end, yet always with harmony, congruity and beauty. We cannot, in our climate, use these in such richness or wealth, yet we can and ought to use the softer shades, which have depth of colour without garishness.

So far so good, but possibly some of you may say, "Now coming to sculpture. You surely no not advocate colour in sculpture." And yet if you think, why should one important branch of art be robbed of the charm of colour, and have to depend entirely on beauty of form? It is largely a matter of habit that we have come to expect sculpture in white marble, or else in bronze, which speedily turns black. It seems to suit our matter-of-fact minds, and this matter-of-fact age, that we must have even our sculpture in "black and white," reduced, as it were, to legal exactness.

It was long thought that ancient sculpture was not coloured, but it has been placed beyond all controversy that the Greeks, who were the best sculptors that the world ever saw and will possibly ever see, employed colour to heighten the effects of their sculpture, and never hesitated to cover even the most precious white marble with gold and blue and other colours. Careful examination of many of the sculptures of the Greek temples conclusively proves this, as the remains of the colour is very plain. There is no doubt that the famous Parthenon frieze was colored, and quite recently several sarcophagi were found at Sidon, three of which are Phoenician in character and seven of Greek design of the purest type, without a trace of Roman influence, richly sculptured, and bearing close resemblance to the Parthenon frieze in the horses and beauty of the figures. These show large remains of colored decoration, and leave no doubt whatever as to great development of Greek polychromy in their sculpture, as well as in their architecture. So also the Christian sculpture and Gothic art. There are numberless examples in our cathedrals and old mediaeval buildings of sculpture, both of the figure and of natural forms, with more or less remains of rich colour upon them, on the portions less exposed to the weather than the others. And where we find Greek sculptors and the best Gothic sculptors employing colour in their sculpture, the abstract theorical use of it cannot be condemned. It is in the application of it that we are apt to go wrong. Here very great caution and artistic sense has to be exercised, and Gibson's tinted Venus stands as a warning that there are defined bounds and limits to its application. There are certainly great objections to the use of natural colour in isolated figures, subjects either wholly or partially draped, in that the colour takes away from its ideal and abstract character, and it becomes at once an imitation of a living person, and as such, influences us in quite a different way.

The modern fashion of placing busts about the middle of a room is hardly in the best taste, and isolating sculpture out of its proper sphere, but where it is rightfully employed to heighten the effect of a building and such like, then the necessity for the use of some material of such a colour as to harmonize with the building arises. More especially where isolated statues are placed in our streets to commemorate some noble life or deeds; if they are of white marble they get grimy and streaky and dirty, and the light and shade is crude and hard. If they are of bronze, they speedly become black as a negro, obliterating all the finer lines of expression and fold of garment, and presenting little more than a silhouette against the sky. In one notable case, that of the statue of the Prince Consort in the Albert memorial, in Kensington Gardens, London, a bold departure was made and the statue was gilded all over, but the result was no better than before, and indeed, rather worse, and was christened the "God of Mammon."

I would just mention the beautiful majolica or faience work of Luca della Robbia, which glows from so many of the facades of the Italian churches. They were chiefly figure work of a religious nature—Holy Families, Virgin and Child, Saints, etc.—but so beautifully modelled, and such rich colors burnt in and glazed so as to be almost imperishable—a very suitable material for smoky atmosphere when they could be washed and always keep their brightness and beauty. The secret was so well kept by the Robbia family that it died with them, and we have been unable to get the full brilliancy of all the colours, but a resuscitation of this in some such form would seem to fulfil the conditions of modern times.

I had intended to speak of colour in interior decoration, but it is so large and important a subject that it is worthy of a better place than the close of a paper, and I will conclude in a word by respectfully urging you all to assiduously cultivate your colour sense in the conviction that it will minister to your susceptibility to refined and beautiful impressions, and afford an abiding source of joy and pleasure.

USEFUL HINTS.

To clean marble mix up a quantity of the strongest soap lees, with quicklime, to the consistence of milk. Lay the mixture on the marble for twenty-four hours, then wash it off with soap and water, and repolish if necessary.

TO PRESERVE SCAFFOLD ROPES, ETC.—Ropes used for scaffolding may be preserved by dipping, when dry, in a bath containing three-fourths of an ounce of sulphate of copper to a quart of water, and kept in for four days; then hung up and dried.

All main steam pipes and steam risers says the Heating Engineer, should be connected at their lowest levels by relief pipes run to or connected with the main return pipes, or to the return risers below the water line in the boiler, to take from them any condensation that may be formed. These relief pipes also serve to equalize the pressure throughout the apparatus, or the return lines may all run below the water line of the boiler, in which case the connecting lines spoken of are unnecessary.

TO REMOVE CREASES IN DRAWINGS, ETC.—Fasten the engraving or drawing by drawing pins on a board face downward on a sheet of paper. On the back place another sheet of paper which retains a very slight quantity of moisture. Over this place flannel or blotting paper, and taking a hot iron pass it carefully over the part where the creases have been made until they disappear, and then submit the drawing or engraving to pressure between glazed boards.

Mr. Thos. Potter in a letter to the Builder, states that the better concrete is the more readily it conveys sound, and that an actual trial lately proved that ordinary conversation could be distinctly heard through a six inch concrete wall plastered on both sides, and the same applies to concrete floors. Such floors should never be constructed solid throughout, says this writer, if required to be sound-proof, and where wood in the form of joints, bears directly on the concrete, sound is very readily transmitted from one to the other.

TO GILD ON PLASTER OF PARIS.—To satisfy the absorbent nature of the plaster, brush it over with linseed oil, at intervals of twenty-four hours, till it will absorb no more. Then go over it with oil gold size, ground with yellow ochre into a paste. If this size does not work freely, thin it with linseed oil. When this is so far dried as to be just tacky, gild in the ordinary way with gold leaf, using a tip. Press the gold gently but firmly down with a bob of cotton, covered with soft washing leather; then rub off superfluous gold, and smooth the surface with a second bob of cotton not covered.

One of the latest things in the way of so-called fire-proof material for building purposes is "metal plated lumber," the invention of a Baltimorean. The method pursued is to take a piece of lumber of any desired shape or length, together with a strip of thin sheet metal to correspond, and run them through a simple machine, formed mostly of rollers, which folds the metal skin tightly around the lumber. Thus prepared, it is claimed that the lumber is specially adapted for use in the construction of doors, flooring, partitions, stairways, freight and passenger cars, granaries, refrigerators, &c., &c.

The following weights for brickwork in mortar, 100lb. per cubic foot; brickwork in cement, 112lb. per cubic foot; masonry, rubble, 140lb. per cubic foot; masonry, ashlar, limestone, 150lb. per cubic foot; masonry, granite, 160lb. per cubic foot, are after Rankine. The following weights for timber are due to Haswell:—

	Weight of cubic foot. Green.		Seasoned.	
	lb.	oz.	lb.	oz.
American pine	44	02	30	0
Ash...	58	3.	50	0
Beech	60	0	53	6
Cedar	32	0	28	4
English oak	71	10	43	8
Riga fir	48	12	35	8

But no definite rule for correctly calculating weights from the measurement of timber can be given, for Rankine, in "Civil Engineering" (Griffin, 1870), states that the timbers given below have the percentage of loss of weight in seasoning set against them. The correct weight per cubic foot depends then to a great measure upon the condition of the timber: Red pine loses in seasoning twelve to twenty-five per cent. in weight; American yellow pine loses in seasoning eighteen to twenty-seven per cent. in weight; larch loses in seasoning sixteen to twenty-five per cent. in weight; British oak loses in seasoning sixteen to thirty per cent. in weight; elm loses in seasoning about forty per cent. in weight; mahogany loses in weight sixteen to twenty-five per cent. in weight.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

THE NECESSITY FOR A CANADIAN SCHOOL OF ARCHITECTURE.

MONTREAL, May 3, 1894.

Editor CANADIAN ARCHITECT AND BUILDER.

THE Province of Quebec Association of Architects and the Ontario Association are endeavoring to do good work in the the face of the craze for Americanism that has been the rage in Canada for a few years back. They have formed associations for the culture of artistic architecture, and especially aim at courses for the students, and only wait the munificence of some of Montreal's benefactors, who have been so liberal to the other arts. We understand that space is available in the applied science department at McGill, and only requires the appointment of competent professors to start a school of architecture equal to Cornell or the Boston school. If this could be accomplished, our young men need not seek architectural training in the United States. This, I contend, is the root of all the evil. How can it be otherwise, as is rightly argued by wealthy capitalists, who seek the latest and most advanced ideas in art and architecture. A school of architecture would place all the exalted ideas, present and past, before the student's mind. His eye would be trained to the beautiful in art, his mind would be stored with the best of all the ancient examples, the theory, the styles, the proportion, the strength, construction, designing, and correct and artistic principles would be instilled as the alphabet is in a child—never to be forgotten. Everything that is pure and noble in architecture would become a part of every student of ability, and in obtaining his diploma the public would be assured that he at least knew something about architecture, and that it would be unnecessary to go to foreign countries for taste and ability. The case is now deplorable. All our large and expensive buildings are given to Americans, and to some without this special training. And what has been the result? In our own city we have examples of the failures in design and construction. The Y.M.C.A. is in a deplorable state, and in a few years may become a complete wreck. Other examples in Toronto are fully as bad, and in the face of this, still our Canadian people will persist in employing this foreign talent. The latest insult our Canadian architects have had to submit to is from the Canada Life Assurance Co., a purely Canadian company! making its revenue out of Canadians, its chiefs Canadians, and yet it employs an American, and gives him carte blanche as to expense—some $400,000—to spend on a comparatively small building. A Canadian would have been asked to build this palace with $150,000, at most, and comparisons would be made with American buildings costing half a million.

This is not all. This new building is to be erected alongside the Temple Building, and on a mean technicality the Trustees of the latter building are asked to take down the rear portion of the party wall, the claim being that it was not according to law, while they acknowledge that if it was, it would still be insufficient for this new fire proof building, which is to be three stories higher than the Temple.

They appear to be using all the smart dodges they can invent to misrepresent the actual thickness and strength of the wall, and try to induce the City Inspector to condemn said wall, but thanks to the City Inspector's practical and extended knowledge, he refused to do this, and states that the wall is good and sufficient for the Temple, it having stood without a hair's breadth of settlement, and remains just as it was built, five years ago.

For a wealthy Canadian company to allow itself to be placed in such a doubtful position is not to its credit. The City Inspector, when he granted his certificate to the Trustees of the Temple building, knew what he was doing, as is amply proved by the stability of the wall. He knew full well that the lower part, 2 ft. thick for two stories and sixteen and then 1 ft. of an old wall, thoroughly well built, with the best 1½ thick brick and good mortar, equal to cement, was as good as a new wall 4 in. thicker, and so would any practical architect decide, with the exception of an autocrat American, in whose hands our Canadian companies appear as so many puppets.

If, as I said before, our young men were thoroughly trained, our Canadian public would have the guarantee that all receiving the diploma would at least be men of knowledge in the profession, and would attain as high a standing before all the world as do our doctors and lawyers.

CANADIAN.

LEGAL.

The Supreme Court of the United States has decided that where carpenters are employed in a building and no notification of the fact is given by the owner to the insurance companies holding risks on the building, as provided for in the conditions of the policy, the validity of the policy is thereby rendered void.

Mr. C. R. S. Dinnick has lately added to his brick making plant at Toronto Junction a wire cutting brick machine with table and die. A similar machine has been purchased by the Burlington Pressed Brick Co., Freeman, Ont.

ARCHITECTURE AT THE MONTREAL ART GALLERY.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—The annual spring exhibition of oil and water colors with the usual adjunct of a few architectural drawings is now the chief attraction at the art gallery, and it may be said that the exhibition as a whole, compares favorably with those of former years.

To an architect an exhibition of this character should prove particularly interesting, and the idea of combining an exhibition of architectural drawings in one which includes other works of art, is about the only way at present to advance the cause of good architecture in a city like Montreal, for the chances are that an exhibition that was purely architectural in its character, would very likely prove a failure, for the reason that the public for the most part does not as yet regard architecture as an art, and what is worse, thinks that an architect's calling is one that can be equally well filled by a novice, as by an educated practitioner.

It is not the intention of this article to enter upon a detailed criticism of the drawings on exhibition, but it is my firm belief that an exhibition of architectural drawings is valueless as a means of educating the public to know what is good and what is bad without fair and just criticism. Our architects as well as the public should be willing to invite the criticism of their work by those who are competent to judge, as such criticism not only points out to us our errors which we ourselves are only too apt to overlook, but it tends to broaden our ideas and incite us to make still greater efforts to improve the quality of our works, which ought to be the great object of every architect who has the cause of good architecture at heart. Any one who has read the comments in our daily papers on the exhibition will find that the works of our local artists for the most part have received their fair share of criticism, but scarcely a passing notice is given to the architectural drawings. Why is this? Is it because our local art critics think that an architectural design is something outside the sphere of art, or is it because they are afraid to take up the matter owing to lack of knowledge? If it is owing to the latter, what a lamentable state of affairs then exists, and which only can be rectified by time and proper training.

A knowledge of art is a very excellent and a most desirable acquisition to one's education, and good art has always exercised an elevating and refining influence upon individuals as well as nations, and as we are a very ambitious people, and wish to be considered a refined and cultured people as well, it is only natural and proper that we should patronize art. But in order to become an artistic people in the fullest sense of the word we must be educated in art, for, unfortunately, although we are lovers of the beautiful, we are not naturally an artistic people; we look altogether too much at the utilitarian side of things, thinking that as long as anything answers its purpose it does not matter whether it pleases the eye or not: It is this state of affairs that must be remedied, and the only way to bring about the much desired reform is by educating the public. Of all the arts that we should know something about, it would seem only natural that architecture, that art above all others, is the one where we should make the starting point, for the reason that it is an art that had its beginning before all other arts, and one that administers most largely to our comforts.

Buildings that are well designed and beautiful in proportion and detail are the surest evidence of a nation's wealth and culture, and have been so from time immemorial.

How this much desired change is to be brought about is an important question, but one way of doing it would be to have architecture taught in our public schools, and perhaps some day in the near future some of our wealthy citizens may see their way clear to establish a school of architecture in connection with one of our great collegiate institutions where those who wish to practice the architectural profession can receive the proper training. Then, and not until then, will architectural art assume the position among the arts that it should, and greater inducements will be given members of the profession to exhibit their work when they feel that their efforts will be appreciated by the public.

ARCHITECT.

RECENT CANADIAN PATENTS.

A patent has been granted to Mr. A. Wilford, Todmorden Ont., for a brick kiln, comprising in a continuous kiln, a series of independent adjacent chambers with horizontal walls between and the chambers connected to each other by horizontal passages, and each chamber being provided with draft openings to supply a current of atmospheric air to the fire within, means for supplying fuel to the fire, a flue for conveying the heated air from one chamber to another, etc.

H. Johnas Johanson and Bertrand Harris Short, of Vancouver, have patented a paint for iron, etc., composed of tar, salt, carbon bi-sulphur, benzine refined and paraffine cake.

John Geo. Heilig, Hamilton, Ont., has patented a ladder shelf scaffolding.

A patent for a sash fastener has been granted to Mr. L. Eveland and Alonzo Herrick, of Port Stanley, Ont.

Robt. Sampson, Quebec, has secured a patent for a plumber's test pump.

ROUGH-CASTING IN CANADA.

ROUGH-CASTING, or as it is sometimes called, slap-dashing—both words of which are synonymous with the French *hourdage*, rough work, and *ravalement*, having a similar meaning, writes Mr. Fred. T. Hodgson in Architecture and Building—is a method of plastering the outside of buildings much used in the northern part of Canada, because of its being durable, cheap and well adapted to keep out cold winds during our long winters. The methods of applying rough-cast and the mixing thereof do not materially differ from the methods adopted in Northern Europe or even in the North-Western States, but it is these minor differences, perhaps, that make the rough-casting done in Canada superior, so far as durability is concerned, to much that is done in other parts of the world.

There are frame cottages near the city of Toronto and along the northern shores of Lake Ontario that were plastered and rough-casted exteriorly over forty years ago, and the mortar to-day is as good and sound as when first put on, and it looks as though it was good for many years yet if the timbers of the building it preserves remain good. Rough-cast buildings are plentiful in every province in the Dominion from Halifax to Vancouver and from Lake Erie to Hudson Bay, and when well built, and the rough-cast properly mixed and properly applied, the result is always satisfactory. It is quite a common occurrence in Manitoba and the North-west territories in the winter to find the mercury frozen, yet the intensity of frost does not seem to affect the rough-casting in the least, though it will chip bricks, contract and expand timber and render stone as brittle as glass in many cases, and the effect on iron and steel is such as may prove dangerous if exposed to sudden and unexpected strain.

In preparing a frame or log building for rough-casting, care must be taken in putting down the foundation. A good stone or brick foundation is, of course, the best, but where rough-casting is intended, stone or brick foundations are seldom used because of their cost, and the builder is compelled to use posts of wood. Here the posts are generally made of white cedar, which has a lasting quality of thirty-five or forty years, if sound when used. The posts are put in the ground from 3 to 5 feet, the deeper the better, as they should be deep enough in any case to prevent the frost from forcing them upward. When a sufficient number of posts have been properly placed a line is struck on them the proper height from the ground and the tops levelled off. The sills are then placed—all joints being broken on top of posts—and the whole made level. These sills and all the other timber, scantlings and lumber, should be well seasoned, if possible, for the greatest enemy to the plasterer is unseasoned timber; shrinkage of joists, posts and scantling, not only breaks the bond of the mortar, but causes great cracks in corners and angles, that no amount of pointing or patching can ever make good.

When the frame is up and the rafters on and well secured, the whole of the outside should be covered with good, sound, common inch stock pine, hemlock, spruce or other suitable lumber, dressed to a thickness. If put on diagonally so much the better, but this is not absolutely necessary if the rough-casting is to be of the best quality, as will appear hereafter.

When it can be done it is best to get all partitions set in place and lathed, the roof on and all necessary outside finish or grounds put in place and made ready to receive the lath. The carpenter must prepare his finish or grounds for finish to accommodate the extra lath, as the walls will be thickened accordingly.

For the cheaper sort of rough-casting in one or two coats, the following method of lathing is employed:—Nail laths on the boarding—over paper or felt, if paper or felt is used—perpendicularly 16 inches from centre to centre if 4-foot laths are used, or 18 inches or 1 foot from centre to centre if 3-foot laths are used. The whole surface to be rough-casted will require lathing this way. When done lath as is ordinarily done with No. 1 pine lath, breaking joints every 15 inches. Put five nails in each lath, driving each nail home solid, coat over with mortar, well haired, and that has been made four or more days, smooth and straighten as well as possible with a darby. When done and while yet soft the rough-cast is thrown on it with such force as to drive the pebbles or small stones deep into it. The mixture or dash, as it is called, is composed of fine gravel, clean washed from all earthy particles and mixed with pure lime and water till the whole is of a semi-fluid consistency. This is mixed in a shallow tub or pail and is thrown upon the plastered wall with a wooden float about 5 or 6 inches long and as many wide, made of half-inch pine and fitted with a wooden handle. While with this tool the plasterer throws on the rough-cast with his right hand he holds in his left a common whitewash brush, which he dips into the rough-cast and then brushes over the mortar and rough-cast, which gives them, when finished a regular uniform colour and appearance.

For this sort of work the following proportions will answer: To one barrel of prepared gravel use a quarter barrel of lime putty; mix well before using. This may be coloured to suit the taste by using the proper materials, as given further on. It must be understood that the foregoing is the cheapest sort of rough-casting, and is not recommended where more durable but more expensive work is required.

The best mode of doing this work, as practiced in the lake district of Ontario, is about as follows:—Have the frame of building prepared as indicated in the foregoing, with partitions all put in and well braced throughout and well secured. Lath diagonally with No. 1 pine lath, keeping 1½ inches space between the lath. Nail each lath with five nails and break joints every 18 inches. Over this lath again diagonally in the opposite direction, keeping the same space between the lath and breaking joints as before. Careful and solid nailing is required for this layer of lathing, as the permanency of the work depends to some extent on this portion of it being honestly done. The mortar used for the first coat should have a goodly supply of cow's hair mixed in with it, and should be made at least four days before using. The operator must see to it that the mortar be well pressed into the key or interstices of the lathing to make it hold good. The face of the work must be well scratched to form a key for the second coat, which must not be put on before the first or scratch coat is dry. The mortar for the second coat is made in the same way as that required for the first coat, and is applied in a similar manner, with the exception that the scratch coat must be well damped before the second coat is put on, in order to keep the second coat moist and soft until the dash or rough-cast is thrown on. The rough-casting is done exactly in the same manner as described for the cheaper sort of rough-cast work.

A building finished in this manner, if the work is well done, possesses many advantages over the ordinary wood-covered structure. It is much warmer, being almost air-tight so far as the walls are concerned. It is safer, as fire will not eat its way through work of that kind for a long time. It is cleaner, as it will not prove such a harbour for insects. It may be made as handsome as desired, for, before the rough-cast is dashed, it may be laid off in panels of any shape by having strips or battens tacked over the soft mortar, which may be removed after the rough-casting is done and the coloring finished. It is much superior to the so-called brick veneered house, as it is much warmer, more exempt from fire and cheaper.

For 100 yards of rough-casting in the manner described the following quantities will be required:—1,800 lath, 12 bushels of lime, 1½ barrels best cowhair, 1¾ yards of sand, ¾ yard of prepared gravel and 16 pounds of hot cut lath nails, 1¼ inches long. The gravel should be sifted through a half-inch mesh screen, and should be washed before mixing with the lime putty.

To color 100 yards in any of the tints named herewith use the following quantities of ingredients:—For a blue-black mix 5 lbs. of lamp-black in the dash. For buff use 2 lbs. of green copperas, to which add 1 lb. of fresh cow manure, strain all and mix well with the dash. A fine terra-cotta is made by using 15 lbs. of metallic oxide mixed with 5 lbs. of green copperas. A dark green color is made by using 5 lbs. of green copperas and 4 lbs. of lamp-black. Many tints of these colors may be obtained by varying the quantities given. The colors obtained by these methods are permanent; they do not fade or change with time or atmospheric variations. Many other colors are used, but few stand like the ones named. A brick color may be obtained by the use of Venetian red and umber mixed in whisky first and then poured into the dash until the proper tint is obtained.

The following are the officers elect for the ensuing year of the Ontario Society of Artists:—Hon. President, Hon. G. W. Allan; President, M. Matthews; Vice-President, W. Revell; Secretary, Robert F. Gagen; Auditor, James Smith. Executive Council—C. M. Manly, W. D. Blatchly, Miss G. E. Spurr, W. E. Atkinson, A. C. Williamson, R. J. Hovenden, F. M. Bell-Smith. Industrial Exhibition Committee—T. M. Martin, F. M. Bell-Smith.

IN Germany the liability of employers for accidents to workmen rests chiefly on the law of insurance, which dates from 1884. All employers are obliged to insure their work-people and clerical staff, even when the employment is temporary and unpaid. There are special associations for different industries, and the statutes must be approved by the Imperial Insurance Office. Injuries include those which are internal as well as external, loss of intellect, memory or nerve. When compensation is claimed, it is necessary to trace the injury to some specific cause, and not to the mere normal exercise of the occupation. Generally the person who is to gain or lose most by the undertaking is held to be the employer. Thus, in building contracts, it is not the capitalist who advances the funds, but the master builders, carpenters, &c., who are responsible. Employers' contributions to the associations are proportionate to their annual expenditure in wages. The amount of compensation is based on the wages received by the workman during a year. So long as he is completely incapacitated, he is to be allowed two-thirds of his wages. For partial disablement he obtains a fraction of that maximum proportionate to the extent of the injury. In case of death, twenty days' payment (in no case less than 30 marks) are to be granted towards funeral expenses. The widow, until her remarriage, is allowed about 20 per cent. of her husband's wages, while 15 per cent. is allowed for every child under fifteen who has lost one parent, and 20 per cent. if it has lost both. The total compensation to widow and children must not exceed 60 per cent. of the deceased's wages. In case of remarriage she receives as composition three times the amount of her annual allowance. If the deceased was the sole support of parents or grand-parents, they may receive 20 per cent. of his wages during their lifetime.

SHAVINGS.

The City Council of Toronto has resolved that in future none but Canadians shall be given employment in the city service.

John W. Long, a prominent contractor, residing near St. Catharines, Ont., committed suicide by shooting himself on the 29th of April. Ill-health and loss of money on several large contracts in Buffalo and Tonawanda, are assigned as the cause.

The contract has been let for the erection of an opera house at St. Thomas, Ont., to cost $20,000. The building will be three stories, built of red pressed brick, and will have a seating capacity of 1,200, and a gallery, with a stage 32 x 50 feet, and four boxes.

Wm. Herod, a tuck pointer employed on the new drill shed at Toronto, was killed by falling from a scaffold on April 23rd. The coroner's jury found a verdict of accidental death, adding a rider to the effect that a by-law should be enacted compelling better safeguards to be placed on scaffolds.

Mr. Coatsworth gives notice in the Dominion Parliament of a resolution:—"That it is expedient to insert in every contract for any public work made hereafter a clause requiring the contractor to pay the workmen engaged upon such work a rate of wages at least equal to the current rate of wages paid in the locality where such work is being done, at and during the time such contract is being done."

WM. J. HYNES,
Contractor and Plasterer.
Relief Decorators in Plaster, Staff or Papier-Mache.
97 Winchester Street.
Shop, Esplanade, foot of Jarvis Street.
Telephone 3414.

ARCHITECTS and ENGINEERS
APPLY TO
THE NEW COLOR PROCESS CO.
214 ST. JAMES ST., MONTREAL,
for Instantaneous Reproductions in Colors of Drawings and Plans
WILL SAVE YOU . . . . .
MONEY Copies on Manilla Paper 4c. per sq. foot.
LABOR No recoloring by hand.
TIME We print without the aid of the sun.
ERRORS We give exact fac-similes.
TRACING CLOTH
We print direct from originals on paper.
DISSATISFACTION
We guarantee uniformly perfect work.
Originals sent from a distance returned with copies same day as received.

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with advertisers.

Hayes' Patent Steel Lath . .

HAS NO EQUAL IN ANY PARTICULAR

. . . Used in more important buildings . . .
. . . THAN . . .
all other styles of metal lathing combined.

SOLE MANUFACTURERS

THE METALLIC ROOFING CO.

OF CANADA, LIMITED.

BRANCH OFFICE:
706 Craig Street
MONTREAL

HEAD OFFICE:
82 to 90 Yonge Street
TORONTO

Send for Samples and Prices

The Great Church LIGHT.
FRINK'S Patent Reflectors give the Most Powerful, the Softest, Cheapest and the Best Light known for Churches, Stores, Show Windows, Parlors, Banks, Offices, Picture Galleries, Theatres, Depots, etc. New and elegant designs. Send size of room. Get circular and estimate. A liberal discount to churches and the trade. I. P. FRINK, 551 Pearl Street, N. Y.

"Richelieu"

Registered No. 20/4741.

IN consequence of the great popularity of this Closet, we find that imitations are being made and sold as the Richelieu, though decidedly inferior to the genuine article.

The "Richelieu" Closets made by us are stamped as above, in addition to our ***"Trade Mark,"*** and as the name "Richelieu" is registered in the Department of Agriculture, we shall take immediate action against any one ***stamping*** the name "Richelieu" on any closet, or ***having in possession*** closets so stamped that are not of our manufacture.

DOMINION SANITARY POTTERY CO.
Montreal Office: 68 Temple Building. **St. Johns, Que.**

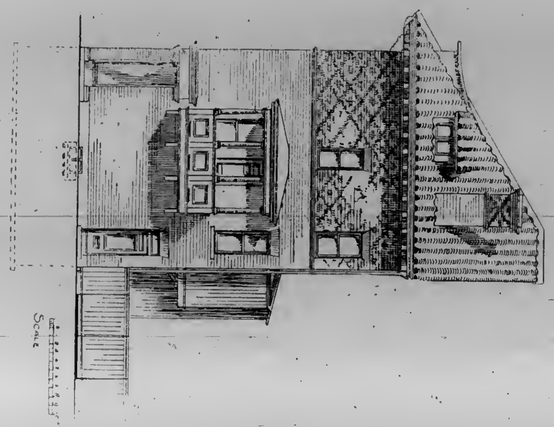
Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

Front Elevation
Side Elevation
Scale for Elevations
Dining Rm.
11 6 x 13
Kitchen
9 6 x 9 6
Out
Pan
China Clo
Down
Store
Parlor
12 x 14
Entry
Up
Porch
Bed Rm
Clo
Bed Rm
Clo
Bath
Clo
Down
Bed Rm
Clo
Clo
Rm
Note:—
Fuel bins, and larder in cellar.
Rear Elevation
Scale for plans etc
10
20
feet
30
W
S
E
N
First Floor.
Second Floor.
Clap-boards
Details of Entrance
Scale
6
12 in
3 ft
Hall
Balustrade
Section
Lattice
Column etc.
Clap-boards
Stone
Side Elevation
—Design for Cottage—
to cost about $1000.
"Demos"

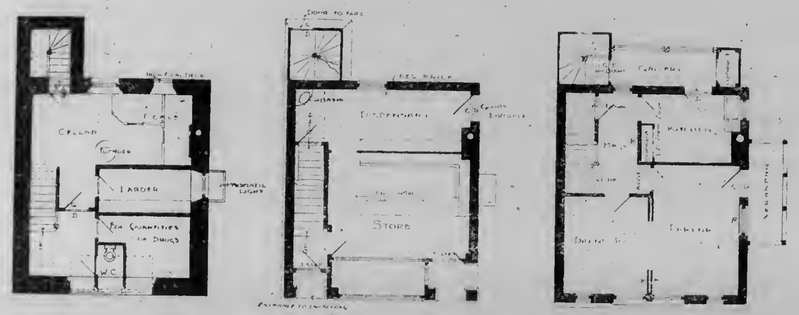
Side Elevation

Competition for "A Drug Store"

Design submitted by "Italia"



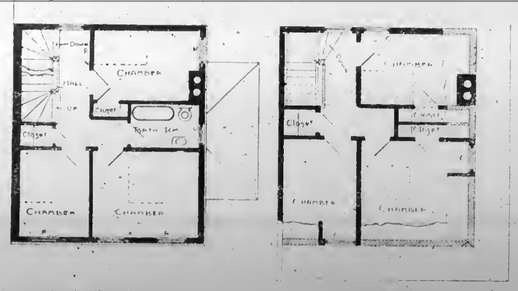
Scale



Basement Plan — Ground Floor Plan — Upper Floor Plan

Competition for "A Drug Store"

Design submitted by "Italia"



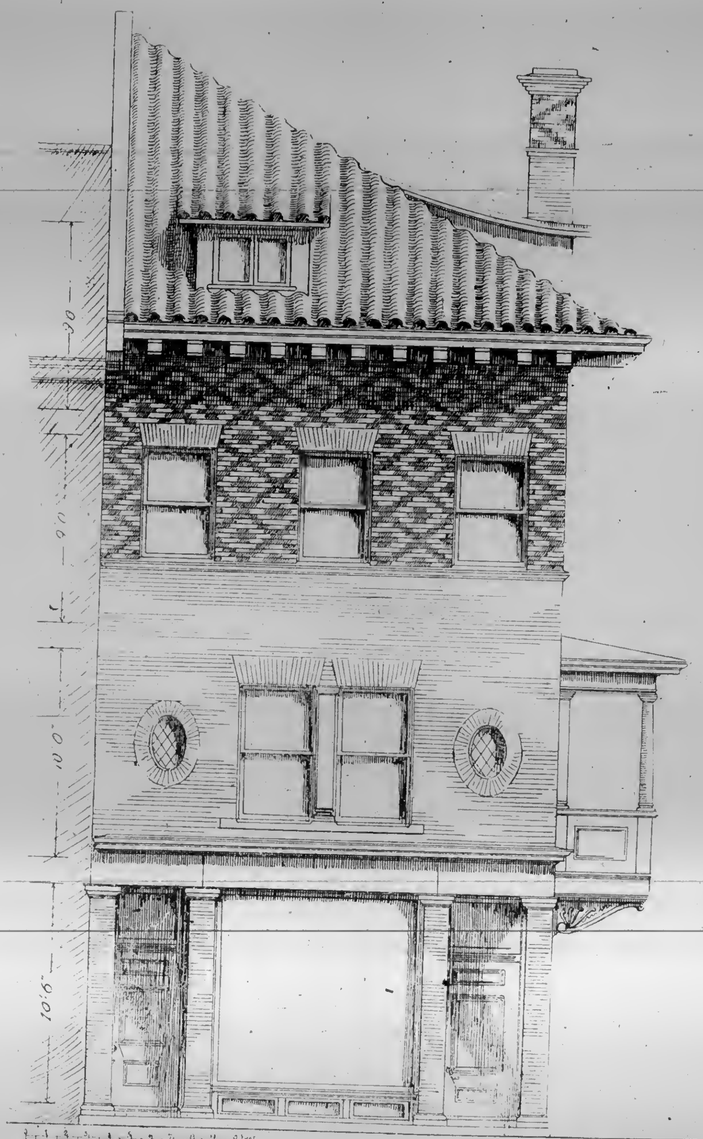
Second Floor Plan — Attic Floor Plan

Competition for "A Drug Store"

Design submitted by "Italia"

Specifications

Basement walls to be 24" thick Rubble Masonry in Ground and above Ground four 6" courses in front and 12" course at water to be picked Limestone. Body of Building to be of ordinary white Lyeth wash Brick, with caps and bases of piers, entablature over Store, String Courses at second floor, all other sills in front and side, pilaster in front wooden first floor and cornice, to be painted Plain red sandstone, and pilasters in brickwork to be ordinary red pressed bricks. All interior woodwork of dwelling to be of pine for painting. Front Doors and woodwork to Store to be of white wood for varnishing. Roof to be covered with cheapest description of Tarred felt "granite tites" Rebuilt 4" Brick Wall to be to support front cornice. Main wall to be 12" Stone set in Portland Cement.

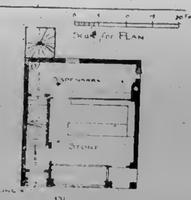


SCALE FOR ELEVATION

FRONT ELEVATION

Competition for "A Drug Store"

Design submitted by "Italia"



SCALE FOR PLAN

Plan

BANCO DI SAN SPIRITO ROME

CANADIAN ARCHITECT AND BUILDER.

VOL. VII.—No. 6. JUNE, 1894 PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2269.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 15th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITORIAL ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	EDMUND BURKE, Toronto.
1ST VICE-PRESIDENT	J. E. BELCHER, Peterboro'.
2ND VICE-PRESIDENT	W. A. EDWARDS, Hamilton.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI	Ottawa.
FRANK DARLING	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:
W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	J. NELSON, Montreal.
1ST VICE-PRESIDENT	CHAS. BAILLAIRGE, Quebec.
2ND VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
SECRETARY	JOSEPH HAYNES, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. GENDRON,	Montreal.
J. B. BERTRAND	Quebec.
ERIC MANN	Montreal.
J. VENNE	Montreal.
G. E. TANGUAY	Quebec.

AUDITORS—THEO. DAOUST, J. F. PEACHY.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.	FRED. WAKEFIELD.
WM. PARK, 1st Vice-President.	WM. BOOTH.
GEO. OAKLEY, 2nd Vice-President.	JAS. ISAAC.
DAVID WILLIAMS, Treasurer.	H. LUCAS.
JOHN ALDRIDGE.	JAS. THOMSON
JAS. CRANG.	H. MARTIN.

JOHN L. PHILLIPS, Secretary.

THE members of the American Society of Civil Engineers who are meeting in annual convention at Niagara Falls, will visit Toronto on the 25th inst. by invitation of Sir Casimir Gzowski, ex-President of the Canadian Society. The members of the latter Society resident in Toronto, have arranged to give the visitors a fitting reception.

THE Court of Common Pleas at New York has decided that a plumber who is not registered in accordance with the provisions of the plumbing ordinance of that city cannot legally enforce the payment of his accounts. This decision is said to have fallen like a bomb in the ranks of about five hundred unregistered plumbers in that city, and the Health Department is crowded with applicants for licenses.

IN our correspondence columns will be found an interesting article, accompanied by illustrations, relating to the recent landslide at St. Albans, Que., by Mr. Chas. Baillairgé, of Quebec. It is a matter of some surprise to us that Mr. Baillairgé, or some person of like practical experience, was not chosen by the government to report upon the causes, etc., of this catastrophe. It will be remembered that in the case of the great landslide at Quebec, in 1889, where fifty persons were killed, Mr. Baillairgé's version of the cause of the accident prevailed over that of Prof. Laflamme, (who has been deputed to report on the latter occurrence) both before the Society of Civil Engineers and before the Supreme and Lower Courts, where the case was discussed.

THE effort of a company to secure the passage of a Bill through the Dominion Parliament giving them the right to construct an elevated railway through certain of the principal streets of Montreal, was nullified by the determined opposition of the citizens. The Bill, as it passed the House, provides that before construction shall begin, compensation shall be made to the owners of property which would be damaged in value by the carrying out of the enterprise. This provision of the Bill will it is believed be sufficient to stop the further progress of the scheme. In a city of compact area like Montreal, there does not appear to exist the slightest necessity for an elevated street railroad. The electric street cars answer all the requirements, and in placing property owners beyond the reach of possible blackmail, Parliament has done an act of simple justice. There has been too much juggling with public franchises of late in the city of Montreal.

ON the 13th inst., in the Chancery Division Court, before Justices Boyd and Meredith, the appeal of Mr. Neelon, contractor for the new Toronto city buildings, from the decision of Mr. Justice Rose, which affirmed that the architect had authority under the contract to dismiss the contractor, came up for argument. The court agreed with the construction put upon the contract by the trial judge, and dismissed the appeal with costs, unless the plaintiff chooses to pay the costs of such part of the proceedings as will be abortive in the event of a new trial, in case of which election and payment there will be a new trial. Mr. Neelon is said to have stated his intention previous to this appeal of carrying the case to the highest court of appeal should an unfavorable decision be recorded by the lower courts. Whether or not he still adheres to this determination we are not informed, but it is at least probable that the case will not terminate at the present stage.

WE regret to observe the published statement that dissension has arisen in the Hamilton Arts and Crafts Association regarding the disposition of the surplus of $110 from the late Exhibition. If, as is stated to be their intention, a section of the members resign and form a new society, the result is not likely to be satisfactory to either party. The history of the Arts and Crafts Association thus far would seem to show that when accorded the united support of all persons interested, one such organization might be made successful. On the other hand it is extremely probable that a division of effort would result in general failure. We therefore hope that in the best interests of the Arts and Crafts Association the members will be willing to endeavor to arrive at some adjustment of the present difficulty which will be satisfactory to all concerned.

THE Dominion Government will be asked to make a grant of money towards defraying the cost of a Dominion Exhibition in Toronto in 1895. The so-called Dominion Exhibitions which have been held in the past have not even in a moderate degree been representative of Canadian progress. An Exhibition which would be truly Dominion in character would be likely to result in adding to the population and business of the country. Something of the kind is needed at the present stage in our history, and we therefore hope the Federal and Provincial Governments will liberally assist the Toronto Board of Trade, the Industrial Exhibition Association and others interested in bringing the project to a successful issue.

A LARGE amount of stone is every year imported into Canada from the United States, displacing in the local market an equal quantity of native material. The owners of Canadian quarries do not appear to be sufficiently alive to the importance of making known and keeping before the attention of architects and builders the location, quantity, accessibility and price of Canadian building stones. We believe Canadian sandstones are available which, in color and quality, are equal to those imported from the United States. This being the case, it is not to our credit that foreign material should be so largely used. In view of the difficulty experienced in securing samples from Canadian quarry owners for the series of tests of Canadian building stones conducted a couple of years ago by the Ontario Association of Architects, the blame for the present condition of things would appear to be due in a considerable measure to carelessness on the part of owners of Canadian quarries. We regret to observe also a fondness on the part of some Canadian architects for the use of foreign materials, even in cases where an equally good Canadian article could be had. Architects who pass by native in favor of foreign material are quite as unpatriotic as the professedly Canadian company which gives work that should properly belong to Canadian architects into the hands of a foreigner. In this connection we observe that the affiliated building trades in New York City have passed a resolution that after June 1, 1894, they will "refuse to handle any imported decorative or other material, and will take any steps necessary to protect the industries affected." "The onus of this complaint," says Stone, "lies against the practice of wealthy men with snobbish tendencies favoring foreign material for their buildings, in other words awarding contracts to European firms for work that domestic firms could do as well and cheaply, thus enforcing idleness upon our workmen." We quite understand that in some instances it is necessary to go abroad for a suitable material, but this should not be done until the possibilities of home production have been exhausted.

THE MASSEY MUSIC HALL.

THE Massey Music Hall just completed in Toronto, was opened with a three days festival last week. The Music Hall, as announced in the festival prospectus, has been provided through the magnificent liberality of a wealthy citizen of Toronto, Mr. Hart A. Massey. It is also stated that in this building, Toronto possesses a music hall worthy of her position as the chief city and artistic center of this great Province. There is an old saying that "one should not look a gift horse in the mouth," but there are some circumstances connected with this enterprise which we desire to bring to the notice of our readers. It is quite noticeable that the official prospectus of the opening festival contains a number of portraits of persons who took part in the inaugural concerts as promoters and performers, but no illustration of the design of the building nor any mention of the architect's name.

The plans were imported from an American architect. If our architects were as well protected in their work as Mr. Massey has been in the business by which he has been able to accumulate his wealth, this would probably have been otherwise. Mr. Massey did a very generous and public spirited act in donating so large an amount of money $150,000 for such a purpose, but it was a very unpatriotic act, when he allowed any other than a Canadian architect to furnish the design.

We take exception to the claim that the building is a creditable and satisfactory fulfilment of the opportunity which existed when Mr. Massey came forward with his offer. We cannot go into an extended architectural criticism of the building, but wish to mention a few important particulars in which we consider it to be deficient. This we do without any reflection upon the architect. We do not know what limitations he may have worked under. The indications are that the principal aim was to get the largest possible number of sittings with the ground space and money available. The exterior is about as aesthetical as the average grain elevator. There has been no attempt to make the structure fireproof. The floors, platforms, stairs, and seats are all wood work of the most inflammable kind. The exits will never be comfortable even for ordinary use, to say nothing of emergencies. The arrangement of seats is good. Commendable taste has been shown in the window glass, which is very plain, of light cathedral tints, with a few portraits in stained glass. On the whole, however, the interior effect is bad, made so by the pretense to ornamental construction of the upper portion in the Moorish style of architecture. This style of work, more than almost any other, requires a very elaborate treatment for agreeable results. It would be hard to find an interior so devoid of pleasing lines as the one referred to. The color decorations are what may best be described by the word "tawdry." The whole scheme has been carried out on an ill-advised basis. A lot should have been provided in some part of the city where the surroundings would have been favorable, and large enough for a building to contain from one to two thousand more seats, with ample room for approaches, both on foot and by carriage, inside of the street line. This with an appropriate design would have given the city a monumental building, which would have produced an effect impossible to be attained in the location chosen, even if the lot itself were of sufficient size. A building of this kind should fill a double purpose. While providing for those who could pay the prices of admission a suitable place for the enjoyment of good music with all its elevating influences, it should be constantly exerting a no less positive influence for good, from the artistic standpoint, on all who come within sight of its exterior. Many more persons would receive the benefit of the latter than could afford the privileges of the former, and as an educator of public taste it would be at least as valuable through its architecture as in its utility for large audiences.

We think Canadian architects are in a measure responsible for the great mistake that has been made in this scheme. When the preliminaries were under consideration, the Ontario Association of Architects should have pointed out to the committee associated with Mr. Massey that the funds were inadequate for the purpose. This suggestion if unheeded should have been followed by a formal protest in unmistakeable language, placing the architects on record as opposed to such a work being undertaken under conditions which were certain to result in an obstacle to the development of architecture. This building will for a number of years prevent Toronto from having a temple of music of a character to meet the requirements. Such a position on the part of the architects we believe would have commanded respect from the public. Similar conditions not infrequently occur in regard to public buildings and we trust that the architects will in all such cases hold up a finger of warning as has been done elsewhere in some instances. We very much regret that the Massey Music Hall is not a worthy subject for one or two illustrations in this journal.

THE Journeymen Stonecutters of North America will hold their convention in Toronto the first Monday in August.

Messrs. Oakley & Holmes, contractors, have removed their office and works from 68 to 89 Wellington St. W., Toronto.

THE ONTARIO ARCHITECTS' ACT.

THE Ontario Association of Architects are coming forward again with an effort to make the Ontario Architects' Act effective. The subjoined manifesto issued to candidates nominated for election in Ontario states the reasons why the Act should be amended, and it certainly seems as if it would be for the good of all that it should be so amended. The Association ask for no special privileges or powers for members of the Association as opposed to the public, but have accepted fairly the essential character of the Act as a measure passed in the interest of the public. Nor is there any injury offered to any class of practitioners engaged in building at present. Wherever there are persons now practising as designers for others and to whom the title architect is an object, the need is regarded as right and it is proposed to throw open to them the Association on its new basis. Builders who design for themselves will be in exactly the same position as they are now; nor is it proposed to place any restriction upon their building for others without the intervention of an architect. In the city as well as the country there is much building that any experienced builder can do. But when it comes to the application of science or to artistic judgment and an architect is employed, the public—builders themselves—want to be assured that the name indicates certain qualifications. If the amendment can be established there seems to be no doubt that the profession of architecture will be raised and the whole building business with it. The following is the circular letter to the candidates for election:

OFFICE OF THE REGISTRAR,
CANADA LIFE BUILDING,
TORONTO, June 12th, 1894.

DEAR SIR:

The Ontario Association of Architects, incorporated in 1890, was founded, as the preamble to the Act of Incorporation states, for the better protection of the public interests in the erection of public and private buildings in the Province of Ontario, and to enable persons requiring professional aid in architecture to distinguish between qualified and unqualified architects and to ensure a standard of efficiency to the persons practising the profession of architecture in the Province, and for the furtherance and advancement of the art of architecture.

The act provides that membership of the Association can only be attained by passing qualifying examinations, and the distinction given to architects thus qualified is the title "Registered Architect."

It has been found in practice that the Act fails to secure the ends set forth in this preamble, because the title "Registered Architect" is considered to be of no practical advantage so long as there is no restriction as to the use of the traditional title Architect. For this reason the influence of the Association upon both students and architects is materially weakened.

The course of study required for the examinations of the Association has been of great service to such students as have come up for the examinations, but these students are the few. The majority decline to prepare for the examinations and many give openly as their reason that they can see no use in doing so when they can call themselves Architects without examination.

Many Architects also, who, as persons practising architecture at the time the Act came in force, were registered as members of the Association, have since withdrawn their names and support from the Association on the ground that they do not find it necessary to belong to it.

In this way there will soon be a majority of persons practising architecture in the Province who will not be members of the Association.

Building operations are, in the meantime continually growing more complicated and involving more branches of scientific knowledge. The education of an architect no longer consists only of an acquaintance with the ancient forms of design, but spreads, of necessity, over a wide field of scientific knowledge; and the difference between the trained and the untrained architect is now not in point of taste only, but in matters directly affecting the public safety.

For this reason it seems proper that the profession of architecture should be put upon the same footing as that of law, medicine, or surveying, since its proper conduct as regards the convenience, health and safety of the public is as much dependent as these professions upon the exact knowledge and skill of the practitioner.

Nor can it be said that a fundamental training that will raise the general quality of design in the Province, is an unimportant public consideration; for the Province is being built up, in most parts permanently, and may with the same material and the same cost be made either attractive or unattractive, according to the skill of the architects. But in a new country where there are no traditions of good design and no ancient standards of excellence constantly before us, the attainments of architects in this direction will depend upon the opportunity they may have for a training which shall enable them to go beyond what their surroundings can teach them.

The first step to ensuring in architects of the Province a standard of efficiency in the many branches of knowledge now necessary to an architect, is to make the right to use the traditional title "Architect" dependent upon the attainment of this standard, tested in the only possible way by examination. The Ontario Association of Architects therefore intend to petition at the next sessions of the Legislature, that the right to the title, "Architect" be restricted to such persons as have succeeded in passing the examinations of the Association, conducted on such a basis and by such persons as the government may see fit.

It is not, of course, proposed to restrict the right of designing or building to architects. It is only proposed that persons who design or build without being qualified according to the accepted standard be known by some other name than architects.

Nor is it desired to injure those who, at present, make use of the title "Architect." The necessity of admitting all such persons will prevent any immediate change in the condition of practice in the Province; but the process of education will be going on amongst students, and the good effect of the Act will appear after a few years in the general improvement of buildings in point of economy, safe construction, and sound sanitation; and also, there can be no doubt, as works of art.

I have been instructed by the Council to state the matter to you, and to ask you if you will give it your support in the House.

I am yours truly,

W. A. LANGTON,
Registrar Ontario Association of Architects.

ILLUSTRATIONS.

RESIDENCE OF MR. GEO. I. TUCKETT, HAMILTON, ONT. JAMES BALFOUR, A.R.C.A., ARCHITECT.

This house is built of Credit Valley stone and Beamsville pressed brick. The inside is finished with native and imported hardwoods of various kinds, except drawing room, which is finished in white enamel, and the attic and kitchen apartments, which are finished with pine in natural finish. The house is heated with hot water and lighted by electricity.

CANADIAN ARCHITECT AND BUILDER COMPETITION FOR A DRUG STORE.—DESIGN SUBMITTED BY "TOLEDO" AWARDED SECOND POSITION.

The author in submitting this design states that he has done his best to comply with the published conditions of the competition. He has endeavored to provide a convenient plan, and in designing the elevation has chosen a style adapted from the Spanish Renaissance. The material is Ohio buff stone and buff brick. The roof would be constructed of Spanish tiles. The woodwork would be painted in two shades of cream and white. The facade on the side street would be treated in a similar manner, the brickwork starting from the first stone course above the ground; the bottom 16 courses to be glazed bricks.

SUBURBAN RESIDENCE DESIGNED BY J. C. A. HERIOT, MONTREAL.

COTTAGE AT VALOIS A. F. DUNLOP, ARCHITECT, MONTREAL.

On old work the painter often wants to use a putty that dries quick, sandpapers easily, and sticks where it is placed. To make just such putty, mix dry white lead in a good grade of brown japan, add enough lampblack to color it a good bit, give a binding quality by putting in a few drops of rubbing varnish, and lastly give the whole a dash or two of turpentine. The more rubbing varnish is added, the tougher the putty and the slower it sandpapers.

The term "bay window" is applied to a projecting window rising from the ground on a polygonal plan: it may be half a square or half a sexagon (the latter being the most common) both of them have three sides. Sometimes they are built on plan as half an octagon—that is showing four sides. Those with more sides than four are not frequently used, and the two-sided or canted bay is the least common of all bay windows. When a projecting window rising from the ground shows a half circle, or a segment of a circle, it is called a "bow window," in reference to its shape. An "oriel window" does not rise from the ground like a bay window. It projects from the outer face of the wall, and is supported on a bracket or corbel. The word "oriel" formerly meant a small chamber or apartment. These distinctions of bay, bow, and oriel windows are often used synonymously; but the above definitions will be found to be the correct ones.

THE QUEBEC ASSOCIATION OF ARCHITECTS.

WE desire to call the attention of architects and students of architecture to the removal of the above Association from the Canada Life Building to the more commodious, handsome, and convenient rooms on the lower floor of the New York Life Building, Montreal. The former location was found to be too inconvenient for the easy access which is desirable, especially at night.

To reach the new rooms no climbing of stairs is needed. Under the new arrangement, the new rooms will be kept open on all days of the week, from 8.30 a.m. until 6 p.m., and on Wednesdays the hours will be extended until 9 p.m.

Those who visit the new rooms will be highly pleased with the success of the Association. All kinds of literature, books, etc., will be found there, for a thorough study and reference on all subjects dealing with architecture and building.

The Council are desirous that all architects and students should take advantage of the privileges offered by the Association. We have confidence that such opportunities will be valued and used as they deserve to be.

THE EFFECT OF FROST ON GREEN MASONRY.

DURING the construction of the new theater in Zurich, Switzerland, it became necessary to carry on part of the masonry during the winter. The contractors obtained advice from several sources as to the manner in which the work should be done, but as the recommendations were very diverse the Austrian Society of Engineers and Architects, which has made a special study of cements, limes, and mortars, was asked to recommend a course of procedure. The matter was turned over to the Cement Committee, and this body instituted a series of experiments, which are described in the following free translation from the report in the Society's journal.

The experiments were made in two ways, the first with brick masonry and the second with rubble masonry, using stone of two kinds. This appeared desirable in order to determine if there was any difference between materials which were unlike hydroscopically. The materials used were dry and free from snow and ice, and the mortar was mixed as stiff as possible. The limes and cements were all tested in the municipal experimental station according to the system of the Society.

The separate pieces of brick wall tested were about 3.28 feet long, 6.56 feet high, and 12 inches thick, and were made with lime, Roman cement, Portland cement, mixed lime and Portland cement, and slag cement. The test walls made with these five mortars were laid with unwarmed water from the city mains and with water warmed to a temperature of 77° Fahr. A series of tests were also made with Roman and Portland cements and cold water to which 7 per cent. of its weight of cooking salt had been added. All mortars were made with 1 part of the cementing material and 2 parts of sand. In the mixed mortars twice as much lime as Portland cement was used. The lower half of the walls was partly protected by timbers, but the upper portion was entirely exposed. A few tests were also made with brick masonry laid with Hausleitner's frostproof Roman and Portland cements.

The test blocks of rubble masonry were 3.28 feet long, 6.56 feet high, and 16 inches thick. The stone used was partly limestone and partly sandstone. These blocks were made with lime mortar, Roman cement mortar, and Portland cement mortar, mixed with cold and hot water and cold brine as before.

The brick walls were started the last part of December, when the temperature was 26° Fahr., and the 14 pieces were finished in about three weeks. The temperature of the air was taken three times daily until the middle of April, the lowest temperature being on January 2, when 3 degrees above zero Fahrenheit was registered. The walls were pulled down June 6. It was at once apparent that those pieces of masonry laid with mortar containing lime had suffered more from the frost in the exposed upper part than in the portions protected by timbering, since in the former the mortar had plainly been frozen. The following remarks give an idea of the condition of the walls, as revealed by an examination of the joints with a sharp iron.

1. Lime mortar mixed with cold water. The mortar in the joints had hardened but feebly, and the bricks could be pulled apart by hand without exercising any noticeable amount of strength.

2. Lime mortar mixed with warm water. The mortar in the joints had hardened feebly, and there was no adhesion between the bricks and mortar.

3. Roman cement mortar mixed with cold water. The mortar in the outer and inner joints had hardened moderately, and there was considerable adhesion between the bricks and the mortar.

4. Roman cement mortar mixed with warm water. The joints were quite brittle and the inner portions of the mortar not particularly well hardened; the adhesion between the bricks and mortar was quite good. The part of the walls protected by timbers was in better condition and excelled any of the preceding walls.

5. Portland cement mortar with cold water. The joints were hard and the mortar clung well to the bricks. The protected part was better than the other in this case.

6. Portland cement mortar with warm water. The joints were hard, the mortar adhered well, and the entire piece of wall was a little better than any of the preceding.

7. Lime and Portland cement mortar mixed with cold water. The mortar was badly mixed, brittle and crumbling, but adhesive.

8. Lime and Portland cement mortar mixed with warm water. The mixture was uniform in this case, but the mortar was brittle and not well hardened in the interior, although adhesive.

9. "Frostproof" Roman cement mortar mixed with cold water. The mortar was well hardened and there was a good adhesion between it and the bricks. A plaster of the same material put on a part of the wall at the request of Herr Hausleitner was thoroughly hard and without sign of injury.

10. "Frostproof" Roman cement mortar mixed with cold water. This mortar was well hardened and adhered very well to the bricks. A plaster of the same material was thoroughly hard and without defects.

11. Wittkowitz slag cement mortar with cold water. The joints were brittle and the mortar fell into little particles when scratched out with the iron. The inner parts which had hardened somewhat were crumbling and showed but a slight adhesion to the bricks.

12. Wittkowitz slag cement mortar with warm water. The condition of this wall was but slightly better than of the last noted.

13. Roman cement mortar mixed with cold water to which 7 per cent. of salt had been added. The mortar was brittle and crumbling, adhering but slightly to the bricks.

14. Portland cement mortar mixed with cold water to which 7 per cent. of its weight of salt had been added. The mortar was well hardened throughout and adhered well to the bricks.

The masses of rubble masonry were built on a succeeding year, being started on December 28 and completed about two weeks later, the temperature ranging from 7° to 25° Fahr.. The blocks were examined on April 7, and were found to be in the following condition:

Limestone Rubble. 1. Lime mortar mixed with cold water. The mortar was completely frozen and brittle, without any adhesion to the stones. The block had fallen completely.

2. Lime mortar with warm water. The mortar was entirely frozen, brittle and without adhesion.

3. Roman cement mortar with cold water. The mortar had hardened pretty well, but had not the slightest adhesion to the stones, which could be removed from their beds without injuring the latter.

4. Roman cement mortar with warm water. The mortar was quite well hardened, but did not adhere in the slightest degree to the stones.

5. Roman cement mortar mixed with cold water and salt. In this block there was a partial adhesion between the stone and cement, and the latter had hardened somewhat better.

6. Portland cement mortar with cold water. The mortar had hardened very well and the adhesion between stones and mortar was quite good.

7. Portland cement mortar with warm water. The conditions were the same as with the last block, although the adhesion may have been a trifle greater.

8. Portland cement mortar mixed with cold water and salt. The mortar was very hard and adhered to the stones very well. The tearing down of the wall required considerable strength and necessitated the use of bars and other tools.

Sandstone Rubble. 1. Lime mortar with cold water. The mortar was entirely frozen, brittle, easily broken, and without a trace of adhesion to the stones.

2. Lime mortar with warm water. The condition of this block was the same as that of the first.

3. Roman cement mortar with cold water. The joints were badly frozen, the mortar crumbling and slightly hardened. There was no regular adhesion between it and the stones.

4. Roman cement mortar mixed with warm water. This block was in the same condition as the last.

5. Roman cement mixed with cold water to which salt had been added. The mortar was well hardened and adhered fairly to the stones.

6. Portland cement mortar with cold water. The mortar was well hardened, but its adhesion to the stones was only partly good.

7. Portland cement mortar with warm water. The conditions were much the same as in the last block.

8. Portland cement mortar mixed with cold water to which salt had been added. The mortar had hardened very well and adhered firmly to the stones. The block could not be broken apart without tools.

The conclusions of the committee from these experiments are that in brick masonry laid in frosty weather mortars into which any part of lime enters should not be used. Roman cement mortars behave fairly well under such conditions, and Portland cement mortars give good results. The use of warm water gave somewhat better results, and salt materially increased the resistance to frost. With rubble masonry, using either sandstone or limestone, lime mortar was entirely out of place and Roman cement mortar gave poor results unless mixed with salt. Portland cement mortar behaved well, especially with the addition of salt. The final recommendation of the committee is that in laying brick or rubble masonry in winter to use only Portland cement mortar, mixed with salt if possible.

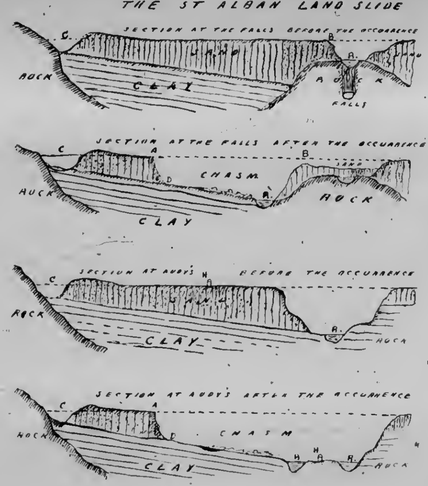
THE LANDSLIDE AT ST. ALBAN'S, QUE.

QUEBEC, June 3, 1894.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—I have as requested by you put a few notes together anent the late slide at St. Alban's, on the North side of the river St Ann, some 36 miles from Quebec, or about 20 miles from where the river empties itself into the St. Lawrence. The accompanying plan or diagram of the locality and the several sections are self-explanatory, and almost sufficient of themselves to account for the occurrence, but I may add that as shown by the first or uppermost of the four sections, the river above the Gorge Mills, or eastwards thereof, ran at a level of nearly 100 feet above that pursued by its course westward, or, towards the St. Lawrence, there being a fall of some 95 feet over a ledge of rock separating the two.

Section 2 shows the channel over the falls, or leading to them, to be now obstructed by an immense amount of sand, clay and forest debris; the hog's-back of sand at B having precipitated itself into and filled the gorge at R, through which the river ran. This caused the waters to rise above the falls, or eastward thereof, to a height estimated by Professor Laflamme of the Laval University (whom the Local Government sent there to survey and report upon the accident) to 100 feet above their normal level. The hydrostatic pressure due to this head of water soon burst through the comparatively narrow barrier of sand—some 300 to 400 feet in width at this point—between the upper and lower levels of the river at the falls; when the impounded water made a new channel for itself at R, in section 2, and the rushing torrent reaching to a height of fully 50 feet above its normal surface—as evidenced by the St. Alban bridge, which though at that height above the stream, was carried away by the water—undermined the sandy shores above the clay formation, thus causing a large portion of the land to slide into the river and be swept away into the St. Lawrence, which it rendered thoroughly muddy, and ever thick with mud as far down as Quebec, discoloring the St. Lawrence for miles below.



This will not be wondered at when I say that the chasm created by the slide is, at the western extremity, not less than a square mile in area, and as its average depth is some 75 feet, or say 30 feet at A and 120 feet at the river, the quantity of soil and of sand and clay removed and carried away by the river cannot have been less than 75 million cubic yards at the western extremity of the slide alone, and much more than this if the portion be added from above the falls, which is said to extend some 3 miles eastward thereof, but which I did not make an inspection of.

The sections, though of course curtailed in length, of which the scale is some 20 times less than that of the respective heights or depths of soil, show how the material removed must have slid upon its clayey bed, well lubricated, so to say, by the percolating water through the sand, and of which at the time of my visit I counted not less than 80 streamlets issuing at D or from between the clay and sand in say 800 feet along the rear line A of slide, or where the land parted.

Some three houses were displaced or moved down with land towards the river, one of which, occupied by the Gauthier family, must be buried deep under the clay and sand; while those of Audy and Darveau, which before the slide were at H in section 3, were found the next morning to be at H in section 4, or some 25 arpents, says Mr. Laflamme, from where they started; and, due to one portion of the land sliding or travelling quicker than the other, had actually veered around by almost 180 degrees, though maintaining their verticality. The translation having occurred at dark and accompanied by roaring and fearful noises all around them, due to the rush of waters, it was only at daylight the next morning that Audy and Darveau found that they had travelled nearly a mile from their former position on the hill.

The disaster at St. Ann, some 20 miles further down the river, was entirely due to the rush of waters from the St. Alban blockade, after they burst the boundaries, as they then rose so high, as already stated—some 10 feet or more at St. Ann, where the river is so much broader than at St. Alban—that they gradually ate away the shore for a distance of some 1700 feet north eastward of the C. P. R. bridge, several houses and outbuildings being thereby undergrounded and tumbling into the river, while about a dozen others were at the time of my visit being hastily moved back to prevent the possibility of further damage.

While the accident at St. Alban could not have been foreseen or, if so, guarded against, the same thing cannot be said of St. Ann, where every time there is a freshet, the shore is eaten into and made to recede towards the east or village.

A man named Gorlin, who was busy putting his house back, informed me that this was his second removal in 8 years, due to a like cause. At St. Paul's Bay, where I was called lately to advise them as to their proposed aqueduct, I found the same features exactly as at St. Ann's, though on a smaller scale, the Riviere du Gouffre being of less capacity than the other. The citizens there, however, had faced the difficulty and set to carrying out the self-suggestive mode of protecting the sandy river shores by piling driven to some 10 feet below the bed of the river or to a hard bottom; some 500 feet lin. of this work had been done at a cost of only $300.

The same remedy is required at St. Ann, or the balance of that portion of the village north of the railway will go with the next freshet. It is passing strange that this idea of piling their respective frontages should not have occurred to these riparians, who cannot surely have forgotten already how, only a few years ago so to say, they were witness to the way in which piles were driven to stand the piers of the bridge on a sure foundation. This piling of some 1700 of the river frontage here might cost, say $5,000, at the utmost, while as appears by the figures given by a Quebec journal, the "L'Electeur," the loss in ruined tenements and removing others is not less than $20,000.

As a minor feature of the accidental outcrops at the lines of parting of the removed material, the student in geology may see both at St. Ann and St. Alban, as could also be seen at Portneuf when the hill was excavated into for the bridge abutments, layer upon layer of clay in the process of formation into stratified beds of stone; and I may say here, that in visiting a sand quarry at Beauport while surveying the locality for the then proposed and now constructed aqueduct to the lunatic asylum, it was my good fortune to see, which I never had a chance at before, perfectly defined, horizontal layers of sand of equal thickness, some 6 inches or thereabout, apparently in the process, a lengthy one though it be, of elaboration into stone.

Again adverting to St. Alban, it is to be feared that in the not remote future there may be a recurrence of these slides in adjoining parishes under concomitant circumstances; the subsoil being very probably honeycombed by water infiltrating through the overlying sand, and the underground rumblings often heard in these vicinities seem to give warning of the impending danger.

Only three years ago a slide, though on a smaller scale, occurred a little above the St. Alban on the same river. Some 20 years ago or less, an exactly similar slide of a mass of sand and loam over its well lubricated bottom of hard clay, took place at St. Valier, when an extent of land some several acres in area moved bodily, trees and all left standing, into river Boyer, causing it to change its course entirely at that locality; while others on all scales, large and small, are of daily occurrence in some part of the world or other.

C. BAILLARGE.

ON THE ADAPTATION OF A PRICE BOOK TO MEET VARYING RATES OF WAGES.

(FROM "LAXTON'S PRICE BOOK.")

THE following table shows a method by which an approximate estimate of the proportion which labour bears to material in each of the several branches of the trades, may be calculated:

Trade	Approximate proportion for Material.	Approximate proportion of Labour.	Proportion of total requiring adjustment.
Excavators, navvies or other labouring work			The whole, except such margin as may be apportioned to cartage.
Drainage work	66⅔ per cent.	33⅓ per cent.	one-third.
Bricklayer	66⅔ " "	33⅓ " "	one-third.
Mason	33⅓ " "	66⅔ " "	two-thirds.
Carpenter	66⅔ " "	33⅓ " "	one-third.
Joiner	33⅓ " "	66⅔ " "	two-thirds.
Plasterer	50 " "	50 " "	one-half.
Plumber	75 " "	25 " "	one-fourth.
Painter	40 " "	60 " "	three-fifths.

MEMO.—Each of the above carries with it its own labourers in attendance. The trades of slater, smith and founder, gas fitter, bell-hanger, etc., are purposely omitted, as they are mostly dealt with upon a different basis, and in fact should be regulated by their prime cost.

Example.—Supposing it be desired to adjust an estimate or measured account upon the basis of mechanics' wages at 10d. per hour, instead of 9½d., then add one-nineteenth (or say 5¼ per cent.) on to the proportion of such trades as is given in the outer right-hand column thus: If the joiner's bill in the summary of an estimate, amounted to £450, the proportion attributed to labour would be two-thirds, or £300, to which we add the one-nineteenth, for increase in wages, making £15 15s. 0d., and raising the total to £465 15s. 0d.

Or supposing the case of the plasterer's bill amounting to £90, the proportion attributed to labor would be ½, or £45, to which we add one-nineteenth, or £2 7s. 4d., raising the total to £92 7s. 4d., as the corrected amount to meet the altered rates of wages.

Or, again, suppose it be desired to apply London prices to suit the lower rate of wages of a provincial town, say 8d. per hour, hour instead of 9d., then deduct from the proportion one-ninth (or, say 11 per cent.), thus: If the bricklayer's bill amounted to £1,130, the proportion attributed to labor would be one-third, or £376 13s. 4d., from which deduct one-ninth, or £41 17s., giving the revised total as £1,088 3s. to adjust the variance in wages.

STUDENTS' DEPARTMENT.

INTERCOMMUNICATION COLUMN.

This column is intended to afford a means of correspondence for students, builders and all our readers desiring information they cannot otherwise obtain. Questions for which an immediate reply is required should be marked "Urgent." Names and addresses of correspondents must be sent with their communications, but these may be signed with initials or otherwise for publication.

QUESTIONS.

[20]. I am roofing a brick building, which we faced with pressed brick. The brick were only damp enough to lay nicely and the walls well protected from the weather. A white substance which seems to come out of the bricks themselves now covers the wall in many places, thus greatly disfiguring it. We had the same trouble on a building which we built over a year ago. I write hoping that you may be able to suggest a remedy. Do you think oiling the wall after cleaning it with acid would be a permanent cure. A. E. C., B. Columbia.

[21]. Counting 25 bricks to a cubic foot when laid, and allowing fifteen per cent for waste, how many bricks would it take to build a chimney of square cross section, having its outside dimensions 6×6 feet at the base and 3×3 feet at the top, its inside dimensions 2.5×2.5 feet at the base and two feet at the top? (The fifteen per cent. to be added to the theoretical number required to build the chimney.) The height of the chimney is to be 60 feet. With the same diameters, how many bricks would it take to build it 70 ft. high?—STUDENT.

REPLIES.

[19]. "County Builder."—To give a full answer to your question we should have to print a table giving the comparative strengths of ropes of all diameters, but a few examples may suffice you at present. For instance a 1 inch girth hemp (hawser) has a breaking weight of .20 tons, whereas an iron wire of same girth will only break at 1.40 tons, and a steel wire at 2.50 tons. A 2 inch hemp breaking weight .80 tons, iron wire 5.60 tons, and steel 10.00 tons.—[Ed. Inter. Col.]

[20]. So far as we can learn, there is no process which is effectual in preventing the exudation of magnesia from brick work. We are informed that there is a standing offer on the part of the leading brick manufacturing companies of Canada and the United States of $10,000, for the discovery of a process which will prevent efflorescence from brick work. If the bricks before being laid in the wall, are dipped in linseed oil to the depth of an inch and a half on the surface to be exposed, it will prevent to a considerable extent the magnesia from coming to the surface. The cost of dipping would be from sixty to seventy cents per thousand. Experience in Toronto and elsewhere has shown, that with constant washing by rain and drying by sun, the efflorescence usually disappears to a large extent, if not entirely, after the building has been exposed one or two seasons to the weather. This being the case, it is considered hardly necessary to go to the expense of dipping the bricks in oil. So far as our information goes, we do not think that oiling the wall after cleaning it with acid would prove a satisfactory remedy. We understand the amount of magnesia in the brick depends largely upon the depth at which the clay used in their manufacture is obtained. In bricks made from clay dug at a considerable depth below the surface the quantity of magnesia is less than in those made from surface clay. We might add that the defect to which you refer appears not to be confined to any particular deposit of clay, but it is incident to bricks everywhere. The problem of how to avoid it is one which has for a long time given brick manufacturers a good deal of anxiety. If any of our readers are possessed of any additional information on this subject, we will be pleased if they will contribute it.

[21]. In order to get the volume of brickwork in the chimney it is necessary to find the volume of the outside frustum of a pyramid and that of the inside frustum or flue, and to subtract the latter from the former. The volume of a pyramidal frustum having its base and top parallel is found by adding together the areas of its base and top, and the area of their mean proportional, and multiplying their sum by ⅓ the perpendicular height. The area of the base of the outer frustum is 36 square feet: that of the top 9 square feet; their mean proportional is $\sqrt{36\times9}$=144 equals 18 square feet. Then 36+18+9=63; 63×20=1260 as the number of cubic feet without deducting the volume of the flue. The flue has its base area 2.5×2.5=6.25 square feet; as its top area 2×2=4; the mean proportional between these two areas is $\sqrt{6.25\times4}$=25=5. Then 6.25+5+4=15.25; 15.25×20=305 as the number of cubic feet in the flue; this being taken from the outside volume 1260 leaves 955 as the number of cubic feet of brickwork. If there were 25 bricks to the cubic foot that would call for 955×25=23875 bricks without allowing for waste, and fifteen per cent. of this would be 3581 for waste; so that the total number required be 27476 bricks.

SALT WATER FOR BRUSHES.—The water in which brushes are kept during the warm summer months, often though it be changed, is apt to get foul. To prevent this put a little salt in the water.

A NOTABLE CASE OF MOVING A BUILDING.

A NOTABLE instance of removing a large building was the removal at Rouen, in France, of a large timber and iron shed, 194 ft. long, with a 97 ft. span, over a distance of several hundred feet. The structure was made up of twelve trusses, supported on double posts at each end, and the total load to be lifted amounted to about 180 tons. The crucial part of the undertaking was in the lifting of the twenty-four supporting posts at one and the same time, and it was indispensable also that this raising should be accomplished in a manner which would not in the least degree alter the relative positions of the posts. One circumstance largely favoring the undertaking was that the slope of the ground over which the shed had to be moved was slight, and that the posts, when in their new position, would require raising to the extent of only about 10 in. The mechanical appliances necessary, therefore, were comparatively simple, comprising only some winches, cables, and screw jacks, some strong blocks, and the special trucks which had to be built to carry the posts in transit. Rails and sleepers, necessary to complete the outfit, did not add greatly to the expense. The first operation consisted in laying a track underneath each line of posts, and then building around each post a truck on to which, subsequently, the posts were lifted. As soon as all the trucks had received their loads they were coupled together by iron rods so as to transmit the traction in the line of the posts, and also to preserve the proper distance between them. Somewhat beyond the far end of the distance to be traversed two piles were driven into the ground almost in line with two rows of posts, and at each side of these piles another and smaller one was driven to serve as the fixed points for the cables used in hauling. The latter, starting from these, passed successively around pulled blocks on the two heavier piles, then around blocks fixed to the leading trucks, and finally were wound on a winch placed inside the building. A graduated plank was laid down along the whole length of the route to aid in securing uniformity of progression in all the trucks, and the whole operation was carried out expeditiously and successfully.

So far as is known, wall paper was originally made by the Chinese in square pieces, about 20 inches wide and 20 inches long. It was probably pasted on the wall, and used in some such manner as the Spaniards used their stamping leather, taking the place of the arras of the French, and the tiles of the Dutch. China stands prominently out as being able to make more from paper and pulp than any other nation.

The object of shingling a house, or other building, is to keep out the rain; from the manner in which some carpenters do their work, says the Kansas City Architect and Builder, it would seem as if their object was solely to see how many shingles they could make one nail hold in place until they got off the roof. But the good and conscientious workman lays the shingles right side up, spaces them evenly, puts butts even, and drives two nails in each shingle over four inches wide.

A section through in a drawing will tell more about the arrangement of the internal details than dotted lines ordinarily can. Therefore, says an English architectural paper, after a sufficient number of side views and a plan have been made—or, better, an isometrical picture of the device illustrated—enough cuts should be made through different parts of it to clearly show the inside parts. This practice will generally obviate the necessity for a separate drawing of the full details on experimental work and on tools, where it will be found necessary to draw but few such details of the more complicated shapes. Dotted lines for every covered part are an abomination when made by the average draughtsman. Few men have the artistic skill thus to depict the transparent effects so that an intelligent view is given of the internal parts. A section here and there, on the other hand, makes all parts clear and so well within the capacity of the most ordinary draughtsman to depict, and in the power of the most crude mechanic to read, that there can be no two opinions as to the advisability of plenty of sections and few or no dotted lines. In a long experience we have found it to pay, as a corrective, to make sections, for many of the mistakes of draughtsmen may thus be caught and remedied.

A NATURAL bridge is said to have been discovered on the Columbia river near West Kootenay. It is composed of grey granite, allied to syenite. The piers on each side are 20 feet high, when the arch begins to spring and rise in the centre to a height of 90 feet above the ground. The distance from pier to pier is 264 feet, and this enormous span is covered by a roof of granite 30 feet wide, and varying in thickness from 10 feet at the sides to 12 feet in the centre. The form of the arch is that of a rainbow, the under side being smooth, but not water-worn, and without angles or bosses. It is cracked in radiating lines, which divides the centre into self-supporting keystones, but the joints are quite close, without fissure between them. The sides of the piers are as smooth as the arch, and great firs and cedars grow beneath the arch. This remarkable monolith does not appear to have been caused by the wearing away of the rocks around it, nor by falling from a higher level, but seems to have either been elevated en masse or left standing on the subsidence of the surrounding land.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The Hon. Mr. Nantel, Minister of Public Works for this Province, has returned from a trip to Europe, Egypt and the Holy Land. He is reported to be much improved in health.

The Sanitary Engineer has reported to the Health Committee that certain large educational establishments now in process of construction have failed to carry out by-law No. 105, section 26, which requires them to submit to the Board of Health plans of the internal arrangements, plumbing, etc., after being duly notified to do so.

At a meeting of the Council of the Province of Quebec Association of Architects held in their new rooms in the New York Life Insurance Building on May 29th, Mr. Joseph Haynes tendered his resignation, which was accepted. Mr. A. C. Hutchison has consented to act as secretary till the next annual meeting. Mr. Hutchison is known to be a hard worker in the interests of the Association, and the secretaryship could not be in more capable hands.

The members of the Carpenters' and Joiners' Union are not likely to again order a strike in this city, at least until the recollection of their present defeat shall have become less painful. They demanded that their working hours be reduced to nine instead of ten, and that their wages be increased to a minimum of 20c. per hour instead of 16c. per hour. These demands, the master builders refused to grant. After having lost five weeks of their time, and an advance in wages, which they might have got from their employers at first, they have been compelled to return to work at the same hours as before, and some for less wages than they were getting previously. Indeed they have not all succeeded in getting employment. Some employers took non-union men on during the strike, and they now refuse to replace them by the strikers. Those union men to whom employment has been given are not recognized as such. The men claim that about fifty of the builders have acceded to their demands, but this statement appears to be exaggerated. It has only been possible for me to find two, and of these one has failed since the settlement, and the other I hear discharged his union men immediately after the settlement. The Carpenters' and Joiners' Union probably selected for their strike the slackest time we have had for the last twenty years. There are very few buildings in course of construction this year; and the foundations of these are hardly in yet. The only work that is always going on perhaps is jobbing, which in the month of May is a little more active than usual. All this no doubt helps to account for the little success which rewarded the carpenters' recent effort to force payment of a higher rate of wages. Speaking to a prominent contractor the other day in this connection, I was told that he had only fifty men in his employ at present; when business is brisk he employes from one hundred to one hundred and fifty men. Of the fifty at present employed, about half are union men to whom before the strike he offered an advance in wages of ten per cent., which was refused. He also said that a good many of his former employees applied to him for employment after the strike, but he refused to grant their request. The absurdity of this strike when the business is so dull is clearly illustrated by the fact that hundreds of men are necessarily idle, and as this contractor said: "Applicants are so numerous that I had to put up a notice at my office entrance to prevent them from coming in." Last week this contractor said that he received over 70 applications for employment, and at the beginning of this week about thirty. This is not the opinion and experience of one man only, but of the most prominent contractors of the city. A few architects interviewed on the subject with one exception said the strike affected them very little; one said it had been the means of stopping work on ten of his buildings; but it is yet early in the season, and with men plentiful, there is time enough in which to gain the lost time.

HAMILTON, ONT.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The City Council have been petitioned to further extend the fire limits.

The City Council recently passed a by-law exempting builders from payment of water rates. It is said an effort will be made to have the by-law declared to be illegal on the ground that there was not a quorum of members of the Council present at the meeting.

An Arts and Crafts Exhibition in Canada is a sign of progress. Hamilton exhibition, which was held in the well-lighted rooms of the Art School, opened on Queen's birthday and closed on June 2nd. About 250 persons visited it daily, and most of them will undoubtedly have received an object lesson as to the real meaning of art and handicraft. The walls were covered with pictures by local artists, and 40 selected works from the Ontario Society's exhibit, interspersed with some excellent works loaned by Hamilton citizens. The "Crafts" section occupied the centre and filled a row of benches across the end of the large lecture room. The architectural designs were hung in the hall and staircase. Messrs. John Ireland, Stark Gordon, J. S. Gordon, A. Stuart and L. Stuart; Madames Ireland, Hull and Birely, and Misses Linton, Shed, Galbraith, L. Hamilton and Boine, were the most conspicuous exhibitors among local artists. Mr. S. John Ireland's "Attraction in Reflection" and "Washed Ashore," and Miss Galbraith's "My Mother's Garden," were worthy of the praise bestowed on them. Space is too limited to review the pictorial section, and as many of the best works have been lately considered while on exhibition at Toronto, it is unnecessary to do so; it is presumed also, that the readers of the CANADIAN ARCHITECT AND BUILDER will be more interested in the Architectural and Crafts' sections. The architectural exhibits consisted of design for exhibition building by E. Patterson; city hall in French Renaissance style,—the planning is good and the facades are effective. James Balfour, A.R.C.A., exhibited a perspective, in line, of a municipal building —a good composition and a most creditable bit of draughtsmanship; he had also a perspective of his Detroit Museum of Art. W. A. Edwards had a fairly good design for a school, but the coloring detracted somewhat from its merits. R. Cloheey had a pen and ink of additions to Loretto Convent; Messrs. Rastrick had a colored perspective of Mr. Lucas' house; John A. Sellard exhibited his silver medal drawings for a museum, art school and gallery; A. W. Peene had a nice bit of pen work, a porch shelter of very appropriate design. The wallpaper designs by A. McKenzie, Gilbert Clayton and Misses Lucy McInnes, D. Trigge, Lena Bowman, were good, as were also the tiles by Thos. Davidson. Designs for painted ceilings—by Frank Nairn, Misses L. Bowman and Marguerite Jackson. Design for grate and overmantel, by Miss Ida Thompson—this drawing was quite refreshing; to see such good technical work by a girl is unusual; this drawing was exhibited at Chicago. Brasswork—a lectern by Chadwick & Sons.

Wood carving and cabinet work was best represented in the Crafts' section. J. Hoodless & Son had a magnificent bedstead in Empire style, designed by Jas Barton, and carved by J. A. Thompson and W. Taylor; a bric-a-brac cabinet by Malcolm & Souter—designed by J. Souter, carved by Jas. Thompson, and cabinet work by R. Newbegging. This was sold for $110. There was also shown centre tables by R. Boase and Mrs. Robt. Evans; flower stand by Miss Ethel Hamilton; folding screen by Amy Barnard, this received an award at the Columbian Exhibition; carved panels, F. J. Morrison—particularly good examples of Renaissance; clock cases, etc., by J. Souter and J. Thompson. Needlework, designed and wrought by Madames W. H. Ballard, Leith, Wright, McBrier; lace, Mrs. A. W. Peene and Miss C. McIlroy, also original designs.

In bent iron work, Miss M. E. Anderson, of Glasgow, Scotland, had a varied display.

In carriage painting, Malloy and Malcolm had a case of samples showing every stage of carriage painting up to 14 coat work; this exhibit attracted everybody's attention.

In the German specimens of raised wool work, loaned by Senator Sandford, the horses' heads were really wonderful, being shaded and shorn till it was a work of modelling as well as needlework.

A modelled figure of Venus was exhibited as the work of Miss R. A. Baine, the indefatigable secretary of the Association. In silversmiths' work Andrew Dwine had a nicely modelled figure of a curler, and his brother Robert an automatic perfume fountain—these exhibits were loaned by the Merriden Brittania Co. In stained glass there were designs by Walter R. Dulf and Arthur Adam.

The exhibition was a success financially, $214.50 being received at the gates. Over $100 is to be expended in the purchase of works of art to form the nucleus of a collection for an art gallery.

THE MARITIME PROVINCES.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The citizens of Moncton, N. B., are very much in earnest in their determination to secure harbor improvements for the town. With regard to the need of such a work and the valuable results to flow from it, its advocates are able to point out that Moncton has already made fine progress as a manufacturing town; that it is the natural outlet of varied and extensive natural products seeking foreign markets; that it is well located to become an important manufacturing centre, and that the town already has a good record as a shipping port. Coming now to the possibility of providing the town with a good harbor, the Harbor Improvement Company present an elaborate series of plans showing how, by an expenditure that would be very moderate compared with the cost of similar works at other ports, the place can be provided with a wet dock covering 14 acres, with also a dry dock for making light and another for more extensive repairs to vessels. The Petitcodiac river flows beside the town. Just beside the sugar refinery, cotton mill, B. & M. railway terminus and the pumping station, flows Hall's creek, a winding tidal stream, tributary to the Petitcodiac. The proposition is to convert this Hall's creek into a wet dock, with, as already stated, 14 acres of available water for ships. Wharves will be built along the banks of this dock to accommodate vessels as the business develops. The entrance would be through a lock with double gates, and out of which the water could be withdrawn, leaving a dry dock where a vessel could make light repairs. If more extensive repairs, involving considerable time, were needed, another dry dock at the extremity of the wet dock can be provided for. As the land is ordinary high marsh, there would be no difficulty in excavating wherever necessary, and the construction material could be of wood and practically indestructible, because experience has proved that timber in the Petitcodiac river is free from worms.

Hence it is claimed, the cost would be relatively small, considering the amount to be done and the value of the works when completed. The largest ships could be accommodated, for the largest vessels can ascend the Petitcodiac to Moncton. The wet dock would be steadily supplied with fresh water from the creek above, or by pipes from a reservoir within two miles of the town. When completed the new harbor would be beside the sugar refinery and cotton factory, with connection with the I. C. R. and B. & M. railways, and special facilities would be afforded for the establishment of new industries along the wharves, one of the inducements being a nominal or low rate water supply, and another easy access by water to the coal mines of Cumberland, Nova Scotia, and by rail with the quarries of Westmorland, Albert and Kent counties, to say nothing of the lumber and farm products of the surrounding country.

It is stated as a strong point in favor of the proposed work, that old shipping men not only recommend it but will back it with their support. The people of Moncton themselves are prepared to aid the project in a substantial way and the company are willing to thrust their hands deep into their own pockets, believing the investment would be a good one. The growth of Moncton, they point out, would be for the advantage of the traffic on the I. C. R. and of the trade of St. John, and for the good of the whole country. Therefore they maintain the whole country should favor the scheme.

A mass meeting was held in Moncton a short time ago and the sentiment as expressed was strongly in favor of the new docks. The Provincial as well as the Dominion government will, it is believed, support the scheme.

A move is being made by Campbellton merchants to improve their harbor. According to the survey of the river made in 1839, which appears to be the last general survey made, there is 23 feet of water in the channel opposite the ballast wharf at the lowest neap tide. But on the traverse there is at times only 11½ feet. This gradually deepens, however, till at the Battery point there is plenty of water for the largest ships. The plan proposed is to dredge out the south channel, which joins the north channel opposite Point La Garde. This would make a direct course up the middle of the river, and it is contended the current would keep it clear when once opened up. About two miles would require to be dredged, but the channel is partly open now. A petition was sent to Mr. McAllister, the representative at Ottawa, and it is believed there will be little difficulty in getting it through the House.

A. H. Mc.

PERSONAL.

The death is announced of Mr. Charles Goswell, a prominent builder and contractor of Winnipeg.

Mr. F. H. Herbert, architect, Toronto, has recently removed to new and more commodious offices at 32 Queen street East.

The Hon. William Harty, of Kingston, has been appointed Commissioner of Public Works for the Province of Ontario to fill the vacancy caused by the recent retirement of Hon. C. F. Fraser.

Mr. J. A. Ellis, architect, of Toronto Junction, in conjunction with Mr. Wm. Fingland, late of Toronto, has opened an office in the city of Baltimore, and is about to temporarily remove to that city. On the eve of his departure from Toronto Junction he was tendered a complimentary banquet by a number of the prominent citizens. Mr. Ellis' popularity is well deserved, and his departure is the subject of much regret.

The government are being urged to restore the duty on white granite ware to 35 per cent., as at the reduced duty of 30 per cent. difficulty is being experienced in organizing a company to continue the large industry at St. Johns, Quebec, formerly carried on by the St. Johns Stone Chinaware Co.

THE WUENSCH AND MELAN SYSTEMS OF FIRE-PROOF FLOOR CONSTRUCTION.

WITHIN the last few years Austrian engineers have been adopting various systems of combination iron and concrete arch floor construction in buildings where the floors are subjected to heavy loads, with a considerable reduction in cost and a great gain in the rapidity of construction over the old form of brick arch construction. For some years the Monier system, illustrated and described in Engineering News of May 23, 1891, and Feb. 16, 1893, has been most generally specified for floors, but recently two other systems, the Wuensch and Melan, have been very successfully used in a number of large buildings. The application of these two systems to actual structures is shown in the accompanying illustrations.

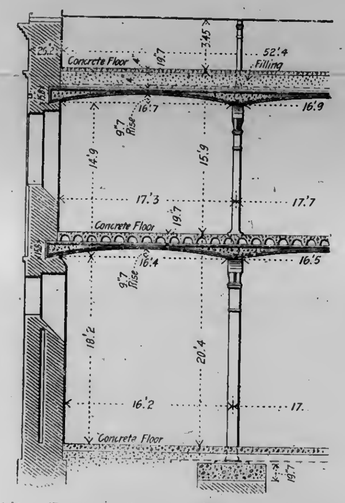


FIG. 1.—TRANVERSE SECTION OF BREWERY AT BUDAPEST, SHOWING WUENSCH SYSTEM OF IRON AND CONCRETE FLOOR CONSTRUCTION.

In Fig. 1 is shown the construction of the Wuensch system as used in the floors of a large brewery at Budapest, Hungary. In this building the second floor had to be designed for a load of 240 lbs. per sq. ft., and the third floor for a 80 lbs. per sq. ft. load. The space to be covered was 174 × 52½ ft. Two rows of columns were run lengthwise of the building 18 ft. apart and 16 ft. from the side walls of the building, and upon these was placed the system of concrete and iron arches shown in the illustration (Fig. 1). As will be seen, this system consists of a series of arches spanning the spaces between columns lengthwise of the building, and these arches carry other arches which span the space transversely. The longitudinal arches act simply as girders which support the arches forming the floor proper and are only 15¾ ins. wide, 14 ft. span and 1.4 feet rise. They are made up of four 2.16 × 2.16 × 0.28 in. angles, two of which are curved to form a bottom chord, so to speak, for tension, and two of which form a horizontal top chord for compression, and are filled in with concrete. It will be seen that the system is simply a modified form of the Monier system, in which the wire nettings are replaced by stiff angle or T-sections.

The tranverse arches are constructed in exactly the same manner as the longitudinal arches, except of course that they form continuous vaults the entire length of the building and use

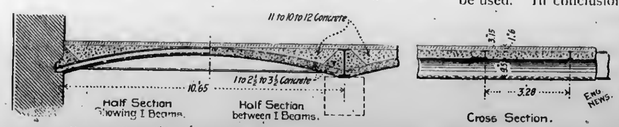


FIG. 2.—THE MELAN SYSTEM OF IRON AND CONCRETE FLOOR CONSTRUCTION.

T-sections instead of angles for the iron skeleton. Two of these arched vaults have spans of 16 ft. and one a span of 18 ft. and the iron frames are placed 7.9 in. apart for the second floor and 13 ins. apart for the third floor. The T-sections used are 1 × 1 × 0.15 in. The composition of concrete was 1 cement, 2½ sand and 3½ broken stone.

The time taken to construct this floor with 8,500 sq. ft. of area was four days; the centers were allowed to stand one week after the concrete had been placed. Mr. Schustler, the designer, works out the cost of the floor, as compared with a floor consisting of twelve 14-ft. span brick arches laid between I-beam girders supported on cast iron columns (a design which was at first proposed for the work) as follows:

	Brick.	Wuensch.	Saving by using Wuensch system
Weight of floor per sq. ft..	500 lbs.	320 lbs.	180 lbs.
Weight of cast iron columns	82 800 lbs.	65,000 lbs.	17,800 lbs.
Weight of wrought iron used	108,400 lbs.	56,400 lbs.	52,000 lbs
Volume of brick or concrete	13,603 cu. yds.	798 cu. yds.	502 cu. yds.
Depth of floor.....	40 ins.	6.7 ins.	33⅓ ins.

Mr. Schustler further states that the saving in cost over brick arches in this floor was 30%. It is to be remembered, however, that this statement applies to the cost of materials and labor in Hungary. The high price for labor in this country would make the saving considerably less.

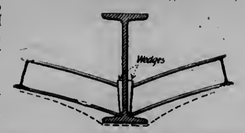


FIG. 3.—CONNECTION OF CURVED I-BEAMS WITH FLOOR GIRDERS, MELAN CONCRETE AND IRON FLOOR CONSTRUCTION.

The second system of floor construction shown is what is known as the Melan system of arch construction. As already described in Engineering News, this system consists in embedding curved I-beams in concrete and has proved very strong under heavy loads. The illustrations, Figs. 2 and 3, show the system as applied to the floor of the spinning-room of a large factory at Tetschen, in Austria. This floor has an area of about 40,000 sq. ft., and is loaded with heavy spinning machinery. As will be seen the concrete is filled in between the beams, coming down below the concave flange of the curved I-beam and being level with the upper flange of the arch. A poorer quality of concrete is generally used for the spandrels and ashes are used for filling. The connection of the curved I-beams at the floor girders is shown in Fig. 3, where it will be seen that simply a couple of wedges are used, there being no riveting of any sort.

The manner of laying the concrete is first to build a centering with tight lagging conforming to the intrados of the arch. The manner of constructing the centering is shown in the accompanying sketch, Fig. 5. The iron frames are then placed and the concrete rammed in place in layers, as is also shown in Fig 5. In this manner a gang of 14 men have laid from 700 to 800 sq. ft. of floor in a day of ten hours, including the spandrel filling of poorer concrete which, of course, had to be laid separately. This gang consisted of four men placing the I-beams, fastening them and placing the centering; one man for sand and one for cement; four men mixing the concrete; two men carrying the concrete and two ramming it into place. With

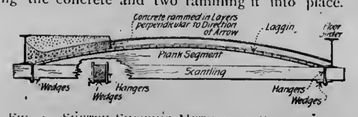


FIG. 4.—SKETCH SHOWING METHOD OF CONSTRUCTING MELAN CONCRETE AND IRON FLOORS.

this gang the amount of concrete laid per hour per man was 2 cu. ft. This record is low, however, and on bridgework the average amount of concrete laid is 5 cu. ft. per man per hour.

In Fig. 2 it will be seen that a tie-rod has been used in the arches abutting against the wall. Usually the stiffness of the I-beams is sufficient to prevent any movement without these. The arrangement of the I-beams and the depths of the concrete for different span arches are shown in the accompanying table:

Space, feet with rise of 1-2 to 1-15	Depth. ins.	I-Beams— Dis. apart. Weight. ins.	Weight, lbs. per sq. ft. of floor.	Depth of concrete. in ins.
10 to 12.....	3	6 40	1.8	4
12 to 16.....	4	6 40	1.8	4½
16 to 20.....	4	7½ 40	2.25	4½
20 to 24.....	5	10 50	2.4	5½

For smaller spans than 10 ft. T-iron instead of I-beams will be used. In conclusion, it may be of interest to mention some tests recently made by the Austrian Society of Civil Engineers and Architects to determine the comparative strength of different systems of concrete arch floor construction. The Wuensch system was not included in these tests, but other tests made by the Hungarian Government show it to be far superior to the Monier system. These tests may be tabulated as follows:

	Brick.	Concrete.	Monier.	Melan.
Span.....	13½	13½	13½	13½
Rise.....	15¾	15¾	15¾	11
Thickness at crown.....	6	4	2⅞	3⅛
Lbs. iron used per sq. ft.....	...	...	8	4
Breaking load, lbs. per sq ft...	321½	737	839	3,360

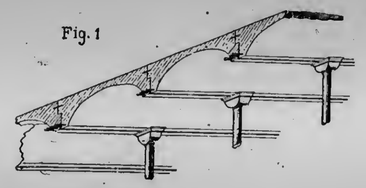
We are informed that in practice the relative strengths of the several arches when all are made of equal thickness are as follows: Brick arch, 1; concrete arch, 5; Monier arch, 16; Melan arch, 36. On the other hand, the relative thickness of different arches of the same strength would be: Brick arch, 12 ins.; concrete arch, 5 ins.; Monier arch, 3 ins.; Melan arch, 2 ins.

CONCRETE CONSTRUCTION.*

ON account of the small and very uncertain tensile strength of ordinary concrete it has appeared to be entirely unadapted for horizontal beams of floors or any parts of a structure subject to other than compressive force, nor did it appear a hopeful field for investigation and experiment. However, many efforts have been made during the past 20 years to unite the tensile strength of iron with the compressive strength of concrete in such a manner as to secure the whole value of each material for its respective position. These experiments demonstrated many years ago the feasibility of the union, but the methods were more or less complicated, and wasteful of the more expensive material, iron, for which reason little use was made by the discovery until Mr. Earnest L. Ransome, of our city, invented and applied plain, square, cold, twisted iron bars for this work, and demonstrated clearly that this simple process was perfect in its results, even showing a much greater advantage than the original tensile strength of the iron. The present paper will contain notes of the principal work that has been executed in this vicinity and that has come under the writer's observation within the past few years.

The first example in point of time is the Bourn & Wise wine cellar at St. Helena, erected in 1888. This building is 400 feet long, 75 feet wide, and three stories high. The entire site is cut into the side of a gentle sloping hill and so arranged as to have driveways 15 feet wide along the entire length at the rear and at the levels of both first and second floors, while beyond the driveways and retaining walls are 13 tunnels, 16 feet wide, penetrating the hill about 200 feet. On the site of the building and immediately surrounding it were an abundance of boulders, of very hard basaltic

Fig. 1

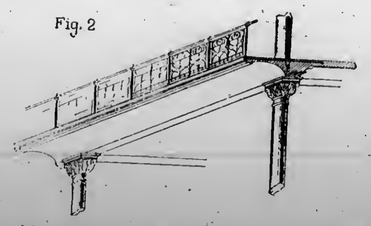


stone, quite unsuitable for rubble-stone work, owing to their rounding form, but excellent material for concrete when crushed; the finer materials were obtained in the form of gravel from a neighboring creek. A good quarry of the soft but durable volcanic tufa so common in Napa Valley was found within half a mile of the building, and as it could be quarried, hauled, and built into the walls for 17 cents per cubic foot it was employed for all walls and partitions of the building. The foundations, retaining walls, lining of tunnel entrances, and the main floor laid on the ground, were formed of concrete in the usual manner. The entire second floor, together with the driveway at that level, was constructed with concrete and twisted iron rods in the form of beams and elliptical arches, as shown in Fig. 1, and as here described. Two rows of iron columns 7 feet 4 inches on centre were placed lengthwise of the building, dividing the width into three sections of about 25 feet each. The floor was constructed with concrete beams 7 feet 4 inches on centers passing entirely across the building, with their soffits resting on the iron columns. The beams were 24 inches deep from soffit to surface of floor, and each had four 1¼ × 1¼-inch twisted iron rods near the bottom, with a vertical joint along the center of each beam, protected against leaking by a strip of lead embedded in each half of the beam. The arches between the beams were elliptical in form, and the concrete 5 inches thick at crown of arches.

The floor was estimated and intended to carry with safety on each beam, for each 25-foot section, two casks, each containing 2,000 gallons of wine, or a total weight, including cooperage, of 40,000 pounds, on each section 7′ 4″ × 25′, or about 220 pounds per square foot, uniformly distributed. The arrangement of the casks was intended to leave a gangway 8 feet wide in the center of each section, thus giving less stress than a uniformly distributed load. Before the building was finished one of these sections was tested with a uniformly distributed load of 300 pounds to a square foot, and produced a deflection of one-eighth of an inch at the center; on removing the load the beam returned to very nearly its original position. Since the building has been occupied many of the gangways have had tiers of large casks placed two in height along their entire length and smaller casks set between the upper bilges of the large casks, thus loading the floor largely in excess of its intended capacity. Implicit faith seems to be placed in this construction by those engaged upon it that it will carry anything that can be put on it. These floors have now been in use four or five years, and answer the purpose for which they were designed by making a strong and non-absorbing floor and assisting in keeping a uniform temperature throughout the building.

The next building of importance in which the writer employed concrete and iron floors was the California Academy of Sciences in this city. In this case a careful estimate of cost was made of the usual steel-beam and hollow tile construction, and compared with the cost of this method. The result was a saving of 50 cents per square foot, or $20,000 for the entire building,

Fig. 2



in favor of the concrete and twisted iron method. After due investigation the latter method was adopted by the Board of Directors and executed by Mr. Ransome. This work was subject to much adverse criticism by certain architects and builders, and some members of the Academy of Sciences, and persistent efforts were made by some to have the work condemned by fire wardens on the ground that it was not provided for in our valuable com-

* Abstract of a paper by George W. Percy, read February 9 before the San Francisco Chapter of the American Institute of Architects.

pilation known as the building ordinances. Several visits were made to inspect the work by parties connected with the Fire Department, but as they could not find anything about the construction that could be injured by fire, and had sense enough to perceive its great strength they declined to take any action in the matter. To satisfy all skeptics in regard to the strength of this work a test was made on a section of the second floor 22 feet span and 15 feet wide; this was loaded with gravel uniformly to 415 pounds to a square foot, and showed a deflection of one-eighth of an inch at the center of the beam. The load was left on this floor four weeks, and during that time many of the critics were invited to examine it. That very few availed themselves of the opportunity may indicate an unwillingness to have wrong opinions corrected. To those, however, who were directly interested in the work and had entertained honest doubts of its strength this test was satisfactory and conclusive.

The floors in this building were constructed with large beams about 15 feet apart and flat panels 8 inches thick between, with the plastering ap-

Fig. 3

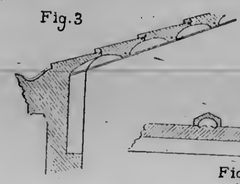
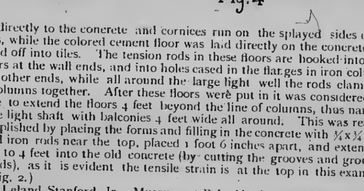


Fig. 4



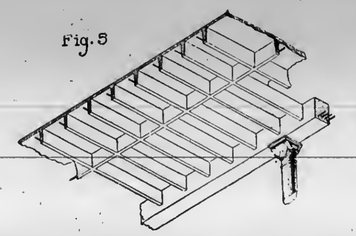
plied directly to the concrete and cornices run on the splayed sides of the beams, while the colored cement floor was laid directly on the concrete and marked off into tiles. The tension rods in these floors are hooked into wall anchors at the wall ends, and into holes cased in the flanges in iron columns at the other ends, while all around the large light well the rods clamp the iron columns together. After these floors were put in it was considered advisable to extend the floors 4 feet beyond the line of columns, thus narrowing the light shaft with balconies 4 feet wide all around. This was readily accomplished by placing the forms and filling in the concrete with ¾ × ¾-inch twisted iron rods near the top, placed 1 foot 6 inches apart, and extending from 2 to 4 feet into the old concrete (by cutting the grooves and grouting the rods), as it is evident the tensile strain is at the top in this example. (See Fig. 2.)

The Leland Stanford, Jr., Museum at Palo Alto is probably the largest most important building in the world constructed entirely of concrete. It was designed to have dressed San Jose sandstone for the external walls, backed up with brick, and to have brick partitions, with concrete floors. Owing to the great cost of stone work it was decided to build the walls of cement concrete colored to match sandstone used in the other university buildings, and to carry out the classic design first adopted. This led to making the entire structure, walls, partitions, floors, roof, and dome, of concrete, making it in that respect a unique building.

Having some knowledge of the disadvantages and defects natural to a monolithic building, such as result from the shrinkage and expansion and contraction of walls, floors, and roofs, several new experiments were tried to overcome them, with varying results of success and failure. It was thought to overcome the cracking of walls by inserting sheets of felting through the walls following the lines of the joints as near as practicable on each side of windows. The lapping bond of the concrete, however, proved too strong to allow the cracking to follow these joints; in most cases the weakest points were found at the openings, and small cracks appear from window sills to head above.

Joints were formed through the floors about 15 feet apart, and in most cases the cracking has followed these joints and been confined to them. To prevent the possibility of moisture penetrating through the walls, and also to render them less resonant, hollow spaces 5 inches in diameter were

Fig. 5



molded in the walls within two inches of the inside face, and with about 2 inches of concrete between them. These are successful for the primary object, and partially so for the secondary.

The roof being the greatest innovation, and the first attempt known to the writer of forming a finished and exposed roof entirely in concrete, required the greatest care and consideration. The result in form and appearance is shown by Figs. 3 and 4 and is described as follows: The roof is supported on iron trusses 10 feet on center and has a pitch of 20 degrees. The horizontal concrete beams rest on the iron rafters and with half arches form the horizontal lines of tiles about 2 feet 6 inches wide with joints lapping 2 inches and a strip of lead inserted as shown. Vertical joints are made through the concrete over each rafter with small channels on each side. These joints and channels are covered with the covering tiles shown on drawings, and similar rows of covering tiles are placed 2 feet 6 inches apart over the entire roof, thus forming a perfect representation of flat Grecian tile or marble roof. Notwithstanding the precautions taken, this roof presented several unexpected defects. The most serious proved to be in the Venetian red used for coloring matter and mixed with the cement. This material rendered the covering tiles absolutely worthless, many of them shocking like lumps of lime, and all were condemned and remade. The same material injured the general surface of the roof, rendering it porous and necessitating painting. The roof over the central pavilion, being hidden behind parapets, is made quite flat and covered with asphaltum and gravel over the concrete. This roof, with its low, flat dome, is without question the largest horizontal span in concrete to be found anywhere on earth, being 46 × 56 feet, the flat dome having all its ribs and rings of concrete, with the

panels or coffers filled with 1 inch thick glass, and weighing about 80,000 pounds. This structure, covering 21,000 feet, and containing over 1,100,000 cubic feet of space, and requiring about 260,000 cubic feet of concrete, was completed in seven months' time from the commencement of the foundations, and at a cost of about 18 cents per cubic foot of space. This the writer believes to be a very low figure for a thoroughly substantial and fire-proof building with marble stairs and wainscoting, cast iron window frames and sashes, and other parts equally enduring, and would call attention to the fact that concrete walls with iron rods embedded, when cracked are not in the bad condition of stone or brick walls without bond, but the iron ties are always good to prevent spreading or falling, while several methods may be devised for allowing free expansion and contraction without producing unsightly cracks. Some such method should be employed on all finished structures.

One of the rooms in this building was designed to be the receptable of many valuables, and to render it burglar-proof the floor, walls, and ceiling had copper wires embedded in the concrete not over 3 inches apart, forming a continuous circuit, and designed to strike an alarm bell at the university if any wire should be cut. This device has been in use at the United States Sub-Treasury vaults in this city for several years, and would be very effectual for prison walls and cells, as it would be almost impossible to cut a hole through strong concrete large enough to admit a man's body without cutting or breaking one or more of the wires, thereby giving an alarm.

Other important works have been executed in concrete in this vicinity, among which may be mentioned the girls' dormitory at the Sanford University, a three-story building completed in 90 days from the time the plans were ordered. Also the torpedo station on Goat Island, 80x250 feet, with walls about 30 inches high, built under the direction of Colonel Mendell: and the addition to the Borax Works at Alameda. In the latter the walls, interior columns, and all floors are concrete, and are remarkable for the lightness of the construction and great strength. These floors are constructed as shown in Fig. 5. In these floors the clear span is 20 feet. The floor consists of beams 4 inches wide at bottom, 5½ inches at top, and 1 foot 0 inches deep from bottom beam to top of finished floor. The beams are placed 2 feet 6 inches on center and the floor over the beams is only 3 inches thick. A section of this floor 10x20 feet was tested February 28, 1893, with the following results: Before testing there was a uniform load of 105 pounds to a square feet, when the scale was set to indicate deflection.

With 234 pounds per	square foot,	deflection.....	...	.1-16	inch.
" 273	"	"	"	.1-8	"
" 312	"	"	"	.1-8	"
" 390	"	"	"	.3-16	"
" 468	"	"	"	.3-16	"
" 551	"	"	"	¼	"

This deflection is in addition to any that may have existed with the initial load. In November, 1893, the writer visited the building with Mr. H. G. Jacobs, Government Inspector of Buildings, and in our presence a test was made on a section of the third floor, that was selected as an apparently weak spot owing to several cracks showing on the ceiling. A sliding rod was adjusted under the center of the beam. There was a distributed load of about 200 pounds per foot at the commencement; 225 pounds per foot additional were applied, and the deflection noted was less than one-sixteenth of an inch. This type of floor appears to be the best form yet devised for obtaining great strength with the minimum weight of concrete and least expense of carpenter work, the forms used being standard size to be used over again. With the present price of materials and labor such floors can be built with 20-foot span of safe strength for 250 pounds per square foot, and with finished cement surface, for 45 cents per square foot, and without the finished floor surface for 30 cents per square foot. Level plastered ceilings may readily be suspended from the beams and wood or tile floors laid over it, as in other methods of fireproof construction. This method of forming floors with the minimum of very rich concrete is lighter than the common method of steel beams and hollow tiles, for the same strength. The concrete should be composed of 1 part of Portland cement to 3 parts of selected aggregates.

The results given above are much better than could have been expected or hoped for a few years ago, and it is quite possible we have not yet reached the highest development.

In conclusion the writer would say, that while he does not think that concrete in any form is likely to take the place of stone, brick, and terra-cotta for architectural work, he feels quite certain that in combination with iron it is destined to fill a large place in the construction of buildings, and for warehouses, factories, wine cellars, etc., it is now the best and cheapest material for producing substantial and incombustible work.

OTTAWA.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Messrs. Wm. Hodgson and W. C. Edy, architects, of Ottawa, at the request of the local Board of Health, have made an examination of the new Contageous Diseases Hospital buildings in course of erection on Porter's Island. They report that the buildings were not properly designed and that the material and workmanship employed in their construction are so inferior in quality that there is nothing to be done but to pull down the work that has been done and reconstruct it in a proper manner. The Local Board of Health have sent a copy of the report to Mr. C. F. Stalker, the architect of the buildings, with the request that he will make reply. In the meantime the Chairman of the Board has been authorized to stop the work, while the contractors are appealing to the Courts to either allow them to complete their contract or be released from it.

HALIFAX.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Early in the present year regulations were adopted by the City Council for the plumbing work, and providing for the proper inspection of all work done within the city in future. Mr. E. W. W. Doane, City Engineer, was appointed Sanitary Superintendant, and Mr. Claude Donovan, Plumbing Inspector. From the annual reports of these officials it is learned that since the first of May, 1892, 469 houses have been connected with the main sewer, and 249 permits granted for building work. Some idea of the sanitary conditions hitherto existing may be inferred from the fact that out of 162 houses inspected on complaint not one was found in a sanitary condition. Referring to the sanitary condition of the city in the past, the Sanitary Superintendent says: "There were no inspectors, and closets were fitted up in every conceivable design and in all kinds of places without any provision for ventilation or particular attention to drainage. A favorite location was under the back stairs, from which position, under the mode of construction followed in the past, the poisonous gases from the drains easily found their way all over the house. The drain ran to a cesspit or an old stone drain in a filthy condition, and in some cases to the water pipe trench in the street. Often in some of the best houses there was no trap at all on the closet or waste pipe. These features and many others equally objectionable, may be noted on inspection of the plumbing work in three-fourths of the houses in the city, and yet our efforts to effect a reformation have been strenuously opposed. The plumbers are, I think, with one exception, willing and ready to do good work in accordance with our requirements."

FIRE-PROOF FLOORS.

In a paper recently read before the Civil Engineers' Club, of Cleveland, William Sabin, describes the forms of fire-proof flooring most commonly adopted in America. The oldest method was to place floor beams about 5 feet apart and turn a 4-inch brick arch between them, the beams being tied together to resist the thrust of the arches. The space above the arches was leveled up with concrete, in which were embedded strips of wood for the flooring. The plastering was applied directly to the bottom of the arches and over the flanges of the supporting beams. When exposed to a fire, however, it soon cracked off, and a special tile skewback is now used. Such a floor weighs about 70 pounds per square foot, exclusive of the weight of the floor beams. Its cost in America is about that of terra cotta. In this case the beams were placed 6 feet to 7 feet apart, the tiles being 10 inches deep, and the weight of the floor was reduced to 40 pounds per square foot and its cost to $1.34. A further reduction of weight was effected by the use of porous terra-cotta, obtained by mixing sawdust with the clay. The weight of the floor was thus brought down to 35 pounds per square foot, while its cost was $1.36.

In a test made at Denver, an arch of porous terra-cotta 4 feet wide and having a span of 5 feet, bore a load of 15,145 pounds with a deflection of 0.65 of an inch, and it took 11 blows of a weight of 134 pounds falling from a height of 6 to 8 feet to entirely destroy the arch.

Both systems of terra-cotta floor have successfully withstood severe fires. In a method of construction now being largely adopted, the span of the floor is increased to 12 feet, and it is supported by 12-inch I-beams. Between these beams is strained a galvanized wire net, said to be capable of carrying 1,000 pounds per square foot. A centre board is fixed below this net, and the space between it and the top of the floor filled with a very light concrete, made with crushed coke, cork, cement, and a little sand. This floor is 8 inches deep, the bottom flanges of the I-beams being protected by carrying the cement around them. Its weight is only 18 pounds per square foot, the deflection being only one-half inch. Its cost is about $1.05 per square foot.

MANUFACTURES AND MATERIALS

CAPE BRETON MARBLE.

A company has been organized to develop the extensive deposits of marble at Marble Mountain, Cape Breton. The directors of the company are: Rod Macdonald of Macdonald & Co., Geo. E. Francklyn, of S. Cunard & Co., Robie Uniacke, president Halifax Banking Co., James B. Hattie, of Hattie & Mylius, Ald. Mosher, Henry Saunders, and C. Hobrecker. The directors have elected the following officers to manage the affairs of the company: President, Rod Macdonald; vice-president, George E. Franklyn; sec.-treasurer, Geo. Hattie.

The capital required to develop the property has been subscribed, and work is to be carried on under the supervision of D. D. MacLachlan, manager.

The marble which is to be worked may be classified as follows: Pure white, variegated blue and white, pink, blue, dappled and water white.

Nature has made it possible to produce this marble very cheaply. Its location near to a good place of shipment, while no power but its own weight is necessary to move the marble from the quarries to the wharf; its proximity to the Cape Breton coal fields; its perfect natural drainage and the abundance of sand for sawing in the immediate neighbourhood are advantages seldom combined.

Active operations have been commenced. A steam channeling machine, mill machinery and castings for derricks are all on the ground and the erection of a mill and other necessary buildings will be carried forward as energetically as possible. A tramway down the mountain side from the quarries to the wharf — a distance of about 1,200 feet — will shortly be completed.

The company expect that within the course of three months they will be able to place their marble on the market.

A road in course of construction will bring the quarry within five miles of the railway. Samples sent to Great Britain have given great satisfaction. The quarry has also been examined and approved by an expert, Mr. Underhill, of Vermont.

A handsomely printed and illustrated catalogue relating to Wilson's inside and outside rolling blinds, has been received from Mr. Geo. Chatworthy, Toronto, Canadian agent.

The Crown Pressed Brick Company of Ottawa are applying for incorporation; capital stock $100,000. The provisional directors are G. W. McCullough, H. L. Corbell, J. J. B. Butterworth, all of Ottawa, and H. Mills, of Ormstown, Que.

MODERN EXPLOSIVES.

The compositions of some of the modern high explosives are as follows:

Dynamite.—Seventy-five parts of nitro-glycerine and 25 of infusorial earth.

Dualine.—Eighty parts nitro-glycerine and 20 of nitro-cellulose (gun cotton).

Rendrock.—Forty parts nitro-glycerine, 40 of nitrate of potash or soda, 13 of cellulose and 7 of paraffine.

Giant Powder.—Thirty-six parts of nitro-glycerine, 48 of nitrate of potash or soda, 8 of sulphur, and 8 of resin or charcoal.

Mica Powder.—Fifty-two parts of nitro-glycerine and 48 of pulverized mica.

Tonite.—Fifty-two and one-half parts of gun cotton and 47½ parts of nitrate of baryta.

Blasting Gelatine.—Ninety-two parts of nitro-glycerine and eight of gun cotton.

Atlas Powder.—Seventy-five parts of nitro-glycerine, 21 of wood fiber, 2 of carbonate of magnesia, and 2 of nitrate of soda.

Rackback.—77.7 parts of chlorate of potash and 22.3 of nitro-benzol.

It will be noticed that nearly all the above explosives are composed principally of nitro glycerine; and it is probable that in most cases the other ingredients only act as absorbents for this liquid, and really add nothing to the explosive force. The decomposition of nitro-glycerine is practically instantaneous, and the slower acting nitrates and hydro-carbons must be left far behind when the mass is exploded. The power of all these substances is due to the paradoxical element, nitrogen, which is by itself the most neutral and inactive of all the elements, but, when forced into chemical combination, usually confers an element of weakness upon the entire molecule of which it forms a part.

LEGAL.

In the case of Lavoie vs. Ouimet, which came up for hearing recently in the Superior Court at Montreal, the plaintiff asked that the defendant be ordered to remove a certain building which plaintiff alleged defendant had transferred from his (defendant's) house, and placed at one side thereof, and in close proximity to the line and division between their respective properties. The plaintiff alleged that by a deed of sale of the property in 1884 the defendant especially bound himself never to erect any building in proximity to the portion of the property thereby sold by defendant to plaintiff, which might be injurious to plaintiff in any manner whatsoever. The pretension of the plaintiff was that, by removing the building and placing it where it now stood, the defendant had violated the stipulation of the deed, the building shutting off plaintiff's view of the main road and spoiling the appearance of his property. The court was of opinion that the weight of evidence sustained the plaintiff's pretension, and the judgment ordered the defendant to remove the building, or, in his default so to do, that it be removed by the officers of the court.

PUBLICATIONS.

The Canadian Office and School Furniture Co., of Preston, Ont., have issued a new catalogue, which is attractively printed and contains numerous illustrations of office furniture of various kinds.

Our thanks are due and are hereby tendered to Mr. H. Saywand, Secretary of the National Association of Builders of the United States, for a substantially bound copy of the proceedings of the eighth annual convention of that organization.

Dr. Albert Shaw, editor of the Review of Reviews, contributes to the June number of that periodical an interesting four page illustrated description of the new National Library at Washington and a pen-picture of the Librarian, Mr. Ainsworth R. Spofford. The new building is fast nearing completion, and another year will probably witness its occupancy by the greatest collection of books on this side of the Atlantic.

VALUE OF A LABORER IN CONTRACT WORK.

There is no article that enters into contract work of so uncertain value as that of labor. In all the multitudinous things to be done on a large contract, labour is one of the most important for various reasons. The conditions of every kind of work change so that labor values can not be accurately gauged. The times of year in which work is done, the class of work, and the experience of the laborer at the different kinds of work, all make a case where the discrimination of the contractor must come into play to arrange a system of gauging the value of a man's labor on any given work. Some contractors contend that skilled laborers at advanced prices pay better than hiring indiscriminately any and every class of men who present themselves for labor work. In hiring untried laborers much can be saved by having a live foreman, who is good at forcing the men to work; yet there are men of so stupid a disposition that getting work out of them is next to impossible. A contractor of wide experience says that he can, by intuition, tell in a short time just what men are capable of doing, and that he can detect a shirk in short order; as soon as he finds a man inclined to shirk, that he discharges him at once, and finds that it has a salutary effect upon the others. The difference in the amount of labor that one man can perform, compared with another of the same physical strength, is in the same ratio when one accounts for the payment of the two men, that from ten to sixty minutes loss per day on a laborer would foot up in the course of a week. In employing a large number of men, day in and day out, there is no doubt a great variety of difference in the results of the labor performed, and those results depend very largely upon the study that employers and foremen give to the subject of labor. The loss of 10 cents per day on a man's labor does not apparently amount to much; but on a hundred men it is $10. Now 10 cents is a small amount to reckon as difference in value of one over another for 25 cents would be nearer the mark. One can see when he pays close attention to the labor on his contracts where one contractor comes out ahead of another by close attention to labor details. Quantities and qualities of material in contract work can be valued to the penny but labor cannot.—Eastern Contractor.

Hayes' Patent Steel Lath..

HAS NO EQUAL IN ANY PARTICULAR

...Used in more important buildings...

...THAN...

all other styles of metal lathing combined.

SOLE MANUFACTURERS

THE METALLIC ROOFING CO.

OF CANADA, LIMITED.

BRANCH OFFICE: 706 Craig Street MONTREAL

HEAD OFFICE: 82 to 90 Yonge Street TORONTO

Send for Samples and Prices

USEFUL HINTS.

It is officially calculated in New York that the tall buildings erected in lower Broadway up to date, have added seventy-five acres to the business area of New York city above the sixth story.

Concrete sidewalks should be laid four inches thick, in two courses; first or bottom course three inches, second or finishing course one inch thick. The top should be laid before bottom is set. Prepare foundation on which to put concrete in good coarse gravel or chip stone, well rammed or levelled. Proportion for bottom, one part cement, four parts clean sharp gravel, mixing cement and gravel thoroughly in the dry state, and sufficient water from a sprinkler to make a dry mortar, place at once and thoroughly ram down. For top mix one part cement and one part clean sharp sand; mix well before adding water, add water as above to the consistency of plastic mortar.

A STOPPING for wood, sometimes called beaumantique, can be made as follows: Put one tablespoonful of shellac, one teaspoonful powdered resin, a piece of bees-wax the size of a walnut, into a cup or iron pot, and set on the stove or in the oven until melted. For mahogany, add to it a little Venetian red, to match up the wood; for oak, add yellow ochre; for ebony or rosewood, add lampblack; mix it well up. It can be used while liquid, or it can be made into sticks like sealing wax, by pouring it on to a board, and rolling it with another board slightly warmed. If made up in sticks in this way, it is a good plan to have a variety of colors. When using, melt it over a lighted candle or gaslight, and run it into the place to be repaired; level off with chisel, and smooth down with glass-paper.

MICROSCOPICAL investigation has proved that the pores of wood invite the passage of moisture in the direction of the timber's growth, but repel it in the opposite direction. This accounts for a phenomenon which is often noticed, and which puzzles a good many people, namely, why two pieces of timber sawn from the same section of a tree sometimes appear to possess very variable degrees of durability. If the wood, say of a gate post, is placed right end up, the moisture in the soil will affect it, but the rain falling on the top will do little harm; if, on the other hand, the butt end of the tree is uppermost, the top of the post will decay, because the moisture of the atmosphere will penetrate the pores of the wood more rapidly in this position. Many people have noticed that the staves of a wooden tub appear to absorb moisture irregularly, some getting quite sodden while others remain comparatively dry, and apparently almost impervious to moisture. In this case the dry staves are in the position in which the tree grew, while the saturated ones are reversed.

CREDIT VALLEY BROWN STONE

From Carroll & Vick's No. 6 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure	Height.	Crushing Load.	Crushing Stress per sq. in.	Average Crushing Stress per Square Inch
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	2⅞ × 3	2⅞	131,000	15,188	
C	2 1/16 × 3	2⅞	130,000	14,751	
D	3 × 3	2⅞	133,000	14,777	14,905

14,905 pounds is the average crushing strength per square inch of our Credit Valley Brown Stone.

The highest standard of test attained by any pure Sandstone in America.

IN confirmation of the facts above stated, we have pleasure in directing your attention to the accompanying table, showing the result of the test of our stone, in connection with the series of tests of building stones conducted in 1872 at the School of Practical Science, Toronto, under the direction of a committee of the Ontario Association of Architects.

By referring to the results of the tests above mentioned, it will be seen that the average crushing stress of the majority of Canadian and American sandstones is far below that of ours, the difference in our favor ranging from 75 to 50 per cent.

The Credit Valley Brown Stone, owing to its modest tone, harmonizes beautifully with red or cream colored brick.

It has been reported that there is difficulty in obtaining Credit Valley Brown Stone. To correct this mistaken notion, we wish to state to architects and the public that we have a large quantity of stone ready to ship on the shortest notice, which can be followed up with an unlimited supply. Last year we made extensive additions to our plant and opened up new quarries and mines, and will supply promptly all orders given to us or our agents.

CARROLL, VICK & CO.

Quarries: Credit Forks, Ont. Office: 84 Adelaide St. West, TORONTO.

Montreal Agents: T. A. MORRISON & CO., 118 St. Peter Street.

Always on Top!!

STEEL-CLAD No. 2

List Price $23.00

PLEASE REMEMBER that the materials and workmanship of the **No. 2** are identical with the more expensive lines. We are enabled to reduce the price by limiting the varieties. . . . . .

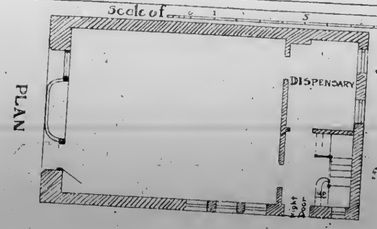
Toronto Steel Clad Bath and Metal Co.

(LIMITED.)

A. G. BOOTH, Secretary-Treasurer. . . . TORONTO, ONT.

RESIDENCE OF MR. GEORGE T. TUCKETT, HAMILTON, ONT.
JAMES BALFOUR, A.R.C.A., ARCHITECT.

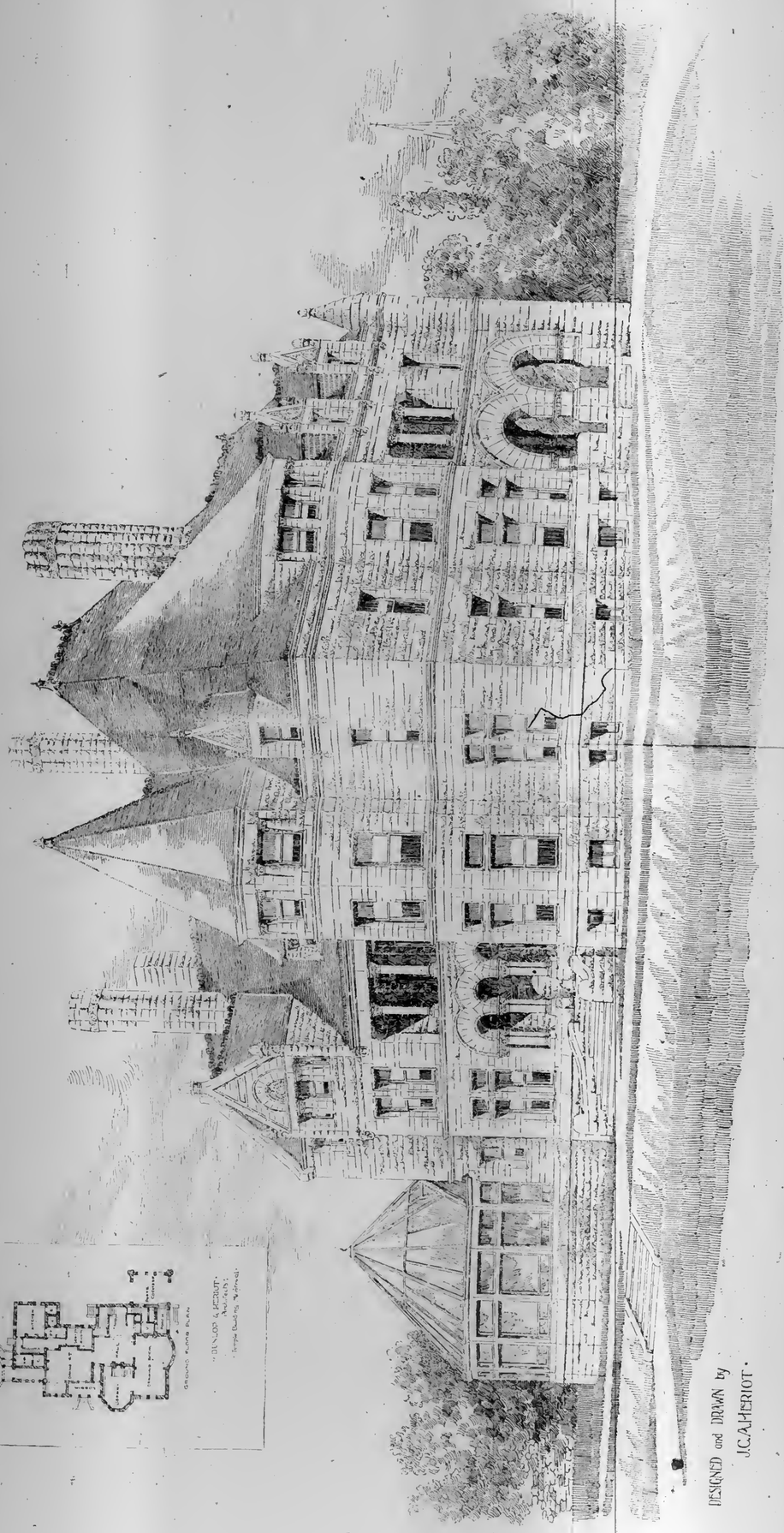
COTTAGE AT VALOIS.
FOR R WILSON ESQ.
A.F.DUNLOP ARCHITECT



PLAN

Scale for Plan

"CANADIAN ARCHITECT AND BUILDER"
COMPETITION
for a DRUG STORE
DESIGN SUBMITTED BY
"TOLEDO"



SUBURBAN RESIDENCE.

DESIGNED and DRAWN by
J.C.A.HERIOT.

CANADIAN ARCHITECT AND BUILDER.

VOL. VII.—NO. 7. JULY, 1894 PRICE 20 CENTS $2.00 PER YEAR.

THE
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2259.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	EDMUND BURKE, Toronto.
1ST VICE-PRESIDENT	J. P. BELCHER, Peterboro'.
2ND VICE-PRESIDENT	W. A. EDWARDS, Hamilton.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI	Ottawa.
FRANK DARLING	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	J. NELSON, Montreal.
1ST VICE-PRESIDENT	CHAS. BAILLAIRGE, Quebec.
2ND VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. GENDRON,	Montreal.
J. B. BERTRAND	Quebec.
ERIC MANN	Montreal.
J. VENNE	Montreal.
G. P. TANGUAY	Quebec.

AUDITORS—THEO. DAOUST, J. F. PEACHY.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
WM. PARK, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JOHN ALDRIDGE.
JAS. CRANG.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
JAS. THOMSON
H. MARTIN.
JOHN L. PHILLIPS, Secretary.

THE attention of the City Council of Toronto has recently been called to the fact that repairs are urgently required for the preservation of the residence of the late Mr. Howard, the donor of Howard Park. Mr. Howard, who was an enthusiastic antiquarian, bequeathed to the city not only many acres of beautiful park lands, but also his residence, stables, etc., with their interesting and valuable contents. To allow these to perish through neglect would show a lack of appreciation of the donor's generosity which should be sufficient to discourage the giving of like public bequests in the future.

IF we are to judge by the slim attendance at the public meeting called in Toronto recently to discuss the construction of a trunk sewer, the citizens see no pressing necessity for the project being undertaken at present. That a better method of sewage disposal than the existing one is required cannot be questioned. A still more important matter at the present time, however, is the adoption and carrying out of means for increasing the water supply and for ensuring its purity. If the city's financial position will not warrant the immediate commencement of both these undertakings, then precedence should certainly be given to the one last mentioned, upon the carrying out of which the health of the citizens so largely depends.

ON another page of this paper is printed the provisions of a by-law for the regulation of plumbing and drainage work in the city of Montreal. This law, which has been under consideration for the past two years, finally passed the Council on the 24th of June. It appears to have been carefully framed, and will no doubt be the means of vastly improving the standard of plumbing and drainage work in the future. From our knowledge of of the sanitary condition of the city, an ordinance of this kind has long been a necessity. It is gratifying to observe one Canadian city after another thus providing means for the protection of the public health. If action had been taken in this direction years ago it would have resulted in the preservation of thousands of lives.

OUR attention has been attracted by an account of the annual meeting of the Whitby Hedge Co., Ltd., to a new and apparently profitable line of business the planting of hedges in which the above company are the pioneers in Canada. The company show a substantial surplus on the business already done, and unfinished contracts amounting to upwards of $12,000. Judging from its location and the personnel of its managers, we presume this company's operations are confined to the rural districts. There is a growing opportunity in the cities also for work of this character. It is gratifying to note these evidences of the growth of the artistic instinct and sentiment among all classes of our people. As a result, the charm of landscape for which England is famed may possibly in future characterize Canada also.

THERE was recently published the statement that the cost of building operations in Winnipeg this season would be nearly double that of 1893, or between a million and a half and two million dollars. In view of the general commercial depression, we read this statement with surprise. Its authenticity is now being called in question, and it is alleged to have had its source in the office of an enterprising real estate firm, whose methods are not unknown in some of our eastern cities. Building operations in Winnipeg are on a moderate scale, and are not likely to exceed the record of last year. British Columbia advices state that a quiet season is being experienced. Works on the new

Legislative buildings at Victoria is said to be progressing satisfactorily. On the ground that in the erection of these buildings American materials and workmen were discriminated against, an effort is being made by the Trades Council of Tacoma, to prevent Mr. R. L. Fox, a British subject, who secured the contract for granite work on the Port Orchard dry dock, from using Nelson Island, B. C., granite in the work.

DOUBTLESS as the result of representations made from time to time by the Architectural Associations of Ontario and Quebec, it is gratifying to learn that the Government has resolved to change the method of appraising the value of architectural plans imported for use in the erection of buildings in Canada. We are informed that new instructions have lately been issued by the Government to customs officials, under which architectural plans passing through the customs will in future be charged a duty based on the cost of the building to be erected. It has likewise been stated, though with what authority we know not, that the new regulations are to be retroactive, and that under them duty will be collected on the cost of the Ontario Legislative buildings, the Toronto Board of Trade, and other buildings erected during recent years from the plans of foreign architects.

THERE is no other class of work in which contractors are obliged to exercise so much ingenuity, good judgment and care as in alterations to existing buildings, which require shoring, underpinning, etc. It is quite common to see the architecture of heavy business blocks and entire streets entirely changed in this way, and in many cases it affords a comparatively cheap means of modernizing property which would otherwise be unattractive and in little demand for business purposes. The calls for this kind of work are becoming more frequent, and it cannot be too carefully studied by all who wish to make themselves competent for any emergency that may arise in their business. We publish in another part of this number a few examples of such work, and hope to follow them with others equally or more interesting.

AN act passed by the Legislative Assembly of Ontario at its last session provides one of the simplest, cheapest and speediest methods that has yet been devised for the settlement of controversies by arbitration. The Board of Trade in any city of 30,000 inhabitants may elect 25 members of a Board of Arbitration to be chosen from 30 or more names selected by the Council of the Board of Trade. Membership in the Board of Trade is not a necessary qualification for the Board of Arbitration. Persons submitting a case may select one, two or three members of the Board of Arbitration to hear and decide the case. Sittings may be entirely private unless otherwise agreed, and unless the time be enlarged by agreement, all awards shall be made within twenty-one days after the submission has been signed. Arbitrators can compel attendance of witnesses on oath and have other powers similar to those in other arbitrations. There is also provision for the submission and award being made a rule of court.

ONE of the most difficult problems that architects have to consider is how to educate the public to a better understanding of what an architect's duties are, and the necessity and value of his services in connection with the erection of buildings. Many people have a hazy sort of idea that architects have something to do with very large or public work, but would never dream that they needed an architect to assist them in building a house, even of considerable cost, much less a small or cheap house such as they imagine "anybody" could successfully manage. How often has the remark been made, "Why, you wouldn't pay for an architect for a house costing so little as that, would you?" And how often persons have started out to save the architect's fee and lost twice as much by lack of his services, to say nothing of the wrangling and worry incident to such efforts. We hope to see this question a live one among members of the Architectural Associations when the season for outings is over, and would be pleased to receive suggestions as to the legitimate means which might be employed to better acquaint the public with the nature and value of the services which an architect should render to his clients.

ATTENTION is directed to the testimonial letter printed on another page of this paper, showing the value of the CANADIAN ARCHITECT AND BUILDER as a medium through which to advertise materials for the use of architects and builders. We have on file and shall publish from time to time a number of other letters from advertisers handling various lines of goods, all bearing testimony to the wide circulation of this Journal and to the fact that the most satisfactory results have followed its use. There are still some lines of business which should be represented in our advertisement pages, as indicated by the following enquiry just received from an architect in a western city: "Will you kindly forward to me by return mail, the names of some parties who would tender on wiring a building for incandescent lighting. I have not the time to advertise in the CONTRACT RECORD, therefore I have asked this favor." Architects and builders will oblige the publisher of the ARCHITECT AND BUILDER by frequently scanning the advertisement pages, and by communicating with us when requiring materials which they do not find advertised.

DURING the past month the people of the United States have been wrought up to the highest pitch of anxiety through a succession of strikes centering in and around Chicago. As usual Canada has been pursuing the even tenor of her way, but while we have been favored with freedom from the turmoil which has engaged our neighbors, we must not be unmindful of the signs of the times and the fact that the question of our continued prosperity may be affected at any time by the development of a larger sympathy with the situation in other countries. The civilized world is groping about for some means of allaying the dissensions between labor and capital. England is well in advance of America in dealing with this question. In the States present progress amounts to little more than a proof that there is a labor question which must be settled, or at least brought nearer to a settlement than it is now, and with as little delay as possible. If this is not done by peaceful agitation and combined effort on the part of all interested, there is every indication that still greater trouble will follow. The relations between labor and capital will not stand many such strains as the recent occurrences in Chicago. None have more at stake in this question than the builders, and they should have as much influence as any class of men for its intelligent treatment. Labor organizations are still too ready to resort to strikes. Peace between capital and labor can never be maintained except by mutual concessions and constant readjustment to meet new conditions. This must be brought about through earnest study and in compliance with natural laws. To this end contractors, material men and tradesmen should meet each other and cultivate at all times a feeling of mutual interest and good will. In this way they would wield a more powerful influence for holding men in check and for preventing such frequent resort to strikes with their sure accompaniments of violence and other aggravated evils. Of all the remedies proposed for removing the differences between labor and capital, arbitration stands to the front as meeting with the greatest amount of favor. It will not be found a universal remedy, as some apparently believe, but it will be very helpful as an intermediate step in some cases, and will become the established usage in others. In all business carried on under public franchises, and largely for public convenience, such as railway and telegraph operation, government should make such regulations as would prevent any set of employees going on strike or leaving their work in such numbers or manner as to interfere with the usual facilities for the performance of public service. For business involving only private interests the best results will come from the recognition of mutuality of interest between employers and employees. When employers and employees shall be willing to meet each other in a spirit of fairness and friendliness, they will be able to work together on a common basis to secure legislation tending to lessen the differences which now frequently arise, and secure their equitable adjustment without recourse to strikes. The whole subject is worthy of the serious attention of all business people. The necessity for its consideration is imperative.

The days of the "steeple" are numbered in New York. The many tall buildings recently and still being erected in the city completely dwarf the former landmarks.

The Ratepayers Association has resolved to petition the legislature to amend the city charter, so as to disqualify as voters at municipal elections every person in the employ of the city or having an interest in any contract with the city.

MASONIC HALL COMPETITION.

The new Masonic Temple which is to be erected on Dorchester street, from designs by Mr. Robert Brown, architect, of this city, will have a frontage of 51 feet and a depth of 109 feet. On each side of the entrance there will be stores, and in the rear a concert hall. The first floor will be fitted up as offices and assembly hall; the second floor as club and refreshment rooms, and the top floor for lodge rooms. In the basement will be the caretaker's quarters, billiard room and vaults. The cost of the building will be about $60,000.

Following is a copy of the report of Mr. Hutchison, the expert appointed to judge the plans submitted in the above competition:—

MONTREAL, June 25th, 1894.

Will. H. White, Esq.,
Secretary Masonic Temple Company.

DEAR SIR,—I beg to report that I have examined the several competition designs sent in for proposed Temple Building on Dorchester Street.

For this competition eleven designs were submitted under nine mottos as follows:—"Shield," seal in red wax with the motto "Touch Not the Cat but a Glove"; "Complete," (three different designs); "Beta"; "Forty-seventh problem of Euclid"; "Try"; "Inter Nos"; "Wasp"; "Ich Dien."

A preliminary examination of the several designs showed that the competition for the first and second place lay between two designs—one designated by a shield and the other by a seal in red wax.

After a careful and minute examination of these designs and a comparison of the merits of each, I came to the conclusion that the design bearing the motto of a shield should be ranked first in merit, and the design bearing a red seal with the inscription "Touch Not the Cat but a Glove," should rank second.

In arriving at this conclusion I have taken into consideration that the author of the second design adhered strictly to the conditions respecting the placing of the two largest lodge rooms in the rear of the upper story of the building, and the smaller in the front, while the author of design No. 1 took the liberty of placing one of the large lodge rooms in front: this change, however, gave him no advantage over the author of design No. 2, and the selection of his design as first is made without awarding him any superiority for this arrangement.

The selection of the design as third in merit I found a more difficult task, as three of the designs approached so nearly in merit that it was difficult to determine which was best. After a careful examination I concluded that one of the designs submitted under the motto "Complete," which I have for the purpose of distinguishing it from the two designs by the same author, marked in pencil as "No. 1," is third in merit.

I have the honor to be,
Your obedient servant,
(Sgd.) ALEX. C. HUTCHISON.

ORGANIZATION OF PLUMBERS.

A general meeting of the master plumbers of this city was held in the "Monument National" building on Thursday evening, the 12th inst., for the purpose of organizing themselves into an association to raise the standard of their profession. Messrs. J. W. Hughes, W. M. Briggs, P. J. Carroll, John Date, Jas. A. Sadlier, Wm. Britton, Jos. Turcotte, John Burns, P. C. Jacotel, J. Jacotel, C. St. Denis, G. W. Henders, Albert Cardinal, H. Paddon, A. Sicotte were present, amongst many others whose names it has been impossible to procure.

On motion of Mr. Hughes, Mr. P. C. Jacotel took the chair. In brief terms the chairman addressed the meeting in French, stating the object for which it had been called; and requested Mr. Hughes to address the meeting in English.

Mr. Hughes said that a by-law similar to those existing in the principal cities of the United States to regulate plumbing in Montreal had been needed for a long time. He was glad to say that such a by-law had been recently passed, though it was not up to what master plumbers would have liked it to be.

A committee was appointed to consider the plumbing by-law adopted by the City Council and to report at an early date. The election of officers for the projected association was deferred to a future meeting. This association proposes to embrace all the master plumbers in the province of Quebec, with headquarters in Montreal, and branches in the principal cities of the province.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

At a Council meeting of the Association of Architects of the Province of Quebec held on Thursday, the 12th inst., it was resolved to call a general meeting of the members of the Association, which will be of great importance to members, as it is proposed to discuss the advisability of applying to the Legislature for the purpose of making changes in the charter of the Association.

STUDENTS' DEPARTMENT.

USEFUL HINTS.

SQUARING UP LINES.—In drawing the lines for a foundation, or stretching them overhead for a shafting, a paper of pins comes in handy, to locate positions on the lines. All that is required is to thrust one through the line every time a point is to be located, and it can be easily done, in a moment, as close to the mark as anyone can work on a drawing board. It may take a few moments to square a set of cross lines on the six, eight and ten principle, when there is to be a ten-foot pole supported by three assistants, reaching out from whatever they may be able to stand upon, as every change in a cross line disturbs all the measurements, but when once adjusted all further lines can be laid out by direct measurements, and the rest of the angles will take care of themselves.

SEASONING WOOD.—Growing wood contains in winter about 50 per cent. of water, in March and April 46 and 48 per cent. in the next three months, with but little variation up to November. Timber dried in the air holds from 20 to 25 per cent. of water; never less than 10 per cent. Wood dried by artificial means until all the moisture is expelled, is deprived of its elasticity, and becomes brittle. If the natural qualities of the wood are to be preserved, the drying must begin at a moderate heat, and be carried on very slowly. For the drying of small pieces of wood, such as are used by joiners or cabinet makers, a bath of dry sand, heated to a temperature not exceeding one hundred degrees, is recommended. The sand diffuses the heat, and absorbs moisture, but it must be cold when the wood is first buried therein.

EFFECT OF HEAT ON LEAD PIPES.—Text-books contain a great deal of useful information, no doubt, but they fail to give a vast amount of knowledge which is required in practice. Where, for example, do we find any mention of the effect of heat on lead pipes? In the case of a recent electric lighting installation, exhaust steam by some means found its way into the ventilating and soil pipes leaking to the drains. One of the first evidences of this was found in the warping of all lead pipes so used. It appears that the heat of the exhaust steam caused the lead pipes to expand and warp, but when the steam was entirely prevented from entering the drains the lead would not contract, and all such pipes had to be straightened by hand. This is a point which embryo engineers would do well to keep in mind, as each time the pipes were heated they expanded, but in no case did they show any signs of coming back to their normal condition.—Industries and Iron.

SAND IN MORTAR.

It was the opinion of Vituvius that pit sands were preferable for mortar, but he says that they must be freshly dug, otherwise they are decomposed by the action of the atmosphere and become earthy, and in this state they make bad mortars. Alberti, Palladio, Philibert, Delorme, Blondel and some other writers agree in these opinions, but Belidor thinks that river sand is best, and that it should be sharp. Palladio considers that white sands are worst. Belidor states that color has nothing to do with the matter. Rondelet, in consequence of these contradictory opinions, made experiments himself on the subject, with the following results:—(1) That the glassy or quartzose sands form with lime a weaker mortar than mixed sands, and that such mortar is longer drying. (2) That pit sand produces a better mortar than that made with river sand composed of grains of the same size. He did not find that the sharpest (*plus arides*) sands made the best mortar but thought that of sands of the same kind those which were deepest in colour, excepting the yellow, were to be preferred. The best sands, he states, are such as hold a middle place between those which are very plastic and very sharp. On comparing mortars made with freshly dug sand washed and dried in the sun, the sharp (*arides*) grains only being left, he found that the first acquired the greatest hardness, and that mortar made with very fine sand did not harden so well as that made with sand of a moderate-sized grain.

All these authors considered sea sand the worst, but Alberti mentions an exception. The sea sand from the neighborhood of Salerno he found to be as good as the best pit sand.

A FAILURE OF CAST IRON COLUMNS.

Major-General Hutchison's report to the Board of Trade, of London, England, gives the result of his enquiry into the accident which occurred on the 12th of December, at Portsmouth Harbor Station, when the roof covering the arrival island-platform was blown down by a high gust of wind just as a train was leaving. Several persons were injured, one very seriously. The fall of the roof must, Major General Hutchison says, in the absence of any other probable cause, be attributed to the effect of a sudden gust of wind during the prevalence of a gale. The zinc roof covering did not give way, but the wind pressure was transmitted toward the base of the cast iron columns—a double row of which supported the roof—with the result that one (or more) of these was at once broken off four feet above its base (which was bolted down to wrought iron cross girders, connecting the cast iron columns employed in the structure of the station); this being immediately followed by the similar fracture of the whole of the forty-nine remaining columns, and the fall of the roof. The columns were all broken in two places, the two points of fracture being in each column almost identical. The thickness of metal was intended to have been uniformly $\frac{1}{2}$ inch, and it must have been either from a deficiency in this thickness or from a flaw in the casting that the force of the wind was able to break a column thus weakened. The evidences of the witnesses does not lead to the impression that they had felt the force of the wind very excessive when the roof fell. Theoretically these columns should have been able to sustain a far greater pressure than they were ever likely to have been exposed to.

"A Draughtsman" writes to the Ottawa Journal urging the formation of an Architectural Sketch Club, on lines similar to the Toronto club. "Draughtsman" is apparently unaware that the Toronto Sketch Club has ceased to be. It should be possible for clubs of this character to be organized and maintain a useful existence in several of the leading cities of Canada.

TORONTO BUILDERS' EXCHANGE.

WE are pleased to learn that the Toronto Builders' Exchange are again holding their annual excursion to Lake Island Park, Wilson, N. Y., on Friday the 27th inst. As the Committee are making every possible arrangement for the pleasure and comfort of the party, this will, no doubt, be one of the most enjoyable trips of the season.

We understand that the steamer "Garden City" (which has been chartered by the committee) will leave Yonge street wharf at 10 a.m. on the above mentioned date, the price of tickets being 50 cents, and 20 cents for children. The members of the Exchange extend a hearty invitation to all their friends to accompany them upon the trip.

ESTIMATES AND QUANTITIES.

THERE is generally a considerable difference to be noticed between an estimate prepared by a builder from a set of drawings and a specification and one which is based upon bills of quantities prepared by a regular surveyor. It is often assumed that a builder can sail nearer to the wind than a surveyor; that he is not under the same necessity for allowing margins of safety, and that, in fact, as he makes any omissions at his own risk, he knows how to compensate himself for such lapses of forethought. Hence, in small works, when an estimate has been accepted on a builder's own quantities, the architect is more than usually on his guard against making allowances for extras. When there is a disagreement in such cases, the amount in dispute is often so trifling that the builder ends by yielding the point and accepting the architect's award. If the architect be a fair-minded man, he

NEW LEGISLATIVE BUILDINGS, VICTORIA, B. C.
F. M. RATTENBURY, ARCHITECT.

will endeavour to adjudicate impartially between the builder and the building owner, allowing the interests of neither to gain any undue ascendancy. This, however, is an extremely difficult thing to do. Setting aside the fact that an architect's own interests are mainly identical with those of his client—a fact which, it is fair to say, does not influence the conduct of most professional men—how does the question usually present itself to the mind of an architect? On one hand there is the client, a man unversed in the technicalities of building, and therefore completely at the mercy of those acquainted with all its mysteries. On the other hand, is the builder, with his own special, practical knowledge, which on some points may exceed that of the architect, and with one object before him—that of carrying on his business with the greatest amount of profit to himself. It is then assumed at once that the client alone stands in need of protection; and so it often happens that an architect becomes virtually his client's advocate, instead of maintaining a judicial attitude between him and the builder.

When a builder commences making an estimate without a previously-prepared bill of quantities, he has an amount of labour thrown upon him for which he can claim no remuneration, and which, in a competition, may prove utterly unfruitful. In taking off quantities, although he will probably adopt more simple and rough and ready methods than would be found convenient for a surveyor, his task becomes really more complex. Instead of taking off a number of dimensions, to be subsequently squared or cubed, abstracted, and brought into bill, he may be seen examining the drawings with knitted brows, going through mental calculations, and occasionally jotting down rough notes. He "lumps" many of his items, considering in his mind the quantity of materials required, the markets where they can be obtained, the cost of carriage, the amount and quality of labour involved, and the profit for which it will be worth his while to undertake the work. Such methods of procedure, so far from being haphazard, demand the exercise of more thought, and bring into play a larger amount of practical knowledge than is generally realized. The items which are "lumped" in a surveyor's bill require an equal amount of careful consideration in pricing, but these items are comparatively few.

In estimating the cost of carving and other ornamental work, the builder often runs considerable risk, unless there is a plentiful supply of large scale details to form the basis of his estimate, or unless he is thoroughly familiar with the style of work which the architect is in the habit of carrying out. In an open competition, when the lowest tender is to be accepted, there is little doubt that differences between estimates are often largely due to vague drawings or the absence of provisional sums for ornamental work in the specification. Marginal sketches in the latter are extremely useful to an estimator, and might be introduced more extensively with advantage, especially in these days of rapid work, when it often happens that there is not time to draw many details before the contract is signed. Architects are usually ready enough to furnish a builder with all the information they can command, and to afford him every facility in preparing his estimate; but time rarely permits of this being done in a thoroughly satisfactory manner to all concerned. Sometimes a builder is allowed two days in which to estimate the cost of a work. He cannot be expected, under such circumstances, to take off quantities in any true sense of the words, and thus finds himself driven to adopt expedients which only very sound knowledge can make reliable. An inexperienced man, says the Building Times, who secures a contract in a competition may well doubt if he has not engaged in an unprofitable undertaking, and may even come to envy those who have given time and thought to the preparation of estimates which have not been accepted.

When an architect is carrying out a work for which the estimate is based upon builders' quantities, he should bear in mind such circumstances as we have endeavoured to delineate. As a matter of fact, such estimates often come out much cheaper than those which are made from bills of quantities supplied by a surveyor. In some cases builders have been known to make little or no profit upon the original contract, and have even sustained losses over extras and omissions. In these days of bad trade it is indeed hard to be presented with the alternative of standing idle or of working to no advantage, and every consideration ought to be shown, in carrying out the details of a work, to those whose toils are but too seldom adequately rewarded.

LEGAL.

Mr. McLea Walbank, architect, of Montreal, designed a chimney for the Royal Electric Co., of that city. The chimney was built by Mr. Wand, contractor, and is alleged to have proved defective. The company brought action for $1,281 damages against the contractor, who in turn took action in warranty against Mr. Walbank, alleging that the chimney had been constructed in accordance with the plans and therefore that responsibility for defects should be with the architect. Mr. Walbank demurred to the action in warranty, contending that no such action lay in a case of this kind. Mr. Justice Davidson dismissed the demurrer. The Civil Code provides that if a building perish within 10 years, from a defect in its construction, the architect and the builder are jointly and severally responsible,

CHRIST CHURCH CATHEDRAL.

VERY few churches in Montreal are comparable from a constructional, as well as from an artistic point of view, to Christ Cathedral, of which I have attempted herein to give a short description. The great cost of stone found in this district, owing to its hardness and the difficulty experienced in carving it, tends no doubt to generalize the employ of lumber and galvanized iron, which has been so extensively used lately where stone should have been used for decoration and construction. This cathedral is an exception to the majority of our churches, having been built by the wealthiest congregation of the city; and nothing was spared to make it artistic and handsome. It is the only structure of its kind here, where stone has been so lavishly used for exterior as well as for interior effect. It is built on the north-west corner of Phillips Square, on the block bounded by Union avenue, University street and St. Catherine street, on a site that was donated by George III, King of England, for the erection of the cathedral which was destroyed by fire in 1856. Work was commenced on the existing church immediately after the fire, and was completed in 1859, when the edifice was opened for service. The plans were prepared by a prominent London architect, who unfortunately was not permitted to see this gothic chef-d'oeuvre carried out, but died before the foundations were out of the ground, at the beginning of the year 1857; when a successor had to be appointed to carry out his plans.

But two blunders were committed, one owing to the entire ignorance by the architect or his representative of the nature of the ground on which the church was to be erected, and the other to the severe climate of this country in winter. The first was due to the inefficiency of the spire foundation, which having sunk considerably before it got half way up, had to be taken down and rebuilt. The other blunder is practically irreparable, experience having shown that part of the stone employed in the construction cannot resist our severe winter frosts, and every year a goodly amount of money has to be laid aside for the replacing of the damaged stones. All the stone used in exterior trimmings and also in the interior, where there is a considerable amount of stone, was specially imported for the purpose from Caen, France. This stone resembles very much in appearance the Ohio standstone, and was very extensively used for inside work in England at the time the church was built; it is an exceptionally suitable material for executing fine sculpture and moldings—when not exposed to weather. Mr. Taylor, architect, was appointed some years ago to pay regular visits to the structure and attend to all restoration that the course of time might have rendered necessary; nothing is allowed to be touched or altered without professional advice, as it is considered that an inexperienced hand can destroy in an hour what it has taken years for an artist to produce.

A few years ago two stones fell from the spire through the roof, and the beautiful stone cross over the chancel gable also fell to ground, broken into atoms. The architect was sent for, and all the fragments were gathered and put together, and a reproduction of it made of the same material to replace the broken one. Several other ornaments and moldings also perished, but all were treated in the same manner. The only part that has not yet been affected by the frost is the window tracery—which are of stone—and great care is taken to preserve them intact. The chancel and aisle windows and the rose window in front have very remarkable tracery, and should they be injured it would be found extremely difficult to repair windows of such sizes. A curious thing to note is that nearly all the window tracery are of different design, such being the case with the row of circular windows over the main nave and on each side of it. The spire is built entirely of stone, and contains a beautiful clock and chimes. It is reputed to be the highest stone spire in Canada, measuring about 225 feet from the ground by — feet square at its base above the roof.

On Union avenue, close to the church, stands a handsome little monument, about 28 feet high, built of Ohio sandstone, in commemoration of Bishop Fulford, first bishop of Montreal. The front porch of the church is also very handsome, and fine details are to be found, such as crochets, gorgoils and elegant moldings.

Now let us glance at the interior, which is as interesting as the exterior. As we enter there is no flashy decoration, and anyone expecting to see fret or ginger bread work will be disappointed; but everything is so appropriate, neat, simple and artistic, that on closer inspection we are forced to admire the whole. The beautiful stained glass that adorns the chancel and aisles is mostly of Clayton & Bell's make, and of a Brussels firm. On the left hand side of the chancel is the organ, which is hardly apparent, and which is reputed not the most powerful, but the most perfect musical instrument of its kind in America, and is a reproduction of the old organ that was burned with the old cathedral in 1856. It was built by Hill & Son, of London, Eng., who had preserved the plan of the original organ.

The Ledilia (marked 1 on the plan) and baptismal font (5) being all stone, deserve more than a passing glance, and exhibit admirable carving. At (4) stands on a pedestal a bust of Bishop Fulford; in (2) is the Bishop's chair, and in (3) is his throne. The two rows of arcade dividing the aisles and nave, and door and window jambs, are all of solid stone, and the capitals of the columns each contain a specimen leaf of the different kinds of Canadian trees carved in the stone. The altar cloth, made by the Sisters of St. Margarets, of this city, the memorial window in the left transept and the fine brass chandeliers, are of recent date, and were executed from drawings by Mr. Andrew T. Taylor, F.R.I.B.A.

An interesting part of this church that should also receive some attention from the visitor, is the Chapter House over the vestry, where beautiful stone carved statues supporting the roof trusses can be seen. In a word this is a church thoroughly English in character, that is very seldom seen on this side of the Atlantic; and I would advise my professional brethren, when they have an opportunity, not to forget to pay a visit to what I consider one of the finest specimens of gothic architecture of the Decorated Period on this continent.

I desire to here thank publicly the Rev. J. G. Norton, M. A., D. D., rector of the Cathedral, and Mr. Andrew T. Taylor, F.R.I.B.A., architect in charge of the restoration of the church, for the valuable information which helped me in preparing the above.

P.

ESTIMATING.

MANY good workmen and thorough superintendents make poor attempts at estimating, and often their efforts in this direction prove their ruin. On the other hand, the writer has known poor or indifferent workmen who seemed to have a natural gift for arriving at the cost of proposed works; not by any proper or systematic course, but by a sort of intuition which stood them instead of actual trained knowledge. Men, however, of this sort, whose conclusions are jumped at, are not reliable in their figures, when the works estimated are above the average magnitude; and on more than one occasion I have known these haphazard contractors to have been sorely bitten when reaching out beyond their limits.

Estimating, like everything else resulting from human effort, can only be a certain success when directed by a thorough knowledge of the subject and painstaking labor. There is no royal road to estimating, and the man who attempts to jump at the cost of a proposed building, and takes the contract at his own figures in the face of intelligent competition, either does not get proper returns for his labor, or jerrys the work,—either dilemma proving ruinous in the end. The best contractors are men who have been trained to the service, and whose knowledge of every detail in building, the cost of every variety of supply and material, whose acquaintance with the producing capacity of workmen, is complete. Such men are found among the regularly employed "Clerks of the Works," so-called in the British Isles, and in some portions of Europe and America. These men are supposed to know, and generally do, all particulars concerning buildings of every style and grade, and estimates made by them always deserve respect.

In this country the architect is perhaps the best authority on the cost of a proposed building, though I must confess that some estimates made by professional men in this country often prove wide of the mark, their figures generally being too low. There is one department of estimating, however, wherein the architect's figures are generally correct, and that is in the quantities. These, when given by the architect, may be relied upon, and having these, the wide-awake contractor ought to be able to get at the cost of a building pretty close. I have often thought it a mistake that quantities are not attached to specifications in some way, and that intending contractors be taxed a small amount for the privilege of making use of the figures. Let it be understood, however, that I do not advocate the doing of this extra work by the architect, gratuitously. To take out the quantities of a building of any magnitude, entails a great deal of labor and time, and it would be but just that these should be paid for by the parties who receive the benefits, who, of course, are the contractors. The cost to each aspirant need not be much, while the benefits are manifold, inasmuch as the figures may be relied upon; there is much time and tiresome labor saved, and no item will be forgotten or overlooked. The architect might also give the cubic contents of the building, with the actual cost per foot of similar buildings—not that I approve of the "cubing method" for estimating, for I believe it to be very faulty; but it might be given as a sort of guide by which the estimator could see if he had made any serious mistakes.

In a future paper I will endeavor to show a method of estimating, suitable to the requirements of country builders.

A. Z. Z.

Collingwood, July 7th, 1894.

TRADE NOTES.

Mr. Alex. Bremner, of Montreal, dealer in contractors supplies, has issued an attractive wall hanger, giving, by means of illustrations and printed matter, information relating to his various lines of goods.

Referring to the opening of the Zion Evangelical church at Berlin, Ont., the daily news of that town on June 18th said: "The gas reflectors and fixtures were supplied by I. P. Frink of 551 Pearl street, New York. The lighting of the church is on a style most complete, and was put in under the supervision of Mr. E. C. Breithaupt. The lighting is so perfectly arranged that though the church will be as light as day, there are no lights near the pulpit, to dazzle the eyes of the congregation, the reflectors spreading a brilliant light over everything."

Dr. Grady, of Eastport, Me., in company of an expert, has recently made an inspection of the black granite deposits at Bocabec, N. B., with the view it is believed of investing therein.

ILLUSTRATIONS.

COMPETITIVE DESIGN FOR PROTESTANT ORPHAN ASYLUM, MONTREAL.—DAVID A. BROWN, ARCHITECT.

The design which we illustrate received third place in the competition. The reproduction is from a drawing by Mr. O. Tolhurst, of Montreal.

RESIDENCE OF MR. W. T. MCMULLEN, WOODSTOCK, ONT.—A. WHITE, ARCHITECT.

The face stone work is of Credit Valley brown stone, the cut stone of Ohio buff free stone, and the brickwork of first quality Beamsville red pressed bricks. The roof is covered with Rockland slates. All outside woodwork will be painted a cream color. The hall, staircase and principal rooms will be finished in quartered oak; the bedrooms in clear pine, natural state. The parlor, dining room and two bedrooms to have open fireplaces, with tiled hearth and facings.

ORILLIA TOWN HALL AND MARKET BUILDING.—GORDON & HELLIWELL, ARCHITECTS, TORONTO.

The building is constructed of brick with stone trimmings and basement, and a slate roof. The general dimensions are 60×106, the tower and staircases projecting beyond this.

The front portion of building on ground floor is utilized for town offices, including a council chamber 40×32, town clerk's room and a committee room. The rest of ground floor is devoted to the market, and contains eight butchers' stalls or shops and a general market room for vegetables, &c.

The basement under market is devoted to cellar accommodation for stalls and a public lavatory.

The cellar under council chamber is used for boiler and fuel room.

In the two circular towers at front are two wide staircases leading to public hall on first floor and to the gallery of same. In the square tower is a private stair to the stage and dressing rooms of public hall.

The auditorium of hall on 1st floor is 56×64 feet, and the stage platform recess in rear is 32×25 feet. On each side of stage are dressing and property rooms. Around three sides of hall is a gallery to seat about 270 persons. The main floor of auditorium will seat about 600 persons.

The internal finish in town office portion is hardwood and in the rest of building pine. The walls of market are brick and the ceiling wood. The ceiling of auditorium is an elliptical arch in plaster.

NEW LEGISLATIVE BUILDINGS, VICTORIA, B. C.—F. M. RATTENBURY, ARCHITECT.

SKETCHES FROM CHRIST CHURCH CATHEDRAL, MONTREAL.

PRACTICAL CARVING.

A FEW remarks on practical carving may not be amiss at the present time, writes John Keily, of Toronto. Some would-be critics say: Why not use your eye? And a carver who is seen to use a compass or plumb-bob is said to be a mechanical carver.

Now the eye cannot always be depended upon. It seems to be a prevailing fault in drawing a circular curve to make it a flat curve, and a flat curve nearer to a straight line. In the oft repeated egg and tongue moulding, which takes a good carver to make, and which is attempted by every tyro or stone cutter, the chamfer of the egg is invariably on the left side, leaving it full on the right. Its section is not a half circle but the section of a thumb moulding. I observed the same defect on a number of organ pipes carved behind a figure of music.

I once had to finish an oval shield after a boss carver, who used his eye when roughing it out. Taking a centre line and stepping the compass to the right and then to the left, I found the latter was narrower than the right side: the outline on the left side flat, the right bulbous. A fulness on the right side of spiral bands is also a common occurrence.

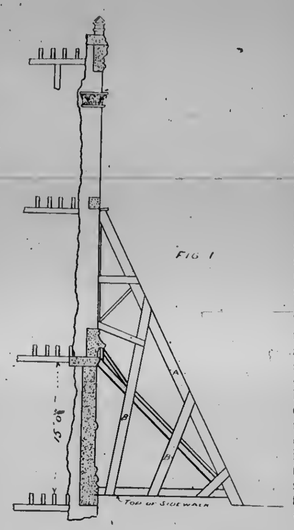
In carving a head or mask in stone there is a tendency to splay it off to the left and undercut it on the right. A proper carver when carving the capital of a column uses a plumb-bob on the bell of the cap to get the column line, carrying it well up to give the column vigor; whereas a novice will leave the bell projecting beyond the column line, and the foliage falling out from the astragal to the abacus.

Daloo, the great French sculptor, when modelling a figure from life, takes a number of fixed points in a mechanical way to determine the proportions of his subject, and then gets in his artistic work. Flaxman says "that Greek sculpture did not rise to excellence until anatomy, geometry and numbers had enabled the artist to determine his drawings, proportion, and motion; then and not before, a just expression might be infused in the truth and the harmony of parts, and the artist endow his statue with life, action and sentiment."

The town of Iberville, Que., has granted a bonus of $600 per year for ten years to Mr. H. Black, for the establishment of a factory for the manufacture of porcelain sinks and baths. Mr. Dakin will be the manager of the new concern.

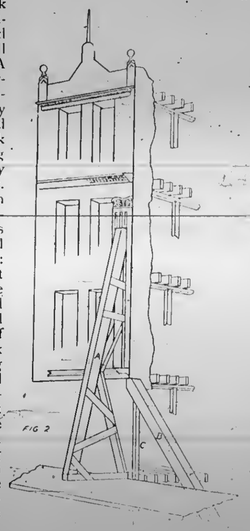
SHORING.

BELOW we show cuts of two examples of shoring which are in use on prominent streets in Toronto. In both these cases side walls are removed down to the footings about 14 feet below the sidewalk. In Figs. 1 and 2 the principal timbers A are built up of 3 pieces each to a thickness of 7½"×12", and in Fig. 2 the piece marked B is built up of 3 thicknesses of 4"×12". This timber is footed at the bottom of the new basement excavation 15 feet below the sidewalk. In Fig. 2 the shop front is entirely removed on the ground floor, and the corner shored up is supported by the post C, and also by another heavier upright which is omitted from the sketch to make the shoring clearer. The tie pieces are of 2" stuff spiked on both sides of the timbering. The differences in these two examples are mainly in the spread of the lower end of shorings, which is 15 feet in Fig. 1 and 6 feet in Fig. 2, and the way the braces are cut around the cornice in Fig 2. In both figures the height of shoring is about 30 feet above the sidewalk.



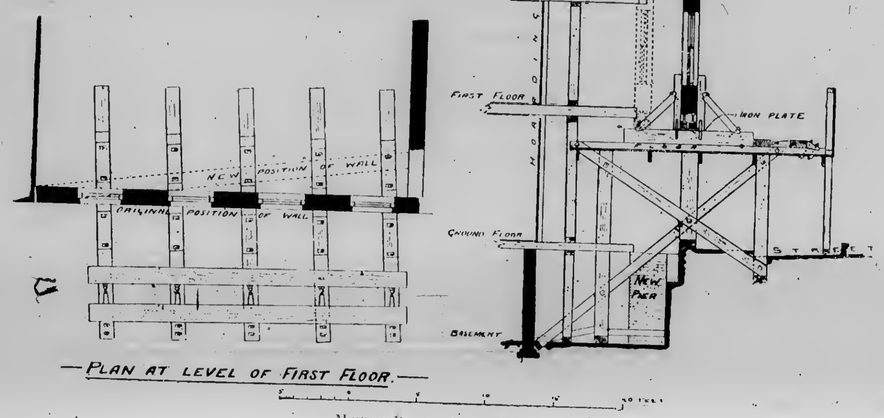
In this connection we reprint from the Building News the following interesting description and illustration of the methods employed in moving back a brick wall:—

In connection with the widening of Minster street, Reading, it has been necessary to throw a portion of the site occupied by Messrs. Watson Brothers' glass and china warehouse into the street. As Mr. Watson was very anxious that there should be no loss of time, and desired that any new front to his shop which might be erected should be similar to the existing one, the Borough engineer (Mr. Arthur E. Collins, Assoc. M.I.C.E.), designed and carried out an arrangement by which the existing front has been pushed back to the desired position. Notwithstanding that a good many persons, who well illustrate the saying that "A little knowledge is a dangerous thing," thought the intended operation a very dangerous one, as an actual matter of fact no more risk was incurred than during the progress of any ordinary constructional operations. Every necessary precaution was taken to avoid accident, and these precautions proved effectual. The actual operations were as follows:—The plate glass shop-front and the window sashes were removed; the floors and roofs were shored up and cut back to the extent of the intended setting-back of the front wall; five strong trestles were constructed beneath and across the girder supporting the front wall, and sliding pieces were placed on these trestles. The sliding surfaces having been well lubricated with soft soap and tallow, the weight of the wall was transferred to the sliding pieces by driving oak wedges between those pieces and the girder supporting the wall. The front wall was then cut away from the surrounding walls and from its supporting brickwork and columns. Screw jacks were then applied to the slides, and the wall was pushed back into its new position. To prevent the wall from falling forward into the street, should it show a tendency to do so, four sets of Tangye's differential chain blocks were attached to the wall and to suitable points in the building, these chains being kept just taut. To prevent any falling inwards of the walls, struts, consisting of stout scaffold poles, were butted on suitable parts of the building. These struts were constantly shortened as the wall moved back, so that whilst never touching the wall, at no time was there a greater distance than 1 in. between the moving wall and the end of the strut. The actual moving was performed in about two hours and a half, under the immediate direction of the borough engineer. Mr. George Lewis, of Castle street, the contractor, assisted by his foreman, Mr. William Church, executed the necessary work most ably, and business was carried on as usual throughout its progress. Messrs. Watson's premises in Minster street are three stories high, and have a basement. The wall moved was 30 feet long, 23ft. high above the first floor, and 18in. thick, including plastering, &c. The front is stuccoed. The east end of the front was moved back 3ft. 6in.; but the west end was not moved, as it was already fair with the adjoining building. The weight of the wall is about 38 tons.



COLOUR IN BUILDING.

AT a recent meeting of the Edinburgh Architectural Association, Mr. A. N. Paterson, M.A., read a paper entitled, "Colour as a Means of Architectural Expression." By way of introduction it was shown that the materials which the architect employs having each their colour value, his art is essentially chromatic, and that in consequence the study of colour is of the first importance; that, nevertheless, it has been much neglected by architects, and that to this among other causes is due much of the monotony of present-day architecture. Architectural expression s regarded to be as much a matter of color as of form, the term expression being used to indicate the individuality which differentiates one building from another, as well as the quality and character of the design in any one building. Three main lines of colour-study are laid down as being of most advantage to the architect. I. An examination of some of the principal laws of the science of chromatics, with the facts thereby to be discovered regarding the effect of colours according to their position and juxtaposition; a knowledge of these facts by itself will never produce fine results artistically, but they may be used by the artist as safe guides for the direction of the studies. The difference between light and pigments in relation to color is noted, and the laws regarding complementaries, contrast and small interval are explained and commented upon. The propositions regarding the use of color laid down by the late Owen Jones in his "Grammar of Ornament" are examined with relation to past examples of architecture and analogy from nature. II. Attention is turned, secondly, to the color qualities of our materials and the range of materials we have at our disposal, and it is found that there is no color which has not its exponent in almost every material the architect makes use of. The various materials are passed in review, with reference to their effect from a color point of view; stones, marble, of which it is thought more extended use might be made over small surfaces in external work; cement used as granolithic, rough cast and (as a form of small decoration) sgraffito; the various woods, singly and in combination, with a remark as to the greater use of inlays; bricks, tiles and terra-cotta; the metals, mosaic and other forms of internal and external decoration. With regard to these last, the more extended collaboration of artist craftsmen is pleaded for as the only means of producing the finest results. III. In the third place, attention is directed to the use of color in the architecture of the past. It is found that color has always played an important part, and a rapid survey is made of pre-classic days, of Greek and Roman, Romanesque and Byzantine, Mauresque, Gothic and Renaissance architecture, with a more careful examination of some Italian temples illustrated—St. Mark's at Venice, with the Ca d'Oro and other palaces there, the churches of Sienna and Florence and the houses of Bologna and Perugia. The use of colored materials and pigments in England and Scotland in past times is inquired into and illustrated. In conclusion, the tendency towards a more widespread use of color in the present day is noted and welcomed, and particular reference is made to buildings in Edinburgh and Glasgow giving evidence of this. The counter influence of fog and smoke is discounted, as much of an architect's work lies in the country beyond their reach, while it is further contended that even if a colour effect in towns is limited to a few years' duration it is none the less worth being carried out, for that beauty is none the less beautiful because it is transient.



MOVING BACK A BRICK WALL.

THE NEW UNION DEPOT, TORONTO.

THE erection of the new union depot at Toronto is proceeding satisfactorily. The entrance to the passenger waiting rooms on Front street is spanned by an immense arch, the dimensions of which are: span, 44 feet; rise, 28 feet; thickness, 4 feet; depth of voussoirs, 6 feet. There is also an inner arch, of the following dimensions: span, 54 feet; rise, 32 feet; width, 12 feet. The outer arch is believed to be the largest, forming part of the construction of a building, to be seen in America. The existence of two towers, one on each side, has rendered it possible to make this arch such an important feature of the building. It is built of Credit Valley brown sandstone, the inner arch being constructed of imported Scotch sandstone, which is also to be employed to a considerable extent for the interior walls of the waiting room. The progress of the work has been considerably delayed by the difficulty experienced in getting the necessary supply of this stone at the time required. The contractor for the masonry of the building, Mr. Benjamin Gibson, of Oshawa, Ont., is deserving of praise for the excellent character of his work. It is one of the finest specimens of masonry construction to be seen in Canada.

Black granite polishing works are being erected at Bocabec, N. B.

Mr. Wade, the well-known English sculptor, has been commissioned to erect the statue of Sir John Macdonald in Kingston.

A company is being incorporated at Pictou, N.S., under the name of the Cairo Polish Co., to manufacture bricks, tiles, pipes, paints, etc. Capital $10,000.

The Sydenham Glass Company, of Wallaceburg, Ont., are applying for incorporation, with a capital stock of $50,000, and will erect a factory at Wallaceburg to manufacture glassware. Mr. A. G. Baird, is acting secretary.

NEW PLUMBING BY-LAW OF THE CITY OF MONTREAL.

FOLLOWING are the provisions of the by-law for the regulation of plumbing, drainage and ventilation adopted by the Council of the City of Montreal on June 24th, ult.:—

Sec. 1. Every master plumber, or drain builder or drain layer shall be required to register his name and place of business at the office of the board of health, and to give notice at the said office in case of the removal of his place of business.

Sec. 2. An official list of such plumbers and drain builders or drain layers recognized by the Board of Health, shall be published once a year during the month of May.

Sec. 3. It shall be unlawful for any person to carry on the trade of plumbing or drain making in the city of Montreal, unless enregistered as above.

Sec. 4. All plumbing and house drainage and ventilation in the city shall be made and constructed in accordance with the following rules, which shall be binding on all parties concerned :

(1)—No drain or plumbing work or drain ventilating shall hereafter be made in any new building unless plans, drawings and a description of the same shall have been previously submitted by the proprietor, or his representative, in the health office, at least eight days before the commencement of the work, and unless such plans and drawings shall have been approved of and authorized by the sanitary engineer ; and in case of repairs or alterations affected by sanitary regulations, notice shall be given to the health department at once ;

(2)—No part of the work shall be covered or concealed in any way until after it has been examined and approved of by the sanitary engineer or his representative ; and notice shall be given to the health department when the work is sufficiently advanced for such inspection ;

(3)—The water department shall refuse to turn on the water unless the demand for the same is accompanied by a certificate of the sanitary engineer, to the effect that the works have been inspected, and found to be in accordance with the said rules ;

(4)—The material used shall be of good quality and free from defects, and the work shall be executed in a thorough and workmanlike manner ;

(5)—The arrangement of the soil, waste and ventilation pipes shall be as perpendicular as possible ;

(6)—The soil, drain, waste and drain ventilation pipes shall be at all times exposed to view ready for inspection and for convenience in repairing ;

(7)—When necessarily placed within partitions or recesses of walls, soil, drain, waste or ventilation pipes shall be covered with woodwork, so fastened with hinges or round headed screws, as to be readily uncovered ;

(9)—Every house or building shall be separately and independently connected with the street sewer, in front of such house or building, or with such other sewer as shall be designated by the board of health ; but in all cases of dwelling houses, there shall be a special communication with the street sewer for each fifty feet frontage of said houses if there be only four dwellings in the said space ; and in case there shall be more than four dwellings in the said space of fifty feet, the special communication with the street sewer shall be as directed by the board of health ;

(10)—Every such drain put in and covered without due notice to the health department shall be uncovered within 24 hours for inspection by the sanitary engineer or his representative ;

(11)—No brick, sheet metal, earthenware or chimney flue shall be used as a sewer-ventilator, or to ventilate any trap, drain, soil or waste pipe ;

(12)—Soil pipes shall be of cast or wrought iron of the weight specified in subsection 20, and shall extend at least two feet above the highest part of the roof, or coping, light, shaft louvres window or other opening ; they shall be of the same size throughout, and in no case shall they be less than four inches in diameter ;

(13)—Soil, waste and vent pipes in an extension, shall be carried above the roof of the main building when they are closer than twenty feet to the windows of the main building of adjoining houses ;

(14)—All water closet traps must be amply back air ventilated with a pipe from 2" to 4" or other approved device to prevent syphoning ;"

(15)—Joints of sewers and soil pipes shall be gas and water tight ;

(16)—When stacks of pipe are required for sinks only, they shall be carried full size through the roof and be not less than 2" for 4 sinks or 3" for over that number ;

(17)—When lead pipes are used to connect fixtures with vertical soil or waste pipes, or to connect traps with vertical vent pipes, they shall not be lighter than six lbs. sheet lead to the square foot ;

(18)—There shall be no traps in connection with vertical soil or waste pipes unless a permit so to do shall be obtained from the board of health ;

(19)—All pipes shall be sound and free from holes or cracks ;

(20)—The following weight per lineal foot or yard shall be accepted as standard :

IRON PIPES.

For plumbing work.

2 inch,	4	pounds per lineal foot.		
3	"	6½	"	"
4	"	9	"	"
5	"	12½	"	"
6	"	17	"	"

For drain work.

4 inch,	13½	pounds per lineal foot.		
5	"	17	"	"
6	"	20	"	"

LEAD PIPES.

1½ inch,	1½	pounds per lineal foot.		
1½	"	2	"	"
2	"	2½	"	"
2½	"	4½	"	"
3	"	5½	"	"
4	"	7	"	"

For waste sink pipes.

2 inch,	10	pounds per lineal yard.		
3	"	15	"	"

Lead waste pipes, bends or cesspools shall be equal to not less than 6 lbs. per square foot of sheet lead ;

(21)—The fittings used in connection with said pipes shall correspond with them in weight and quality ;

(22)—The plumbing work shall be tested by the sanitary engineer or representative, or an officer authorized by him, in presence of the plumber, (when the latter is required to be present) with the peppermint, smoke, or air ;

(23)—When defective pipes are discovered, they, shall be removed and replaced by sound pipes ; defective joints shall be made tight and every part of the work in which defects are found shall be made to conform to the present rules ;

(24)—Joints in iron drain, soil and waste pipes, shall be so filled with oakum and lead and hand caulked so as to make them gas tight, and they shall not be painted, varnished, tarred or puttied over until after inspection, unless the sanitary engineer does not signify his approval or disapproval of the work within 36 hours after the health department shall have been notified that the work is ready for inspection ; the said joints may also be screw joints ; should the work prove to be satisfactorily executed in the judgment of the sanitary engineer, he shall grant a certificate to that effect to the person concerned ;

(25)—All connections of lead with iron pipes shall be made with a brass or copper sleeve or ferrule of the same size as lead pipes, put in the hub of the branch of the iron pipe and caulked with lead ; and the lead pipe shall be attached to the ferrule by a wiped or overcast joint ;

(26)—All connections of lead pipes, shall, where practicable, be by wiped joints ;

(27)—No tile shall be connected with the waste pipe unless the same be provided with a flange to admit of a proper connection being made ;

(28)—Every water-closet, urinal, sink, basin, wash tray, bath, and every tub shall be separately and effectively trapped. This rule shall apply to a set of tubs, but only one trap shall be required for the set ;

(29)—The connections between iron and tile pipes shall be made with the best Portland or Roman cement or by other means approved by the board of health ;

(30)—Traps shall be placed as near the fixtures as practicable, and in no case shall they be distant more than two feet from the fixtures ;

(31)—There shall be only one trap under the water-closet and that immediately beneath the same ;

(32)—All waste pipe fixtures other than water-closets shall be provided at the inlet of such fixtures with strong metallic strainers to exclude from such waste pipes all substances likely to obstruct them ;

(33)—In no case shall the waste pipe from a bath, tub or other fixture be connected with a water-closet trap ;

(34)—Overflow pipes from fixtures shall in every case be connected with the inlet side of the trap, and above the water ;

(35)—Drip or overflow pipes from the safety pan under water-closets and other fixtures, or refrigerators, or from tanks, other than those of water-closets, shall be made to run into some place in open sight ; and in no case shall any such pipe be connected directly with the drain, waste or soil pipe ;

(36)—Water-closet apartments shall open to the outer air, by means of a window, shaft or air duct, going through the roof, or by vent shaft to the chimney ;

(37)—Every water-closet shall have a cistern supply, and in no case be supplied directly from the city reservoir supply pipes ;

(38)—In houses containing one or more than one family, there shall be one water-closet for each family, and a separate cistern for each closet ; in other buildings, however, a group of closets may be supplied from one tank, but not water-closets on different floors ; and at least one water-closet to every 15 inmates ;

(39)—The overflow pipes from water-closet cisterns shall discharge into an open sink, or the basin of the water-closet, or where its discharge will attract attention and indicate whether waste of water is occurring, but not into the soil or waste pipe or into the drain direct ;

(40)—Valves must be so fitted and and adjusted as to prevent wasting of water ;

(41)—No privy vault or cesspool for sewage shall be permitted in any part of the city where water-closets can be connected with a public sewer in the street ; when no sewer exists in the street a permit for a temporary privy may be granted by the board of health ; and in such case it shall be water tight, of a capacity of 15 cubic feet ; the sides and bottom shall be constructed of cemented brick twelve inches in thickness and well cemented inside with hydraulic cement ; such vault may be constructed of cast iron, the shape or form of which shall be either circular or oblong without angles, and with a concave bottom ; it shall be provided with a ventilation pipe at least 4 inches in diameter, extending from the pit through the roof sufficiently high as to prevent inconvenience to occupants of neighboring houses ; the seats shall have a tight fitting cover ; it shall have an aperture opening exteriorly to allow of cleaning by pneumatic process, such aperture to be 2 feet by 1½ feet in size ; or else the flooring shall be air tight and shall have a tightly fitting trap door communicating with the pit ; the top of the vault shall be one foot above the level of the ground ; nothing shall be put into the pit, excepting human excreta ; privies shall be located at a distance of 20 feet (or more according as the board of health may deem necessary) from any house or street ; they shall be emptied when the contents reach to within eighteen inches of the top of the vault, by persons appointed by the board ; no offensive smell or gases may be allowed to escape therefrom. But, in no case shall a privy be allowed within the walls of a dwelling house or in any property situated on a street having a sewer ;

(42)—No steam exhaust, blow off pipe shall connect with a sewer di ectly or any house drain, soil pipe or waste pipe ; such pipe must first discharge into a tank or condenser ;

(43)—Cellars shall not be connected with the house drain unless absolutely necessary, and by special permission of the board of health, and according to plans approved of by the board ;

(44)—A sub soil drain shall be provided when absolutely necessary, and shall be constructed and trapped to the satisfaction of the board of health ;

(45)—No trap shall be permitted between the house drain and the public sewer, unless by permission of the board of health ; conditionally however that such trap shall have a hand hole for cleaning purposes and a fresh air inlet pipe, the whole as may be decided upon by the board of health ;

(46)—Drains in yards shall, in all cases, be trapped below frost, that is to say : four feet at least under ground ;

(47)—In the case of privy vaults now drained into a common sewer, they shall be isolated by means of suitable traps placed below frost and according to instructions from the board of health ;

(48)—In the case of a new house being built or one already existing being repaired, wherever there is a public sewer in the street, a water-closet shall be put in, to the exclusion of privy pits ;

(49)—The inspection of drains within the line of street shall be under the exclusive control of the board of health ;

(50)—Gas pipes will be tested in the presence of the sanitary engineer or his representative ;

(51)—Gas companies are obliged to place a stop cock to every main pipe ;—

Sec. 5. The word "board" wherever it occurs in this by-law, means the board of health of the city of Montreal ; and the word "sanitary engineer" means the sanitary engineer appointed by the council to carry out the provisions of this by law, or his representative.

Sec. 6. Any person contravening any of the provisions of this by-law shall be liable to a fine, and in default of immediate payment of the said fine, and costs, to an imprisonment—the amount of said fine, and the term of said imprisonment to be determined by the recorder's court, *at its discretion ;* but the said fine shall not exceed forty dollars, and the term of imprisonment shall not exceed two calender months ; the said imprisonment, however, to cease at any time before the expiration of the period fixed upon by the recorder's court, on payment of said fine and costs ; and where the infraction is continuous, such infraction during each day, shall constitute a separate offence.

THE DIFFERENCE IN AMOUNT OF RADIATION REQUIRED IN BUILDINGS OF GOOD AND POOR CONSTRUCTION.*

To illustrate the subject before us I will recite my experience in several buildings. In the fall of 1879 I placed a low pressure steam heating apparatus in a building designed for a home for old ladies. Many of the rooms were small, and in order to warm them without question a radiator was placed in each room. Knowing that a high temperature would be agreeable, the calculation was made that one foot of radiation would warm 40 cubic feet of air. This we considered very liberal when the fact that we used the Gold sheet iron radiator is taken into account. We were, however, doomed to a very serious disappointment, as the temperature in the rooms on the windward side of the house frequently fell to 50 degrees, and sometimes even below, during severe cold and windy weather. After reconsidering all the conditions we determined to add a large percentage of radiation, which was done, and the building has been thoroughly warm ever since. The amount of radiation added in many of the exposed rooms was from 50 to 100 per cent. over that originally supplied. To my mind the rooms in this building are very uncomfortable, for the excessive amount of radiation required to maintain the temperature produces a very disagreeable condition of affairs, together with the excessive loss of heat through the thin walls and many air leaks. It was soon found that although the ratio of radiation was very excessive under the existing conditions the condensation was very rapid, and more boiler power was required to maintain the steam pressure. Consequently an additional boiler was supplied, at the expense of the heating contractor, which gave plenty of generating power, but all this was accomplished at a heavy proportional loss to the contractor. To my mind as I review the entire matter I find that the original calculation for the boiler and radiating surface were correct providing the building in question had been ordinarily well constructed. But from subsequent surveys I conclude that the architect and building contractor produced about as poor a specimen as it was possible to do and have it stand up as a public building. The result is that the amount of fuel needed to warm the building is enormous.

I have in my mind another building which belongs to one of our popular colleges. The building was constructed in 1872. The location was on the brow of the hill where the front was exposed to the force of the northwest winds. It was the intention of the heating contractor to make this building very warm, and all calculations were made with this object in view. After the apparatus was complete and the weather became cold it was found that many of the small rooms in the west front did not warm to the required temperature, and an investigation was made to determine the cause if possible. We referred to our calculations as to boiler, piping, radiating surface, etc., and found that the apparatus was constructed according to our calculations; nevertheless we were confronted with a number of cold rooms. We finally determined that the only way to satisfy ourselves was to live in the building and keep a record of the temperature, both in the rooms and outside. While this was in progress I visited the building one very windy day and in entering some of the west rooms I was surprised to find that the hall door would be pulled away from me and shut with a report like a gun.

I supposed at first that the windows were open, but examination showed that they were closed as tight as possible considering their construction, but the air was constantly driven through the brick walls of the building, in fact, the volume of air forced into the room was so great that the hall door was opened with difficulty. The radiators in these rooms were liberally increased and the warming of the building has been very satisfactory to its occupants. The heating contractor in this case did not meet with a decided loss, as a very liberal allowance for the exposure of the building had been made in the original calculations.

Another striking case comes prominently before me. About eight years since I placed the heating in one of our State normal schools. The building was in a very exposed location and the radiating surfaces were very carefully apportioned in order to fully meet all conditions. One large class room, containing about 100,000 cubic feet, was provided with one square foot of radiation to 40 cubic feet of space. This was thought to be excessive at the time but we wished to do the work right the first time and not have any alterations or additions to follow the work, so the full amount of radiation was supplied. When the weather became severe this room was very cold and radiating surface was added at various times until the ratio was brought up to 1 to 18 and the desired temperature secured. The larger part of the radiation was direct, in fact, all radiation which was added was direct. I found that while standing in the room during a severe northwest wind, you could feel the wind on your face as it came through the wall of the building. In the illustrations cited the buildings were very carelessly constructed, the architects in charge giving very little attention to the minor details which have the most important bearing in the comfortable use of the building.

I will now call your attention to the reverse of the conditions named above. Last year I contracted to place a small hot water apparatus in an old residence which was being altered slightly and converted into a small apartment house. The building was not badly exposed, so the calculations where based on a moderate amount of radiating surface. The apparatus was complete in the fall and the tenants moved in. The fire had not been started but a few days when there was a general complaint of too much heat, especially in the bedrooms. I find that the latter contain about 1,500 cubic feet and a radiator of 32 square feet was used to supply the heat. Our advice was to shut the valve in the radiator and run the water at a lower temperature, and when very cold weather came they would be very happy with nicely warmed rooms. Our suggestions were partly followed, but the complaints of over heating were almost constant and after passing partly through the winter both owner and tenants demanded that the radiators be removed from all the bedrooms at least. This was done and there remained in these rooms a riser of 1¼ pipe, which contains about four and a half square feet of radiation surface. In a room of 1,500 cubic feet, or a ratio of 1 to 333. The bedrooms being outside rooms, I have never had the opportunity to examine this house but there is no doubt as to its good construction. I might further say that I am advised that the temperature of the water is kept down to 140 to 160 degrees in the coldest weather.

* Paper read by Mr. E. P. Bates before the Sixth Annual Convention of the Master Steam and Hot Water Fitters' Association of the United States, June 19, 1894.

A few years since I built a small stable. Its dimensions are 24 by 36 feet on the ground. The ground room is used as a carriage room, horse stalls, harness room, etc. In practice the floor is commonly used as one room; above is a hay loft, with a room for the driver over the harness room. To my mind it is desirable to keep the stable moderately warm through the winter and to accomplish this with a moderate outlay in apparatus and fuel. Over the horse stall is a ventilating pipe running through the roof, this pipe is 12 inches in diameter and is always open summer and winter. Usually the air is going through it at a high velocity. There is no special provision to bring air into the stable, but the doors and windows are ordinarily well fitted, and there are large leaks about the entrance to the carriage room which has a sliding door about 9 feet square and opens to the north. In using the stable no difficulty was found to warm it to 60 degrees in the most severe weather, and an ordinary globe stove was used with a grate 8 inches in diameter. The amount of fuel used per season is between three and four tons. The stove pipe passes through the driver's room and heat given out by the pipe maintains a comfortable temperature in that room. I believe this stable is more comfortable in summer and winter than the average stable, although many of them may be much more expensive in construction. The stable is built of wood. The frame is balloon style, the upright stands are 2 by 4 inches, set about 16 inches between centers. On the outside of these studs I placed a course of rosin-sized building paper and one thickness of coved siding. In order to prevent the buckling of the paper at the laps, and to prevent a rapid change or circulation of air between the studs, I placed a 2 by 4 inch girth lengthwise (between the upright studs) on the sill; then, once in three feet, cut in a 2 by 4 inch as an additional girth. The paper being a yard wide abutted on this extra girth which held the edges tight and prevented the circulation of air from cellar to hay loft, and *vice versa*. On the inside of the carriage rooms on the ground floor, as well as other rooms on the ground floor, a course of building paper was used and ceiled over with ½-inch narrow Canada pine for a finish. Under the roof of the hay loft was laid a course of building paper also on the ceiling of carriage room before the ½-inch wood ceiling was laid. At the top of carriage room where the studs and joist join, I stopped off with boards to prevent the circulation of air. The idea of using the cross girths once in three feet and building paper on the inside of the walls was very amusing to the old carpenters employed on the work, but it is very satisfactory in a cold day and equally so in hot weather, the building being much more comfortable than many dwellings which are built at a much greater cost per cubic foot. It will be noticed that the stable here described is of very inexpensive construction and would be very cold in winter and hot in summer except for the succession of dead air spaces in the walls, cove siding being one of the poorest materials for keeping the wind from penetrating a building. Believing that I was correct in theory I determined to carry out my ideas more carefully in the construction of a house two years since. This house to which I will refer stands alone fully exposed on all sides on high ground, in Syracuse, where the temperature frequently falls below zero, and occasionally 15 to 20 degrees below zero.

It is constructed of wood and is comparatively inexpensive. The frame is what is known as balo on with slight modifications. On the outside of the frame are placed hemlock boards planed on one side, and over the hemlock is placed a course of heavy building paper, care being taken to leave no bare spaces, or uncovered knot holes; also that the paper fitted properly around all corners, windows and door frames. A 2 by 4 was nailed to the sill to prevent the air from cellar going to the attic or *vice versa*. Once in three feet a cross girth 2 by 4 inches was cut in between the upright studs to make a dead air space in the walls. This was also done in the partitions. At the ceiling of each story, a board to fill the space between the joists were inserted : said boards were covered with building paper. Over the partitions in the center of the house a stop off was inserted in a similar manner to prevent the air from passing from side to side of the house and cooling the ceilings of the various rooms. The roof boards were covered with paper before the shingles were laid. Every point was carefully looked after to prevent air leaks, the object being to get dead air spaces in all the walls as far as possible to do this. The next point was to install a good warming apparatus, and after having the old saw about the shoemakers' wives and blacksmiths' horses handed to me several times, I determined to erect a heating apparatus which would surely warm the house every day. I therefore placed in the house a No. 6 Bates's self feeding boiler containing 103 square feet of fire surface. This boiler is brick set. Allow me to speak of a peculiarity of this boiler, quite different from many which are advertised. It does not save any coal. They will burn all you fire into them, but if the firing is done with any reason the boiler will give you an equivalent in heat for every pound of fuel it consumes. The house in question being three stories it was decided to make a combination apparatus, i. e., hot water and steam, using hot water stacks for the five principal rooms, and steam radiators for bath, back hall and the small bedrooms. The hot water was circulated from the water line, the boiler set in the usual way for carrying steam, with automatic water feeder, automatic draft door, etc. I placed in the house, which contains about 16,000 cubic feet of air space, 452 square feet of radiation, equal to one square foot to 33 cubic feet of space to be warmed. Of the above 350 square feet was in the indirect hot water stacks and 127 square feet distributed in seven small radiators. For ventilation I built one chimney stack which connects conveniently to most of the rooms. In this chimney stack I placed eight tile flues made of vitrified pipe without hubs and all eight inches in diameter except the flue for the fire place in dining room which is to inches in diameter. These fires are used as follows: one for steam boiler, one for laundry stove, one to ventilate laundry (being three in basement), one for fire place, one for range, and one for hood over range to take off heat and vapor from cooking (being three on ground floor). On the second floor there is one flue from the large bedroom at the base of which is set a Franklin stove, and the other and eighth flue in the back hall. The bedroom being several feet from the chimney has a separate flue of tin and galvanized iron extending through the roof independently, with a globe ventilator on top. Every test made shows each flue carrying out large amount of air, and those flues to which fires are connected are very satisfactory ; in fact, they never fail to draw, and the course or velocity of the wind seems to make no difference, so it is evident that a rapid change of air is going on constantly.

As to results. When the thermometer registered 5 degrees below zero during the past winter we used one stack of pin radiators in the reception hall. Said stack contains eight sections. The register over the other stacks was kept closed, a radiator of 16 square feet in back hall of second floor was filled with steam, and a radiator of 18 feet on third floor was partly filled, equal to ten square feet, or in all 108 square feet in active operation in severe weather. There is no doubt we receive some benefit from the stacks where the registers were closed as there is a small percentage of leakage through the registers, and some heat given off by the tin flues running to the upper rooms. If only 108 feet were used the ratio would be 1 to 135. After having several cold days and demonstrating the fact that the amount of radiation was greatly in excess of the amount which could possibly be used, radiators were removed from the house, to the amount of 86 feet of direct radiation and 60 feet of indirect, the latter being the stack placed to warm the drawing room and was not used, as the room was thoroughly

warmed by the hall stack. It was found also that during the coldest days and evenings it was comfortable to sit in any part of the house, even the rooms where the registers were closed, also that the difference in temperature between the outside and partition walls was slight. One fact worth meationing is that the bath room was in constant use, and that it was designed to heat it by means of a brass coil nickel plated containing twenty feet of one inch pipe, but the valve was not opened during the winter the room being comfortable at all times to take a bath. During this season it is my intention to extend the tin flues to three bedrooms from which the direct radiators have been removed, as the stacks are abundantly large to supply them with heat. I might say in explanation that I should not have carried heat enough to carry steam, but for the fact that one of the upper rooms was used as a sewing room and steam was required to reach that room. In my opinion I shall not need to carry the water above 180 degrees the coming winter to perfectly warm the entire house. Under the conditions here described the boiler ran with the minimum of care, the draft door remaining consequently closed days at a time, the grate was shaken once in twenty-four hours in the most severe weather, and only once in 72 hours in very mild weather. With a temperature of 32 degrees outside, water at a temperature of 110 degrees to 120 degrees at the boiler was sufficient.

The question may now be asked what has all this matter of construction to do with our craft? We do not build houses or other buildings; we must take them as we find them, good, bad, and indifferent, and place in them a heater that will fill our guarantee, be it more or less. This is a fact from one standpoint. There is, however, another view to take of the subject; every trade is responsible for existing conditions to a certain extent; by agitating a subject we bring about reforms, and if fifteen to forty dollars judiciously expended in the construction of a small residence will save the full amount in the value of fuel in one or two seasons and add largely to the comfort of the occupants all the time, our efforts are well expended in diffusing the knowledge of the fact, and intelligent inquiry will be well rewarded in its research. Further, we all make our great successes in well constructed buildings and our failures and sometimes losses in those of poor construction. With this in view I hold that it is largely to the interest of the steam fitter and heating engineer to promote in every way possible the desire which the owner and architect may have for a well constructed building. "Continual dropping wears the stone."

PERSONAL.

Mr. Surtees, City Engineer, of Ottawa, is at present on a visit to New Brunswick.

Mr. Fred. Batty, manager of the stone quarries at Wallace, N. B., died suddenly of heart disease a few days ago.

Mr. Edward Copping, City Building inspector for Toronto, received severe injuries a few days ago, by being thrown from his buggy.

Mr. Eustace G. Bird, who has been pursuing the study of architecture in England and on the continent for several years past, has returned to Toronto.

Messrs. Strickland & Symons, architects, have recently removed their offices from Toronto street to Aberdeen Chambers, corner of Adelaide and Victoria streets, Toronto.

Mr. D. Norman MacVicar, late of Messrs. Taylor & Gordon's office, Montreal, has associated himself with Mr. David R. Brown, architect, under the name of Brown & MacVicar.

Mr. Richard Dinnis, senior member of the firm of R. Dinnis & Son, contractors, has recently returned home from a visit to Great Britain. He describes business conditions in England as discouraging in the extreme.

PUBLICATIONS.

The July Cosmopolitan marks the close of the first year since the revolutionary announcement was made that the price of that magazine, already low had been cut to one-half of three dollars a year. Even severe critics admit that with each succeeding number there has been a betterment in the quality of articles and illustrations, and the size has remained unchanged.

Mr. Charles Baillairgé, of Quebec, at the last meeting of the Royal Society at Ottawa made an interesting contribution to the at present popular subject of Technical Education, in a paper entitled "Technical Education of The People in Untechnical Language." Mr. Baillairge holds that the education of the masses should not go beyond the three R's and object lessons in scientific subjects. "Let us beware," he says, "of too much education; there is a danger of over doing the thing, and thus causing our should be agriculturists to become dissatisfied with their parents mode of livelihood, flocking towards populated centers, there to become second and third class professionals of every hue, with little or nothing to do; with mischief and discontent and anarchical tendencies following in the wake." To our way of thinking the need of the times is in the direction of a change in character and methods of instruction rather than in restricting education.

RECENT CANADIAN PATENTS.

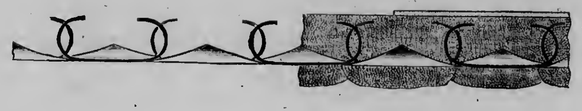
Mr. George A. Watson, of Toronto, has secured a patent, No. 45,906 on a sectional hot water heating boiler.

Messrs. William Pinkerton and Joseph Barrett, of Toronto, have been granted a patent on a building composition consisting of about equal parts of limestone and stone or shale containing oxide of iron and silica melted and moulded into a homogeneous mass.

TO MAKE TRACING PAPER.—Home-made tracing paper is much less expensive than that purchased at shops. Common tissue paper can be had at something less than ½d. per sheet of the ordinary size, when purchased in quantities. To prepare it, mix a proportion of one of boiled linseed oil to five of turpentine in a cup. Put a single sheet of paper at a time on an inverted tea-tray, large enough to allow at least the half of the sheet to lie flat. The mixture should then be put on with a small sponge, one coating only, and that not too thickly; each sheet after such process should be hung over a string stretched across the room, and when all the clear oily marks entirely disappear, it will be ready for use.—Carpenter and Builder.

Hayes' Patent Steel Lath . .

HAS NO EQUAL IN ANY PARTICULAR



. . . Used in more important buildings . . .

. . . THAN . . .

all other styles of metal lathing combined.

SOLE MANUFACTURERS

THE METALLIC ROOFING CO.

OF CANADA, LIMITED.

BRANCH OFFICE: 706 Craig Street MONTREAL

HEAD OFFICE: 82 to 90 Yonge Street TORONTO

Send for Samples and Prices

To Architects and Builders

. . . WE INVITE YOUR ATTENTION . . .
. . . TO OUR STOCK OF . . .

Fine Bronze Hardware

Shelf Goods Contractors' Supplies

PATENT EYE SASH WEIGHTS *KEPT IN STOCK. No delay in filling orders.*

MORTAR COLORS CEMENT SEWER PIPE

The Vokes Hardware Co., Ltd.,

111 Yonge Street, corner Adelaide St., TORONTO.

IT PAYS!

TO ADVERTISE IN THE "CANADIAN ARCHITECT AND BUILDER."

T. J. BALDON, Manager

Architectural Iron Work of all Descriptions

DOMINION ORNAMENTAL IRON Co.

Works 55 NAZARETH ST

BELL TELEPHONE No. 2341.

MONTREAL June 20 1894

T. H. Mortimer Esq
Publisher Canadian Arch^t & Builder
Dear Sir:—

With reference to our adv^t in your paper, we beg to state that it has proved of most excellent service to us. We have received numerous enquiries & orders from all parts of the Dominion, which we attribute to this adv^t, & which we would otherwise never have heard of.

Yours faithfully
Dominion Ornamental Iron Co

MEASURING MASONRY.

There are two widely different methods of measuring and estimating the value of masonry, to which we will find it necessary to attend. By the first of these methods the value of the rough material in cubic feet is added to each successive kind of labour exercised upon it in superficial feet, in order to ascertain the final value of each piece of stone employed. In ashlaring the price of plain work is allowed to face, bed and joints of each stone, with horizontal bed and one vertical face only for bond-stones, unless they are through stones, when two vertical faces may be allowed. If labour is not charged on any face of a stone, half sawing is to be allowed for each lower face. Columns are measured by taking first two plain sides of the cube, added to the girth of the column as circular planes, and two plain faces to each horizontal joint. The material in solid steps is measured by taking the extreme length, including the tailing in the wall, by the width and whole height. Winders in the same, the width being the mean between the extreme end widths. Labour on steps, if solid, includes plain, sunk, or moulded work on the face of the tread, riser, and ends only if laid on brickwork. To this half the bed is to be added if the step is laid on stone. For cornices, strings and blocking courses set on brickwork add the moulded, sunk or planes in faces and top to the plain work in joints, and allow no beds; but if set on stone, half a plain bed to be allowed besides, also half-plain to the back if worked. For landings plain work is to be allowed on top, edges, and joints. If the underside be worked, to be charged half-plain superficial. Curbs are taken as plain, sunk, or moulded to the three faces, but no bed. For hoisting stone above 10ft. from the ground level an additional 2d. per cubic foot for 10ft. in extra height is to be understood, unless otherwise specified. The second method of estimating masonry recognizes only the exact net cubic quantity of stone used, and affixes a definite and total price to this, varying it only to meet cases, where vast differences of labour are palpably required, and allowing no extra or additional charges whatever under any circumstances. Thus we may have rubble or ashlar, as the case may be, in walls, including all plinths, grooves, arch stones, reveals to openings, string courses, copings, returns, etc., at so much per cubic foot nett, deducting all openings, and backings, if of brickwork, as they may appear in the drawings or in the specifications; in fact, tantamount to a lump sum for the whole piece of work. While it must be admitted that this wholesale method of measuring facilitates the progress wonderfully, it is equally undeniable that it is as uncertain in results as careless in process; and, indeed, the exact and just measurer, even if driven to adopt this method ostensibly, will take the trouble to work out an average block or two of each kind of work upon the other and more correct system, and reduce the cost thus found to a set of prices per cubic foot in the required estimate.

CREDIT VALLEY BROWN STONE

From Carroll & Vick's No. 6 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure	Height.	Crushing Load.	Crushing Stress per sq. in.	Average Crushing Stress per Square Inch
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	2⅞ × 3	2⅞	131,000	15,188	
C	2 13/16 × 3	2⅞	130,000	14,751	
D	3 × 3	2⅞	133,000	14,777	14,905

14,905 pounds is the average crushing strength per square inch of our Credit Valley Brown Stone.

The highest standard of test attained by any pure Sandstone in America.

IN confirmation of the facts above stated, we have pleasure in directing your attention to the accompanying table, showing the result of the test of our stone, in connection with the series of tests of building stones conducted in 1892 at the School of Practical Science, Toronto, under the direction of a committee of the Ontario Association of Architects.

By referring to the results of the tests above mentioned, it will be seen that the average crushing stress of the majority of Canadian and American sandstones is far below that of ours, the difference in our favor ranging from 75 to 50 per cent.

The Credit Valley Brown Stone, owing to its modest tone, harmonizes beautifully with red or cream colored brick.

It has been reported that there is difficulty in obtaining Credit Valley Brown Stone. To correct this mistaken notion, we wish to state to architects and the public that we have a large quantity of stone ready to ship on the shortest notice, which can be followed up with an unlimited supply. Last year we made extensive additions to our plant and opened up new quarries and mines, and will supply promptly all orders given to us or our agents.

CARROLL, VICK & CO.

Quarries: Credit Forks, Ont. Office: 84 Adelaide St. West, TORONTO.

Montreal Agents: T. A. MORRISON & CO., 118 St. Peter Street.

THE . . .

"STEEL-CLAD" BATH

Booth's

Patent

. . . MANUFACTURED BY . . .

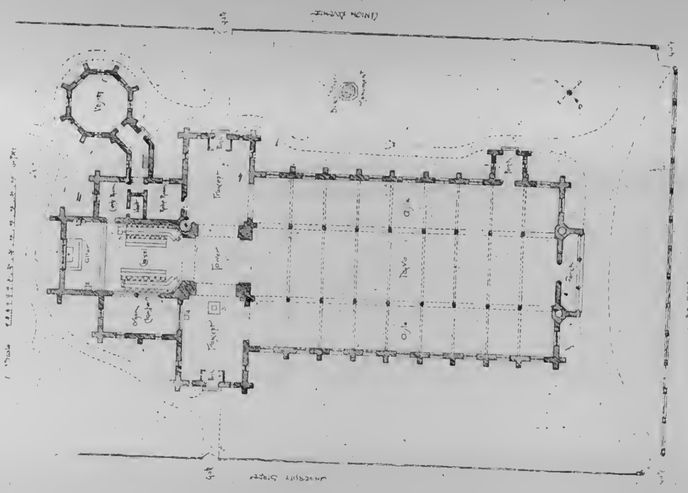
Toronto Steel-Clad Bath and Metal Co., Ltd.

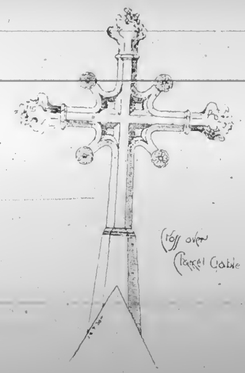
123 Queen Street East, Toronto.

MONTREAL ST. JOHN, N. B. QUEBEC VICTORIA, B. C.

ADDRESS ALL COMMUNICATIONS DIRECT TO THE COMPANY.

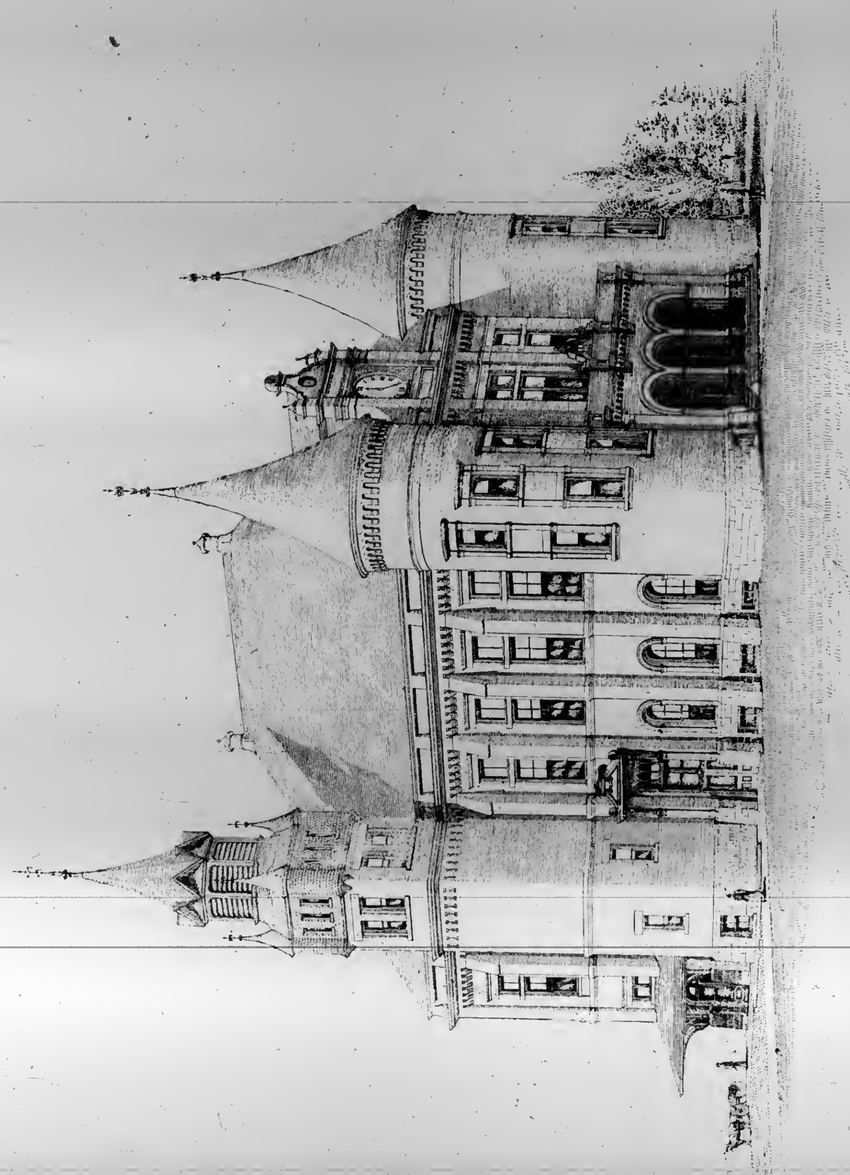
Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers





SKETCHES FROM CHRIST CHURCH CATHEDRAL, MONTREAL.

(ACCOMPANYING ARTICLE ON PAGE 86, THIS NUMBER.)



TOWN HALL AND MARKET, ORILLIA ONT.

GORDON & HELLIWELL ARCHITECTS TORONTO

RESIDENCE OF W.T. McMULLEN ESQ
WOODSTOCK ONT
A WHITE ARCHITECT

SKETCH FOR
MONTREAL PROTESTANT
ORPHAN ASYLUM

DAVID R BROWN ARCHITECT.

CANADIAN ARCHITECT AND BUILDER.

VOL. VII.—NO. 8. AUGUST, 1894 PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	EDMUND BURKE, Toronto.
1ST VICE-PRESIDENT	J. E. BELCHER, Peterboro'.
2ND VICE-PRESIDENT	W. A. EDWARDS, Hamilton.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI	Ottawa.
FRANK DARLING	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON	Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	J. NELSON, Montreal.
1ST VICE-PRESIDENT	CHAS. BAILLAIRGE, Quebec.
2ND VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. GENDRON,	Montreal.
J. B. BERTRAND	Quebec.
ERIC MANN	Montreal.
J. VENNE	Montreal.
G. P. TANGUAY	Quebec.

AUDITORS—THEO. DAOUST, J. E. PEACHY.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.	FRED. WAKEFIELD.
WM. PARK, 1st Vice-President.	WM. BOOTH.
GEO. OAKLEY, 2nd Vice-President.	JAS. ISAAC.
DAVID WILLIAMS, Treasurer.	H. LUCAS.
JOHN ALDRIDGE.	JAS. THOMSON
JAS. CRANG.	H. MARTIN.

JOHN L. PHILLIPS, Secretary.

THE rapidity with which all classes of people, of both sexes, have adopted the use of the bicycle as a means of pleasant exercise and for practical use, has been the subject of general astonishment. When the bicycle was introduced it was regarded by many in the light of a fad, which would disappear as speedily as it came. But time has proved the incorrectness of this opinion. Architects and contractors have found the bicycle extremely serviceable in enabling them to get about rapidly from one piece of work to another. The question of providing bicycle accommodation is one which must be taken into account by the architect when planning for the erection of buildings in the future. The suggestion has been made that the stable should be spacious, convenient to the street and under the eye of the elevator man.

IN this number of the ARCHITECT AND BUILDER appears a fac simile letter from Messrs. Elliott & Son, the well-known firm of decorators, in which they bear testimony to the excellent results which have followed the continued insertion of their advertisement in this Journal. As the authors of this letter have advertised continuously for five or six years past, their testimony is worthy of attention. The fact that the advertisers whose letters we publish handle different lines of goods, though all designed for use in building construction, proves conclusively that the CANADIAN ARCHITECT AND BUILDER is the best medium through which to reach architects, engineers and contractors throughout Canada. Persons who have anything to sell to these classes should be represented in the advertisement pages of this Journal. Will the purchasers of supplies also kindly mention the ARCHITECT AND BUILDER in their correspondence with manufacturers and dealers.

WITHIN a short time quite a marked change has taken place in Toronto in the manner of carrying on business by roofers and galvanized iron workers. Many of those who formerly did only slate, tile and felt roofing have added general galvanized iron work to their business; other firms who formerly confined themselves to sheet metal work are in the field for all kinds of roofing. This has no doubt been brought about partly by the custom of architects in specifying for all iron work which is strictly part of the roof to be included in one contract, and making the roofer responsible for the whole being water tight. There also appears to be a certain amount of retaliation on the part of each trade, caused by the other having taken up the additional line of business. There are strong indications that competition will grow so keen that prices will be cut below a reasonable point. While we would not advocate the restriction of competition in business, we do not think the present condition of affairs is likely to secure the doing of a satisfactory grade of work.

Reference was made in this Journal recently to the financial difficulties in which some church congregations had placed themselves through a desire to worship in expensive buildings. The matter has assumed such a serious aspect that at the last meeting of the Toronto Conference of the Methodist Church the following resolution was adopted: "That this conference is of the opinion that additional guarantees should be provided against the unfortunate tendency that prevails so largely to strain the law affecting the inception of new and the enlargement of existing church enterprises, and recommends that the genetal conference be memoralized to provide legislation which will require the co-operation of the chairmen of districts with the quarterly board in advance of either the enlargement or building of an

existing church, or the formation of a new church trust." The adoption of this resolution may not work to the advantage of architects, builders and supply firms, but there can be no question that it is a step in the right direction when viewed from the standpoint of the churches' interest.

THE seasoning of lumber by kiln drying is a process of recent development and a strictly scientific treatment is necessary to secure good results, more particularly with hard woods prepared for high grade work. It has been found that selections from the same variety of wood grown in different localities require radically different treatment and that perfect drying may be retarded or prevented entirely by too high a degree of heat, especially if applied to lumber soon after it has been put in the kiln. Special machinery and arrangement of the kiln together with experience are as much a necessity in this work as a similar combination of facilities and knowledge is in any other. It is one of the many subjects with which architects should be familiar under the head of growth, formation and chemistry of building materials. We shall not be surprised to find architects specifying ere long that lumber must be kiln dried by a certain process according to the best data available. Another question closely related to that of seasoning lumber is that of preserving wood. It is well known that there are several simple and cheap processes by which the natural resistance of lumber against rotting can be greatly increased. This kind of protection is not used as much as it should be. It is wonderful to see how short a time is required for sound wood in some positions to become thoroughly rotted. The systematic use of preservatives is but little developed and consequently a very great and unnecessary loss is going on always accompanied by insanitary conditions. The remedy for this is largely in the hands of the architects, from whom it should receive more attention.

THE architects of the United States, who have been making heroic efforts to bring about a reform in the method of designing government buildings are greatly encouraged by the strong probability that the present Congress will pass a bill to supersede the Tarnsey bill, in regard to which the president of the American Institute of Architects, Mr. Burnham, and the government officials had such an unpleasant correspondence as noticed in our issue of April last. After that correspondence it was deemed best to proceed by associated individual action instead of officially through the Institute. Several of the architects drafted bills and one drawn by Mr. Post practically satisfied everybody interested. This bill was taken to Washington and after undergoing a number of alterations was introduced in Congress by Mr. McKaig, of Maryland. It is admitted that the modifications suggested by the politicians were all in the right direction and made the bill a stronger and more desirable one than as originally prepared by Mr. Post. Some features of the bill are remarkable and well calculated to make the design and execution of government buildings the highest possible goal of the architect's ambition. To be considered eligible for government competitions is in itself made a high honor, as the bill debars any but an architect in chief of at least ten years practice, and any but those who can cite evidence of sufficient constructive and administrative ability. While the successful competitor will be awarded all the rights and duties of the architect in private practice at full established rates of compensation, very little remuneration will be provided for other competitors. A very modest per diem compensation is allowed to members of the commission who will have charge of competitions. The two features last mentioned are practically intended to limit the cost of the new system, including all expenses for competitions, to the one principal prize, the fee for carrying out the work, and outside of that to prevent any one entering competitions or acting as commissioners from other motives than a generous interest in their art.

THE earnest student of architecture takes upon himself no light task. We think it may fairly be claimed that the student who starts out to qualify himself for an architect, and is determined to master his profession, begins a course which requires an amount of patient and laborious training not exceeded in any line of human endeavor. There is one feature of this work which affords a great relief—the fact that the large variety of knowledge through which he must range is stimulating, and on the principle that change of work is restful, may to some extent be regarded as recreation. But we often think students must be perplexed to decide what is really worthy of acceptance as truth in regard to questions that do not admit of mathematical demonstration. In another part of this number we publish an article on "How to Study Design", which contains some good points, but which would also bear some criticism. The student cannot accept such papers as an indisputable authority, but should cultivate the habit of comparing and sifting different writings on all subjects. Professional societies usually invite those considered most competent to present papers on various subjects and these papers are entitled to consideration. We sometimes notice that two writers, who would stand fairly equal in position and ability, express almost exactly opposite opinions on some matters. Then again strong statements are covered up by such generalities that the student can only understand that something is very wrong or very good as the case may be, but just what that something is, does not appear, so that if he wished to adopt the correct idea and keep clear of the bad he would still be very much in the dark. There seems to be a disposition on the part of many writers to avoid saying definite things about particular parts of work in such a way that faults or merits can be located in existing buildings or illustrated by imaginary examples. We hope to see a change in this respect. Meanwhile students will be safest who take the middle ground, and by careful discrimination seek to find the consensus of opinion among authorities on every subject.

THE contractor's business is always accompanied by risks of loss from many sources. Some of these are entirely beyond his control, and others can only be minimized by carrying on all parts of the business in the most systematic manner. The risks begin the moment a contractor commences to make up the quantities preparatory to tendering on any given job. The risks involved in this part of the business are of two kinds: first, the loss of time devoted to unsuccessful tendering; and secondly, the chances of error in quantities or estimate of values. The total amount of time given by contractors as a body to the work of making up tenders is a very large item, and is one of the channels through which they may suffer continual loss without locating it definitely. That the greater part of the time given to tendering is a direct loss, we think should be perfectly clear to every contractor. Any business man's time has a value for every hour, and if given to work from which there is no return, that value is lost. To illustrate: suppose a contractor who has no business on hand puts in a whole year of solid work in tendering without success in any case if that contractor could have earned any wages in any other way during that time, by just so much has he suffered in actual money loss. The case is not altered by the fact that the contractor may be in a position to stand the loss or that he may have a large business on hand. Some part of that business will be carried on at a greater expense for lack of his personal time and attention. The other risk mentioned, that of liability to error, is one that should not be overlooked. It is hardly necessary to mention how it often happens that a contract is secured by some blunder of omission, and the contractor compelled to do the work at a loss, or perhaps to throw up the job and forfeit a deposit. It also happens that contracts are lost through error of getting figures too high. This is better than to err on the other side, but it is nevertheless far from satisfactory. These difficulties cannot altogether be overcome, but every available means should be employed to reduce them to a minimum. The contractor's business grows out of the demand for an agreed price for certain work, and prices cannot be given like a merchant's price for goods on the shelves, but require careful calculation in each case. No one is proof against making errors, but safeguards can be used which will afford protection from them. The different tenders for any work if carefully and intelligently prepared should not vary from each other more than ten per cent., but it is safe to say the difference is generally greater than this. A more general custom of having bills of quantities prepared by a professional surveyor —a method common in England but seldom used here—would be found of great value in bringing about more uniform tendering. By this means contractors would also effect a saving in

two ways—in the time necessary to make up a tender, and in the reduced possibility of error. Allowing that the cost of the surveyor's services be paid by the contractor there would still be for the latter economy in this system; and we believe that contractors who might feel themselves quite competent to make up their own estimates, survey and all, would find a reliable bill of quantities well worth its cost purely for the purpose of comparison with their own figures. Such a system is also helpful in preventing friction between architects and contractors. In some cases it would call for greater care and definiteness in specifying, and all such influences are beneficial to all parties to a contract. While architects would no doubt be pleased to see a reform in the direction indicated, it is not likely to be brought about unless the initiative is taken by the contractors.

TRADE COMMISSIONS TO ARCHITECTS.

An English architect sends to the Builder for publication a circular addressed to him by a firm of manufacturers of building materials, in which a commission is offered to him on such of the manufacturer's materials as he may specify for use in his practice. Exposure of similar methods has from time to time been made in the American architectural papers. Much has properly been said in reprobation of manufacturers and supply firms who seek to secure business on this plan. The British Architect, however, presents another aspect of the case when it says:

"If one asks why Brown, the stove grate man, offered Robinson, the architect, a commission on the sale of goods, one is tempted to think of the number of Joneses who must have given Brown some direct encouragement to believe all architects were equally susceptible of being approached in a similar manner. A black list of manufacturers who offer commission to architects might be a useful thing, but a similar list of architects who receive it might be a more effectual cure. Some architects don't take commission from manufacturers; they receive presents. They ought to be included in the list. If Jones receives 15 per cent. commission, and Smith accepts an umbrella or a chimney piece ornament, there is no difference in the quality of their offence. They both sell their independence for what, in the opinion of the manufacturer, it is worth. That apparently is not much. It is easy to put the manufacturer into the pillory for offering commission to architects. But there is no smoke without fire, and if all architects, or even the greater proportion of them had always promptly and decidedly rejected any temptation to receive commission from manufacturers, we have an idea the "custom" would practically be dead now. To the manufacturer, no doubt the practice appears to be but that adopted in the pushing of every business. That he would be glad enough to be quit of it goes without saying. It is an expensive and awkward procedure at the best of times. There can be nothing more fatal to honest building and good architectural results than the passing of commissions from manufacturer to architect. The architect loses his independence and self-respect as a professional man, and the manufacturer comes to depend more upon the offering of percentages than the quality of his goods for the extension of his business. But whilst it is impossible too strongly to condemn the system, let it not be forgotten that there are two sides to the question and that it takes two to complete the transaction. Those who receive commission are as much to blame as those who offer it. Are the manufacturers wholly to blame? We think not. But it would need a great deal of courage and independence on the part of any firm of manufacturers to attempt to prove the contrary. A list of offending architects would be quite as interesting reading as that of offending manufacturers."

There is unquestionably ground for this view of the subject. Some Canadian architects are not held to be above suspicion in the matter of accepting bribes. For example, a cement dealer who recently sent samples of his material and circulars to an architect in an Ontario city received in reply a letter from the architect in which he stated that he wished to lay a concrete floor in his cellar, and requesting the dealer to send him enough cement for the purpose. Here was a plain intimation from an architect that he was open to a bribe. In the light of such invitations to wrong doing, it is not to be wondered at that the honest architect finds himself approached with offers of commission and undue influence in other forms. Such practices are highly demoralizing to all concerned, and the influence of architects, manufacturers and dealers of integrity should be exerted in an endeavor to stamp them out.

The builders of London, Ont., held a very enjoyable picnic at Port Stanley a few days ago. A baseball match, a tug of war, and a baby show were among the prominent features on the programme.

COMPETITIONS.

The Ministry of Public Works, Cairo, invite competitive designs until March 1st, 1895, for the new Ghizeh Museum to be erected in that city at the estimated cost of £123,000. The first premium will be £630, and £420 will be divided among the four architects whose designs are placed next in order of merit. Some of our Canadian architects, whose fancy has been running in the direction of Egyptian architecture, should stand a good chance in this competition.

We are informed that no decision has yet been reached in the competition for designs for a public library building at London, Ont. It is reported to be the intention of the Library Board to appoint Mr. O. A. Graydon, City Engineer, to be the judge of the merits of the designs submitted, and to make the selection of the most suitable plan. At last accounts, however, the plans had not been placed in Mr. Graydon's hands.

ILLUSTRATIONS.

MISSION CHURCH, BRANTFORD, ONT. E. SWALES, SHEFFIELD AND DONCASTER, ENG., AND H. ETCHES, M.I.M.E., (LOND.) BRANTFORD, ONT., ARCHITECTS.

This church is designed to seat 204 persons. The foundation and outside walls are of brick faced with rough dressed stone, with half timber work above. The roof is boarded to purlins in narrow widths, jointed, covered with felt and shingles, with red ridge cresting. The total width of interior is 25 feet, total length, 70 feet. The interior is divided up into five bays with six frame principals.

DESIGN FOR PROPOSED STATE CAPITOL AT OLYMPIA, WASHINGTON TERRITORY.—R. MACKAY FRIPP, F.R.I.B.A. ARCHITECT, VANCOUVER, B. C.

THE ROUND CHURCH OF ST. SEPULCHRE'S, CAMBRIDGE, ENGLAND. FROM SKETCHES BY ANDREW T. TAYLOR, F.R.I.B.A., MONTREAL.

SMALL HOTEL AT VANCOUVER, B. C. R. MACKAY FRIPP, F.R.I.B.A., ARCHITECT.

TORONTO BUILDERS' EXCHANGE.

MEMBERS of the Toronto Builders' Exchange, their families and friends, numbering about 150 persons, enjoyed a pleasant days' outing at Wilson Park, N. Y., on July 27th, the occasion being the annual excursion and picnic of the Exchange. The comfortable steamer Garden City carried the company to and from the picnic grounds. The weather though very warm was bright and clear, and when tempered by the lake breezes and the shade of the grove was thoroughly enjoyable.

The excellent music discoursed by the string band which had been engaged to accompany the excursion added not a little to the pleasure of the trip.

Three or four hours were pleasantly passed at the park in boating, bathing, games for the children, etc. Nor must we omit mention of one of the most exciting events of the day, viz. the annual base-ball match between nines representing the Builders and Supply Merchants. The rival teams were composed as follows:

Builders—T. Cannnon, Jr. (Capt.), J. Crang, H. Lucas, Wm. Saulter, John Hanrahan, J. Murphy, —— Bedford, J. Thomson, J. Little.

Supply Merchants—John Maloney (Capt.), W. Whillans, A. Dickey, Isaac Price, G. Oakley, J. Oakley, J. Donovan, M. Ryan, T. Rattledge.

Umpire—T. Stewart.

The game was watched with much interest by the friends of the players, and every exhibition of good play was enthusiastically applauded. Nor were such exhibitions few and far between, as might be supposed, seeing that many of the players only enter the field once a year.

At the close of the game the score stood—Supply Merchants, 9; Builders, 8.

The company bade farewell to the park at 5 p.m. and shortly after 8 o'clock were safely landed at the Yonge street dock.

For the success which attended the event, credit is largely due to the following gentlemen who composed the committee of management: William Forbes, Chairman; Thomas Cannon, John Aldrich, David Williams, Isaac Price, William Booth, John Barnard, Thos. Murray, Geo. Oakley, Henry Martin, Frederic Bayliss, James Craig, John Murphy, Benjamin Brick, William Park, Wm. Whillans, John Phillips.

It is hoped that this annual excursion and picnic of members and friends of the Exchange will be maintained and become increasingly popular.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The authorities of St. James Cathedral have commissioned Mr. Vincent, a local sculptor, to proceed to Rome and study carefully Bernoria's famous canopy in the Basilica of St. Peter, in order that he may be able to reproduce a perfect copy for the cathedral here. This copy will measure 43 feet in height and will be embossed in bronze.

It is to be hoped that the exhibition of improved fire appliances in connection with the recent meeting of Fire Chiefs in this city was an object lesson which will not be lost upon our city authorities. The fire loss in Montreal in recent years has been abnormal and has necessitated the payment of high rates of insurance.

The students examinations of the Province of Quebec Association of Architects which were announced to take place in July, have been postponed until January with the consent of the candidates, who are few in number. The January examinations will take place in Quebec.

MASTER PLUMBERS' ASSOCIATION.

The committee of the Master Plumbers' Association appointed for the purpose of preparing a constitution and by-laws for the Association have completed their task, and at a general meeting of the craft held on Aug. 3rd, the constitution and by-laws were discussed and adopted. The meeting adjourned until Thursday, August 9th, for the election of officers. At a meeting held on that date the following officers were elected:

Executive Board—J. Lamarche, President; John Date, 1st Vice-President; Alphonse Champagne, 2nd Vice-President; Henry Padden, 3rd Vice-President; W. M. Briggs, Secretary; Joseph Gibeau, French Corresponding Secretary; J. W. Hughes, English Corresponding Secretary; P. Leclerc, Jr., Financial Secretary; W. A. Stephenson, Treasurer.

Sanitary Committee—J. W. Hughes, Chairman; John Date, Jas. Mattinson, A. Sigouin, J. C. Jactol.

Audit Committee—J. Watson, Chairman; P. Desforges, T. Jacotel.

Arbitration Committee—P. Carroll, Chairman; A. Demers, George Von, Geo. Rosser, H. Bailey.

Apprenticeship Committee—W. Britton, Chairman; E. C. Mount, A. Cardinal, J. Sadler, A. Blais.

Legislative Committee—F. Brunet, Chairman; D. Gordon, D. Ouimet, J. Burns, P. Leclerc, Jr.

General meetings of the members of the Association will be held on the 1st and 3rd Thursday of each month at St. Joseph's hall, corner of St. Catherine and St. Elizabeth streets.

LEGAL.

Messrs. Brown & Love have entered suit against Mr. E. J. Lennox, architect for the new city and county buildings at Toronto, to recover the amount of a cheque for $7,000 which they they deposited with their tender for the completion of the building. Messrs. Brown & Love's tender was accepted and they entered upon the work, but subsequently withdrew because, as they allege, they were unable to continue owing to the litigation in which the works were involved. The architect claims that by withdrawing from the work the plaintiffs forfeited their deposit. He will therefore retain possession of the money until instructed by the courts what disposal should be made of it.

Application is made for incorporation by the Crown Pressed Brick Company, of Ottawa, with a capital of $100,000.

STUDENTS' DEPARTMENT.

USEFUL HINTS.

Moorish fretwork is becoming more a favourite than ever. It is used most successfully when varnished, but not painted. Paint destroys to some extent the sharpness of the outlines.

A good egg-shell polish for fancy woods may be made by dissolving together in 40 parts of alcohol the following:—Three parts of shellac, 1 part of gum mastic and one part of sandarac gum. The polish may be applied with a brush or cloth.

When it is desired to paint ironwork in exact imitation of stone, let the last coat of paint be very thick and be applied quite freely. After it has commenced to dry dust on sandstone crushed and reduced to powder. If the paint is of the same colour as the stone the imitation will be a very natural one.

MOUNTING PHOTOGRAPHS.—Starch dissolved in water is a good material for fixing mounts to photographs, and not so liable to discolour the photo afterwards. To fix them, have two pieces of plate glass, or any other kind of material similar, place the mount on one, and having smeared the photo with the prepared starch, place it in its proper place, then put a sheet of blotting paper and the other plate of glass, &c., and a sufficient weight to press the photo perfectly to the mount. Let it remain a few hours, and then remove the glass, &c.

A ceiling that is coming to be very popular for cafes and restaurants, and some of those drug stores that depend largely on their soda fountains for their revenue, is made of square glass panels, separated by narrow wooden moldings, the back of the glass being marbleized by some such process as that used in marbelizing slate for mantles, while occasional panels are filled with decorative designs. The effect is very similar to Mexican onyx or polished marble, and is specially adapted for all such purposes. Narrow brass bead moldings would look particularly well to separate the panels, though they would be somewhat expensive.—Painting and Decorating.

THE USE OF TIMBER.—To obtain the greatest strength in timber beams, joists, rafters, and breastsummers, the depth must greatly exceed the width—the greatest strength opposed to the greatest strain. A joist 6 by 3 will bear twice as much if put edgewise as it would if laid flat. If the weight to be supported be in proportion to the length, then, the width remaining the same, the square of the depth divided by the square of the length ought to be the same also—i. e., the depth of a joist ought to be in direct proportion to the length, and for stiffness the width proportionate to the depth. Where the question is of a piece of timber supporting itself, the weight is as the length multiplied by the depth, and we must multiply this again by the length for a divisor. A rod of fir 1 in. square, or a plank 10in. by 1 in. laid flatwise, would keep quite straight with a bearing of 5 ft. A piece of timber 10 in. square would swag very much with a bearing of 50 ft.

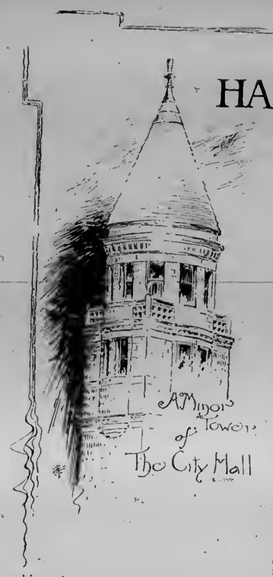
PAINTING IRONWORK.—At a meeting of the Association of Engineers of Virginia, Mr. S. Wallis dealt with the painting of ironwork. He recommended that the first coat should be red lead ground in raw linseed oil, used within two or three weeks after mixing, and kept thoroughly mixed when in use. This coat would dry in from twenty four to thirty hours. For a black finish the next two coats should be made up from a paste composed of sixty five per cent. of pigment and 35 per cent. of raw oil. The pigment should consist of sixty-five per cent. of sulphate of lime and thirty per cent. of lamp black, to which should be added five per cent. of red lead as a drier, the whole thinned to a proper consistency with pure boiled oil. For a red or brown finish the paste should contain seventy-five per cent. of pigment and twenty-five per cent. of pure raw oil. The pigment in this case would consist of fifty per cent. of sulphate of lime, forty per cent. lime carbonate as a drier. Lead paints were not recommended for finishing coats on account of chalking, nor zinc paints on account of cracking.

INTERCOMMUNICATION COLUMN.

This column is intended to afford a means of correspondence for students, builders and all our readers desiring information they cannot otherwise obtain. Questions for which an immediate reply is required should be marked "Urgent." Names and addresses of correspondents must be sent with their communications, but these may be signed with initials or otherwise for publication.

"Quiz" writes: Can you give me a satisfactory method of measuring chimney shafts?

ANSWER.—Take them as solid, work them out cube, and reduce it to superficial 6in. work, and then allow a certain amount for parquetting, in which case, you must use your judgment. To measure brickwork reduce the superficial measurements of 18in. to a standard thickness—i. e., 9in.—deduct all openings, and allow a certain amount for bedding window frames, &c. The angles of brickwork are not as a rule charged any extra, this coming in the price for 9in. work. Reduced moulded brick jambs are measured lineal, and arches are given in quantity at so much each; of course, price depending on what kind of arches they are. Eave courses are measured lineal.



HAMILTON

THE competition for designs for a House of Refuge has been decided by a vote of the aldermen in favor of Mr. Barber, who has recently joined the ranks of local architects in this city. I learn that in this competition there were eight or ten competitors. There were no well-defined rules for the guidance of competitors, and no person with any knowledge of architecture was called in to assist the Council in deciding on the merits of the designs submitted. There is dissatisfaction, of course, as under such circumstances it was a foregone conclusion there would be. Unless architects show their esprit de corps, and unitedly refuse to take part in competitions which are improperly planned, they must expect to suffer disappointment and injustice. As to the merits of the accepted design I have nothing to say, except that the architect has been so hurried for the purpose of getting the work ready for tender, that it is impossible that he can have been able to do any deliberate thinking on his design. The cost of the building will be in the neighborhood of $17,000.

Mr. Mills, a local architect, is seeking to recover by legal process from the Hamilton, Grimsby and Beamsville Electric Railway Co., the sum of $100 for sketch plans for a power house. The defence contend that the plaintiff's claim is excessive. The judge has the matter under consideration.

THE MARITIME PROVINCES.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The Chignecto ship railroad is again exciting considerable interest. Persons who were favorable to the scheme are more anxious than ever that the railway should be completed. They point out that the completion of the work will prove a great and lasting benefit to intercolonial trade and transportation, that the shipping of the Gulf of St. Lawrence country would be greatly developed by such a road, and that the work of all maritime shippers would be greatly facilitated. On the other hand there are those who are opposed to the scheme on the ground that it involves a foolish expenditure of thousands of dollars, and that no adequate commercial advantages could be derived from its construction.

A short history of this great undertaking will no doubt prove interesting to the readers of the ARCHITECT AND BUILDER. This railway was designed as a substitute for the Bay Verte Canal to unite the waters of the Gulf of St. Lawrence with those of the Bay of Fundy. The canal has been agitated ever since the early settlement of the country, and, after a voluminous amount of evidence had been taken, was favorably reported upon by the canal commission. The cost was estimated at from $7,000,000 to $14,000,000, according to the design. The work was actually put up to tender by the government, but was postponed, owing to a proposed change of route. After a great deal of talk and correspondence the canal scheme was abandoned, and a few years later a ship railway was proposed as a private speculation, to be assisted, if successful, by a government subsidy for a term of years. English capitalists were induced to consider the scheme. They were favorably impressed with it, and in 1882 an act of incorporation was obtained.

Sir John A. Macdonald gave a good deal of study to the project, and he finally became an enthusiastic supporter of it. He made a personal canvas of public men, and it was largely on account of his influence that the government voted $170,000 to the company to be paid, commencing one year after the completion of the line, and ceasing if at any time it failed in operation. The company consisted of railway men and capitalists in England with Mr. Ketchum as engineer. The work was commenced in October, 1888, and continued vigorously until July, 1892, when the contractors were obliged to suspend work owing to their connection with Argentia, the financial collapse of the Baring Bros. having shattered their resources. At that time the company had expended $3,000,000 in the work. It is now more than half completed. Nearly all the rails have been laid. Work on the dock at the Amherst end of the line is well advanced. The massive stone masonry has been very substantially constructed. A great deal of work has also been done at the Lidnish end of the road. The company calculate that $1,500,000 will complete the job. The money has been subscribed, but the subsidy act has expired and the government has been asked to renew it. It seems to be demurring slightly just now, but persons who are in a position to give a pretty correct idea about this matter say the extension will be granted. It is pointed out that in view of the fact that the company has expended some $3,000,000 in the work, and the government has expended nothing, and has therefore suffered no loss by the delay, the country has in no way received any damage by it, and therefore not to grant the company an extension of time, would, to say the least, be unjust on the part of the Dominion Government, when it is considered that the suspension of the work was in no way due to carelessness of the company, but altogether to a circumstance over which they had no control.

Mr. Ketchum estimates that of the gulf and bay ports, 600,000 tons of freight would pass over the railway the first year. The traffic would be between Upper Canada and the Gulf ports on the one hand, and the Bay ports, the Atlantic ports of the United States, and the ports of the West Indies on the other hand. The agricultural and fish products of Prince Edward Island, the coal and iron ores of Pictou, and the small lumber of the north shore would be carried to American markets over this road. From the western provinces would come flour, meal, grain, meats, hides, &c., to St. John, there to be exchanged for southern products and other merchandise. In the way of return trade there would be sugar, molasses, cotton, coffee and other southern products from the West Indies and from South America. Coal from the Cumberland and Joggins, Nova Scotia, mines for the west would also be carried.

A. H. McC.

REMARKS ON ESTIMATING.

THE first thing a young builder should do before commencing to make an estimate will be to provide himself with a list of items requiring to be done on the proposed work, and the styles, qualities and amounts of materials of all sorts necessary to complete the work. Having them on his memoranda, and a goodly supply of catalogues and price lists within reach, he may then commence work at once.

Excavating for foundations will be the first thing to consider, and in order to get at the cost of the work closely, he should know the character of the ground, whether clay, gravel, sand or other material; then he must know what it must cost per yard to remove this, and where the surplus is to be dumped. Drains will next require his attention: the number of feet, size and style of drain, cost per foot laid in place and covered, including all traps, joints, angles and connections. A survey of the site—which the estimator may make himself—will give a correct idea of the grades and the amount of digging to be done, which should be accurately measured and charged up.

Next comes the stonework, including the preparations for the footing, which may be piling, concrete, or simply rammed. In either case, the time and material must be considered and provided for. Cost of footings and putting in place should be a separate item. The stone walls follow, including all dwarf walls, buttresses, piers and separate foundations for chimneys, fire places, etc. Remember, in stonework, the mason measures the outside girth, which gives him the benefit of one thickness of wall at each angle. Provide for damp course between stone and brick, which may be of slate, lead or asphalt, as the specification may direct. Do not overlook relieving arches over all openings, both in stone and brickwork, as they require more time to construct than the ordinary wall. Openings in rubble stone work should be charged up solid, as cutting and waste costs as much as though the wall had no break in it. One cord of stone, of 128 feet, will measure in the wall scant 100 feet. It is better always to allow 96 feet of wall for every cord of stone: this of course means 96 square feet. Worked stone measures the same in wall as on the ground.

The foregoing merely gives an outline of the course to be taken by the estimator. Commencing with the excavating, he should continue until every item required to complete the structure in every particular has been provided for; bearing in mind all the time, that the smallest thing about a building costs money, and if he should overlook any item, by a loose system of estimating, he will find at the close of the work, that his profits will be cut down in proportion, as the architect or proprietor will justly demand that the overlooked items be furnished at the contractor's cost. It will not do to lump the small items, as is frequently done by unsuccessful or careless estimators, for the lump sum may be greatly in excess of actual cost and fair profit, and may cause the estimate to be too high, or it may be too low, thus causing a serious loss.

The successful estimator generally has on his desk, when figuring on a piece of work, what is technically called a "tickler." This may be a small book, or it may be a series of cards, on which are written all the varieties of labor, skilled and otherwise, required upon any style of building, with prices by day or by piece work, when such is available. Also the prices of materials of all sorts and sizes, including lumber in all states, stone, brick, hardware, glass, plumbers' goods, roofing, paints, oils, &c., &c. Having a list of this kind before him, with prices attached, the estimator will not be likely to overlook any item in the proposed building he may figure on.

The items in the "tickler" should commence with: Laying out the ground for foundation; digging drains; excavating for cellar and foundation: drain tiles or pipes, foundations, walls; then all the items required for this work, including concrete and cement for cellar floors, or brick paving, if such is used. The superstructure should follow, with windows, doors, floors, furring, partitions, stucco-work and plastering, &c., and every particular in connection with the work. Then comes the carpenters' and joiners' work, including putting down floors, putting up trim, building stairs, hanging and trimming doors, putting in sashes, weights, pulleys, &c. Painters' and finishers' work follow, including all necessary materials and labor. Then follows heating, bell hanging, lighting, &c.

In a future paper I will submit a form of "tickler," which I think may be found useful to country builders when making estimates of work costing not more than $3000.

A. Z. Z.

The School Supply Co., of Berlin, Ont., are developing a talc mine near Sharbot Lake. The talc is manufactured into crayons for school purposes.

HOW TO STUDY DESIGN.*

Is it possible to design in harmony with the spirit we live in, or to distinguish between the archaeological and architectural beauty of ancient buildings? Why cannot we design buildings as an engineer designs an unsophisticated iron bridge without the result being hideously ugly? Will not the terrible buildings of the Victorian Gothic era with which our land is bespattered have in the eyes of succeeding generations the same beauty (is it architectural or archaeological?) that the crude Classic productions of the Jacobean and Queen Anne periods have in ours? and if so, why do we not see the beauty of our bad architecture? Are not we perhaps on the wrong tack altogether, and only manufacturing picturesque grottoes of ancient relics, while the genuine and characteristic architecture of our age is to be found in the works of engineers, mill and factory builders and gin-palace fitters? Are the congeries of Mediaeval and Classical oddments, whether in plan or detail, that compose our Domestic and Ecclesiastical architecture, really works of national art? Are not workhouses and hospitals or a Metropolitan Tabernacle or railway station interior nearer the mark? Do not architects, as far as their revived pedantries of Art are concerned, run a great risk of becoming mere exotics, useful perhaps in arranging the business of a building, but to the world at large as artists, idiotic in expression and utterance?

Can architecture as now practised by its professors continue to survive when the *debris* of the ages has been rummaged through and there is nothing new to revive—when the history of architecture has been learnt in vain, and the poor history-bred architect can no longer find fountains for prigging ready-made details from? Must we really come to the conclusion that clothes can only be made on old patterns, patches and defects included, and only artistic pictures painted of bygone times and not of our own? Is there not beauty or pathos, simplicity of wondrous complexity in our own extraordinary age, with its incessantly varying developments that the architect can reflect in the buildings that he designs for its accommodation? Cannot we hope that some seeds of true architecture may be sown in our work-a-day buildings that may develop into a detailed style possessing true beauty? Does the barren unphilosophical study of our present authorities assist us one whit, or even suggest to us the idea that our own age is the outcome of history, and that we should pursue its direction and learn its lessons of the motive of its soul rather than bark back again and again to the mere outer forms of nothing but bygone art "as if that soul were dead?" We may well ask ourselves the plain question, whether if the so-called history of architecture comprised in illustrated authorities, a list of which would be short and easily made, was laid as much aside by architects and their educators and examiners, as, say, the history of ornament is, though for no given reason—perhaps it is mere forgetfulness—we should be able to design at all? Imagine yourself, if you can, sitting down to design a church or a house in the country with the stipulation that you were not to revive any ancient style in your building, and does not the thought seem both absurd and painful? If so, take for your subjects either a factory, say for boot blacking or fancy soap, or a railway station block, in which it ought to be both absurd and painful to employ any ancient style, and see how you would be able to get along without the seemingly indispensable history. And yet if history teaches us anything as to the sources of life and motive in design, it shows that the Greeks had little or no history of architecture to draw upon and revive, and that the Goths, who probably knew little or nothing as to ancient Art, deliberately set aside the productions of their ancestors, even as types, and thought and acted for themselves alone. Can anyone say that the results do not justify their methods of study, and shall we be forced to accept as a conclusion that the less we have of the study of architectural history as at present conducted the better?

Let us return to our examples. The results of your efforts to design either a factory or a railway block would probably be satisfactory and negatively beautiful in proportion to your regretful resignation to the facts of the case, and to your own ignorance of the pictures in your own architectural history books, or, in other words, of what different people had done under differing circumstances elsewhere. What positive beauty your work possessed would consist in the manifestation of your skill in the choice, contrast and arrangement of materials, in the proportions of your building, in its balancing of voids and solids, its recessings, in its simplicity or variety of line, its unaffected expression of purpose and skilful adaptation to use. Every one of these qualities should be equally evident in the more monumental or domestic subjects, such as the church or country-house. The church having no obstructions to sight, and being perfect acoustically, and with the house rejoicing in pure plate-glass windows where necessary, with further qualities such as a perception of the poetry of scale, of rhythm in contrast or repetition of grouping and perspective, of mystery and distance, with fancy at work on the detail, applied perhaps unconventionally, but always where most effective in execution, and either emphasizing construction or decoratively masking it, suggesting intellectual composition as well as picturesque freedom, the harmonious arrangement of features as well as the application of free ornament and many other ideas in design, with play of light and shade, effects of lighting and schemes of color, all open to the student cut adrift from the modern school of architecture, and an interesting building having naturalness of purpose and real beauty is almost assured so long as each quality of use and fancy is exercised with reasonableness and decency. Some difficulty may occur to the mind as to the quality of ornament not cast in ancient moulds, but the same elements of beauty govern and compose ornamental detail as general architectural design, and there is ever open to the ornamentist the fountain of Nature, which, unlike ancient and traditional sources, is infinite as the sea. Let it not be supposed, however, that by ornament derived from Nature naturalistic ornament is meant as the forms of Nature copied in carvings or paintings. The material and the purpose of the ornament, and many other circumstances, must control the conventionality of its treatment. Remember that a world of art and design exists between the Parthenon frieze and the actual horses and men that Phidias saw around him, and that if intellectual discrimination is not used in the translation of form and matter, and design is not interposed between Nature and ornament, no beauty will be the result. But this is at present a digression apart from carvings and paintings. How about mouldings, capitals, cornices and purely architectural forms? Can these be designed except by ignoramuses, apart from style and precedent? Most certainly. In your blacking factory example you may only require a dignified and simple cornice of brick and stone to crown the wall, and though, from pure poverty of imagination and defective training, you may have no other resource than a doubly-debased Greek molding, there is the conceivable possibility of a simple contrasting arrangement of light, shade and elevation considered in relation only to the wants of your front, and also a possible combination of line in contour of curved and straight members, forming a harmonious whole that shall be satisfactory and yet original, furnishing evidence of independence of thought and perception of beauty to your professional critics. This may sound impracticable, and we expect to be told that ancient styles are the languages of the art of architecture, that their forms and details are its words, and that our fine imaginings without such words and diction are vain and utterly incapable of realization. That we must learn these languages as part of our education, and trust either to heredity or to fickle fortune to teach us what to say and how to say it. Learn your styles, master your Orders, copy them carefully, drum them into your memory for a senseless reproduction as mere forms, and you will be qualified to become a student of a dignified architectural school, and in addition if you cram up the mathematics of the proportional ratios, count the columns of the Parthenon and master a few pedantic technicalities from Gwilt's *Glossary of Terms*, you may pass the Art section of a qualifying examination. That the training adopted to this end has its uses cannot be denied, for all training is valuable, and as an introduction to the study of archaeology it may be definitely useful, though this is very far removed from the cultured dilettanteism in which it took its rise; but to the architectural student it is purely incidental, and as at present conducted, the study of the styles of antiquity is in no sense a qualification for the practice of modern architectural design.

We are living in an age distinguished above all others for its inventive genius—the prime essential of genuine architecture—for wealth, another essential to the practice of architecture. Having a profession of admiration for the arts—famed for municipal enterprise—an age, too, of unexampled peace and prosperity. But architects, instead of growing in public esteem as artists, are losing ground yearly; their works, instead of being characteristic of the whole spirit of the age, only illustrate their own personal fads and fancies and their love for the passing whims of the day. The whimsicalities of the gentler sex with regard to the latest fashion will not exceed in grotesque flightiness the eccentricities of the architects of the last few generations, as illustrated in their periodical fashion-plates of buildings, when they are reviewed, say, at the jubilee of the Architectural Association. To what esoteric impulse are the gyrations of the muse of architecture due, if not to the error of imagining that the past is the present, that ancient means modern, and that archaeology is architecture? What accountable idea underlies the continuous and futile reproduction of architectural antiquities in modern design? Why should a consistent and enlightened race such as English produce, through their architects, within a century, such anachronisms as the National Gallery and the Royal Courts of Justice, or public statues, either clothed in nothing but sheets without canopies or in full modern dress (gilded), covered by baldachinos, and surrounded by unprotected figures, mostly females, only ideally clad? What rational theory of architectural design, apart from archaeology, can reconcile the production of St. George's Hall, Liverpool, with the Houses of Parliament at Westminster? Will not posterity justly conclude upon abundant evidence that the Victorian architects were petty-spirited, out of sympathy with their environment, each bent on vindicating some absurd archaeological revival wholly unsuited to their buildings, and wasting their eloquence in incriminating the age which gave them birth as lacking faith, as Philistinic in spirit and cruel to all the arts, and in bewailing the hard fate that did not cause them to be born barbarians or feudal serfs? And yet our age cannot be said to have lacked men practising as architects, possessed of genius and talents of the highest value to architecture, with inventiveness, perception of beauty and form, of wide artistic sympathies, and of remarkable adaptability of style. The English architects of the various revivals have been men of eminent gifts and enthusiasm for their art, and probably without their equals among European nations. The Greek revival, based upon the work of Stuart and Revett, Wilkins, Cockerell and others, was no mere artistic fad; these men were profound archaeologists, and the combination of artistic instinct and antiquarian learning displayed in such works as the beautiful Hanover Chapel—doomed, shall we say, through the apathy of architects?—the entrance to Euston Station and University College, London, is worthy of unstinted admiration. There is a thoroughness of historical study manifest in these buildings that compels praise; in each case a lofty ideal conception has been attained, and a completeness of architectural feeling for every detail that betokens the earnest designer. Yet in each case the manifest powers of design possessed by the architect have been concentrated upon designing a Christian church as a Greek would have designed

*Paper read by Mr. A. Beresford Pite, A.R.I.B.A., before the Architectural Association, London, on November 10th, 1893.

a temple, an entrance to a station-yard that is but an enormous tribute of the art of architecture at the throne of the railway demon, and the sacrilege that for more than a generation was but a feeble outbuilding to a portico which was an approach to emptiness. In each instance the march of time and the progress of national life have branded the works on which the architects bestowed such earnest care as anachronisms.

The Gothic revival which raged in its turn after the Greek, and had an Italian rival as well as offshoots of its own to compete with, commenced, flourished, died, and is condemned upon the same archaeological ground as the Greek movement we have just described. The presence of rivals produced friction, and the contesting archaeologies each claimed antiquarian precedent only as their ultimate test of beauty. Is it not utterly illogical and ridiculous to reflect that the beauty or propriety of nineteenth-century architecture should be judged by the accident of birth to some detail either in the twelfth or thirteenth century of some corresponding epoch? Traces of this error can be still observed in architectural examination question papers. In ecclesiastical design the iron bondage and dead weight of antiquity was endured longest, but when the evident revolt came it was only to resort to foreign types for a while and then to some period of hitherto forbidden fruit at home. The absurdities of most of this work are manifest to us now, but it is only a very short time ago that tremendous efforts were made to combine incompatible elements, and to compel the nineteenth century to wear the cast-off clothing of its Mediaeval ancestors. But all dead men's clothes soon wear out and want replacing. What shall we say to the revivals of the use of indistinct glass in small pieces fastened together with lead straps, of rough rubble walls unplastered, of chilly paved halls, of wide-mouthed, open-throated chimney openings, of confining the influence of the fire-place to the ingle nook and numberless other barbarisms that have made us laughable to the world at large? And to what other lengths of imitative foolishness will not this historical method lead those who will blindly and unthinkingly follow? Apart from all questions of use or comfort, what beauty of form or of architectural idea is there in half the tricks of design and construction by which a modern building is made ancient in character. Put aside the fact that the Goths did so, we could give no reason, good or bad, for more than half of modern Gothic architectural design. The disposal of thicknesses in walls and buttresses, the scantlings of roof timbers and their framings, are governed by considerations which were good in days when walling was not paid for by the rod and timber was not purchased in scantlings at the Surrey docks. The fact is that English architects have been first bewitched with one beauty and then with another, and have finally endeavored to be in love with all the beauties at once; in losing their hearts they have lost their heads, and have lived in a Mediaeval dream of bliss while the nineteenth century marched on and left them farther and farther behind in what is really a morass of archaeology, out of which no path to real living architectural design can emerge.

As we endeavored, however, to give the modern Greek architects their due, those of the Gothic Renaissance must not be dealt with unfairly. We are to this day living under the romantic charms of their Mediaeval England, and it is doubtful whether we can fairly gauge the verdict of the future on recent work. Great perseverance and consistency, an exact thoroughness of observation, a quick perception of the artistic qualities of picturesqueness, local beauty and appropriateness; a widening sympathy, still at work, for all the crafts and arts connected with home and civic life that flourished alongside architecture in Mediaeval England; a general soundness and simplicity of construction equal to that of the Mediaeval master builders, characterize the work of the leaders among modern architects of the Gothic revival. These men have absorbed themselves entirely into the spirit of the past age, and have succeeded in attaining their ideal to live architecturally in the Middle Ages, and they can and do produce for us genuine works of Art in all branches that compel admiration. Take a country-house by a leading architect of the present day for an example; how picturesquely its rubble and half-timbered walls group themselves upon the hill, with what stern reserve the battlements crown the walls, and behind them at sufficient distance to allow of the passage of a cross-bow man rise the quaintly waving tile roofs. How the tower crowns the landscape, with what a sense of protection the high courtyard walls enclose the entrance. What broad unwindowed surfaces of wall seem to defy the missiles of pre-explosive warfare. The mullioned and latticed windows, the timber framings, the stone jointing, the ancient leaden conduits, the very grin of the gargoyles all bespeak the thoroughness and perfection of the Mediaevalism, which only consummate talent could realize for us in this un-Mediaeval age. How thoroughly the artist has grasped his problem, too. Side by side with the architectural consistency one is conscious of a subtle artistic charm that seems to catch and secure effects in the modern building that the hand of time alone effected in the old prototype. The harmony of color given only by age is sought for, the rapidly weathering tiles, the dark-toned bricks, the fumigated timbers, the colored pargetting all are carefully considered and deliberately carried out to fix the Mediaeval impression upon the mind and emphasize the doctrine that nought but what is old can be beautiful in this grossly unartistic age. The internal arrangements are even equally Mediaeval. With the homely charm of an ancient grange is combined the charm of a modern house, but the essence of the charm is its antiquity. Hence, the quaint crookedness of plan that produces picturesque passages, the variety of levels, the deep window recessings, the great hall, the beamed ceilings, the panelled linings, and numberless artistic methods of carrying the mind back to the times before this Rip Van Winkle of architecture either went to sleep or was born. The result is indisputably charming. It is artistic archaeology tempered with civilization; the dish itself, as well as its trimmings, is Mediaeval; it does everything that is possible to put the hands of the clock back three or four centuries, but it is not modern architecture.

In ecclesiastical buildings we have similar results. The hapless chances of ancient church history and building are reproduced with skill and patience. The acme of modern ecclesiastical art consists in the perfect realization of what a beautiful fourteenth or fifteenth century church would have been, and as before, the laborious and earnest efforts of the artist had succeeded in a short span of life in running the gamut of the centuries and in reproducing in effect and feeling the presentment of the departed spirit of Mediaeval Art. In fact, often no higher praise is required than that the purity, beauty and other qualities of ancient Art are to be found in their present day counterfeit. We have a definite Renaissance of Mediaeval Art; our cathedral work. Our churches, large and small, and our colleges, are the productions of a living school of artistic architects for whom, with their domestic brethren, we cannot but feel the warmest affection and enthusiastic admiration, but they are exotics, they are contemporaries of Wykehamist William, of Harry the Eighth with his palace of Nonsuch, of Spencer and his Faerie Queen. They sing with Shakespeare:—

> Tell me where is fancy bred,
> Or in the heart, or in the head?
> How begot, how nourished?
> Reply, reply.
>
> It is engendered in the eyes,
> With gazing fed; and fancy dies
> In the cradle where it lies.
> Let us all ring fancy's knell;
> I'll begin it—Ding, dong, bell.

and they consistently suit the action to the word and bury true architectural fancy in a grave centuries deep.

We will not stop to discuss whether Queen Anne is dead or not, though she is evidently a guiding star still to the thirsty revivalist who, with faithful discrimination forsakes, with the progress of civilization, such barbarities as metal casements for the newly invented double-hung sash, and welcomes a small increase in the size of manufactured glass that enables him to employ wooden bars of moderate sect on instead of small lead straps. What would her deceased Majesty have given, or that great architect Sir Christopher Wren either, who preceded her, for such beautiful sheets of plate glass as now adorn our shop fronts? Oh, Revivalist, learn to follow the progressive movement of real Art, and become a designer in architecture instead of a mere dealer in her artistic antiquities. We must proceed to draw our conclusions. We are not able to complain of real lack of architectural opportunity, and there is no want of architectural genius and capacity. Our architects are, however, devoted to a more or less stupid archaeology, and therefore have ceased in any effective way to be artists for the age. Why should not this be remedied? Cannot we set ourselves, instead of against the stream of time and progress, with it? Why should not the requirements, methods and opportunities of the men of our own time be studied, and our minds trained to fix themselves upon the universal characteristics of living Art instead of upon its past impressions only? As there is no true Art in representing a laboring man, rough hewn and coarse perhaps, but perfectly beautiful in degree, at his rugged work, as wearing fine clothes or a mask of Apollo, so let a warehouse front represent a warehouse, a railway station appear to be what it is, and as a station only; and let this sensibleness and a simple beauty take the place of the hopeless affectations of domestic design, and we may yet begin to earn back again the wages of public esteem and confidence that we have forfeited by our archaeological heresies. Have you ever discovered that the true beauty of architecture is to do thoroughly and manifestly what it is intended to do, whether to be ornamental, comfortable, monumental or useful, as the case may require? For instance, what a solid impressiveness and grandeur there is about the vast supports and trabeated construction of the entrance of the Great Eastern Railway line into London, between Bethnal Green and Bishopsgate. This singular work of engineering is most architectural, and has stern and earnest beauty of character. Similar effects can be often, if not always, found where constructors have to make great effort to cope with difficulties, and some of the brick-and-girder engineering of the Metropolitan Railway is of this class, and has present in it, and manifestly so, most of the elements of sound architecture, and will without any doubt be regarded by the broad verdict of the future as some of the most characteristic buildings of our day. Why should architects segregate themselves, as if afflicted with an ancient leprosy, from the life of the city and world of to-day? Why should they leave all that is simple and direct in architecture to engineers, and lose their right to even the barren title of architect? Has not the Forth Bridge a piquant power of form and a real, if not ideal, beauty, without the assistance of what you and I call architecture? And does it not compare lamentably with the Tower Bridge, which, unless some undreamt-of convulsion happens, will for many generations be a monument of architectural failure, of great effort made to impart so-called Art and architecture that left to itself would have been much more natural? Also, in other directions, why are characteristic buildings of the age, such as the Crystal Palace and the Albert Hall, eminently works of architecture though not of architects? And, one must add, is not the block of Science Schools at Kensington, so impressive in mass and form and so thorough and beautiful in detail and decoration, the work of an architectural amateur, and does it not assert its dignity successfully amidst all its modern professional rivals?

Is it not time that we considered and reconsidered our methods until we find ourselves facing the problems of our practice, not as champions of a past style and dead art, but as equipped artists who facilitate the advance of architecture by meeting heartily the spirit of the age, in order to adapt her materials to their best uses, to accept her requirements for their greater usefulness, and to suitably and expressively ornament where required? To

discover the true beauty there is in all building truly and simply done, and to emphasize it, to proportion it, to mould it for the true enjoyment of all. To throw aside the trickeries of paper design, and to realize that such trifles as the small panes of glass of which we have spoken, with many others that are—foolish though it seems to say it—so indispensable to the modern architect, are quite unworthy of ourselves. Let us see that, shorn of a fictitious archæological interest, our buildings may be beautiful in themselves, as characteristic products of our high civilization. Be natural, as all the great architects have been before you. Learn by the true historical method the motive and spirit of past Art. See if the Greeks, who built a beautiful monument as a temple to Athene, together with the ecclesiastical and military engineers who erected the cathedrals and battlements of the Middle Ages, were not as far removed from you in the way they set about their work as possible. Was not their architecture the pure product of their age? and should not yours be so, too, in spite of that haunting fear of ugliness—indefinite enough for any bogey—which will cease to trouble you when once conscious that you have succeeded in doing simple and beautifully serviceable construction, adjusted and controlled by your trained artistic instinct?

The growth and practice of the great Renaissance of Art in the sixteenth century will bear the closest examination in the service of modern architecture. The motive of its artists is equally good, though widely different; but do not imagine that it was a mere revivalism of archæology. No restoration of ancient buildings was attempted; a genuine and wealthy architectural genius fed on the beauties of past ages, only to develop itself in the most wonderfully modern achievements, not only of construction and arrangement, but of detail and of all accessory art. Michel Angelo, in Rome, with the Baths of Caracalla and the Pantheon before him, conceived and constructed St. Peter's, and the true historical method of study that discerns how and with what ends he did it will take the idea and motive as its guide to like results. The study of the design, or rather designing, of any one great building at home or abroad is the most fruitful source of profit to the architectural student. The history of the idea of St. Peter's for instance, as it gradually grew from the work of Rosselina and Alberti to that of Bramante, San Gallo, Raphael and Peruzzi, before Angelo commenced his enormously grand and complete conception, is most inspiring and instructive, and of infinitely greater use than a complete calendar of every architect that ever was known, with dates and nicknames. This example of a great architect's power can be studied alongside with the expression of the same ideas of breadth and power of form in his sculptures and paintings, and in fact there is a whole education in the universality of artistic expression in such a historical study of principles. St. Paul's, London, is a similar example as we happily have the whole scheme from start to finish to study. Observe the way in which Wren grasped his problems, and grasp your own little ones with similar firmness, courage and breadth of idea. Take even more ancient buildings. Try St. Mark's, Venice, or an English cathedral and consider the alterations and additions, not as if executed in a delirium of irresponsible building fever, but as having a definite architectural purpose and idea in view. Why were these domes added? is a more important question than who added them. Why was this old front extended beyond all the limits of the buildings behind it? is a more important question than who did it, and did he know that it was a sham? Let us suggest to eminent examiners that the question, why is the Parthenon beautiful? is a much more vital one than in what technical terminology pedants would describe it, or how many columns compose the portico, and other like trivialities.

Until we seek to study the reason why things are beautiful, we shall never know how to design. Some naturally may have an intuitive perception that is denied to others, but for all that the beautiful is but the revelation of unseen truths, and when revealed by this perceptive faculty the lessons of the beautiful are manifest for all. The teachings of the ages are in the effects that their works produce upon our minds, and it is little short of absolute folly to confine the training of architects in design to exposition of the mere forms of the language of architecture and deny them insight into the meaning of the words used. Each stone, each plan embodies an idea that gave it existence at the hands of its constructor. Let us, as we have never done yet, seek to read this out of the stones, and enlarge our appreciation of beauty and the possibilities of the art of design accordingly.

FOREGIN ORNAMENTAL PLASTERING.

Although in England there may occasionally be seen some very handsome ornamental plaster work (principally executed during the last century by the Brothers Adam on the lines of Italian artists), it is not at home that we are to look for the higher examples of what may be done in ornamental plastering. Such work is mostly confined to ceiling spaces with us, and seldom found on walls, while, from India on the one hand to Peru on the other, we find it freely so used in other lands. It is, however, to Spain, whilst the Peninsula was under the rule of the Saracens, that we must look to see the grandest developments of what plaster is capable of. That fairy dream of architecture, the palace fortress of the Alhambra in Granada, built by the Moorish caliphs who ruled in that portion of Spain, has its ceilings and walls covered with decorative plaster work far excelling in beauty aught that Italian or Englishman ever dreamed of executing.

An American traveller, writing in the pages of a contemporary, speaks enthusastically of the "fanciful and light relievos which everywhere cover the wainscques Alhambra, and which, changing under the glance, like to the terns of a kaleidoscope, lend their peculiar power to charm fascinate the eye of the beholder. Like the little stories with each other in the tales of the 'Arabian Nights,' the figures are made up of repeated repetitions, so to speak, and yet, by their suggestive complexity, are ever new and never become wearisome. To the uninitiated the delicate intricacies of the arabesques covering the walls of the Alhambra appear to have been worked out by hand with minute and painstaking patience. Especially is this true of the domed ceilings, which, with their pendants and stalactites, present patterns of labyrinthine and bewildering complexity. When, however, it becomes apparent that all this is stucco work, our astonishment ceases, although our admiration for the design remains undiminished. The patterns are made in plates of plaster of paris, cast in moulds, and, being skilfully joined, form patterns of varied form and size.

"This style of diapering walls with arabesques, and stuccoing the vaults with grotto work, came originally from Damascus, but received its highest development and most pleasing imagery from the warm-blooded Moors of Spain.

"The process employed was simple. Preparatory to applying the decoration, the naked walls were divided by lines at right angles, such as artists employ in producing pictures. A series of intersecting segments of circles were then drawn over these, and by their aid the artist could work with quickness and surety. The great instrument of the Moorish artists was the compass, which, however, was not made in the usual way of two limbs of metal joined. It was a fixed measure, tied by a string, so that for each dimension there was a separate compass.

"Much of the glorious effect of the Saracenic decorations, however, depended on chromatic effect and these Moorish decorators were good colourists.

"Gilt was very freely applied on the stucco, especially on the vaults and cupolas. Brilliant and delicate colors, such as lapis-lazuli and vermillion, were used in the interstices, being applied with the white of egg. The primitive colours prevail in the Alhambra, wherever the artist has been Moorish or Arabian.

"The Hall of the Abencerrages is in the form of a perfect square, and the walls are ornamented with arabesques of the most elegant and intricate designs. The colors still retain their brilliancy, and the delicate beauty of the filagree remains unmarred after the lapse of more than 500 years.

"The Hall of the Two Sisters—so named by reason of two immense marble slabs forming part of its pavement is exceedingly beautiful. Stalactite roof is said to consist of 5,000, and though all this plaster ornamentation is supported only by reeds, it still remains well-nigh as perfect as when first placed there."

Turning now to quite another quarter of the globe, and one far distant from that of which we have just been speaking, let us glance at some extremely interesting specimens of ancient plaster work still to be found in Peru, in South America. As most people are aware, the Spanish Conquistadores, under Pizarro, Amalgeo, and others, found the natives of that country possessed of a civilization which mounted back to hoar antiquity. But Spain conquered and enslaved these Peruvians, and destroyed their temples and cities.

Quite recently (in 1862) Dr. Le Plongeon went to Peru, under the auspices of the California Academy of Sciences, to study the antiquities of the land, and he has explored a number of the ruins of early Peruvian houses and cities. His researches conclusively established the fact that these Indians were masters of concrete building and plastering. At Chimu Coucha he found the remains of some ancient ornamental stucco on the adobe (or clay-built) walls covered with bassi-relievi (low relief) decorative designs. Of course they are not equal to the marvellous Saracenic plaster at the Alhambra, of which we have spoken. Nevertheless, the designs are extremely good, and the material and the execution are both of high merit—in fact, it is impossible to restrain our wonder that a people ordinarily held to be but little better than savages could have conceived ornamentation so æsthetic and executed it with such high technical ability.

Space fails us to speak of work of a somewhat similar character executed by primitive races in India and elsewhere, while to treat of the production of Italian and other European craftsmen does not enter into our purview.

TREATMENT OF COLORS IN DIFFERENT LIGHTS*

A very essential feature, and a subject worthy of more study than is usually accorded it, is the treatment of light and shade in decorative art. I do not think there is a master painter who has not frequently been confronted by some very strange and inartistic ideas of his customers. In some cases by practical advice and illustration, these ideas may be modified and possibly result in a creditable job to customer and decorator. In the selection of wall hangings the goods are placed generally where a strong light prevails. This may be very well in some cases, but how often is it we hear that the paper looks better in the piece than on the wall! What is the reason? Is it the pattern? No! The customer has not considered the light in the room. The same defect may occur once in a while to the decorator. For example, a room may appear to be very light when devoid of curtains, shades, furniture, etc., and in this condition the work may indeed look very satisfactory when completed. But when the room is furnished, it lacks one thing—decision. What appeared to be a delicate ceiling, is now so delicate that it would take a pair of opera glasses to find the design.

There are men we sometimes run across, who think they know it all, but if there is any mechanic in the world of labor who has a broad field for study and food for reflection it is the house painter of to-day. It is the duty of the employer in the interest of himself and workmen to impress upon them the necessity of closer attention to the methods of decorative art. A few practical notes in reference to the treatment of colors in different lights, will, I think, not be out of place.

I call to your mind a room with a south or south-western exposure having at least two good-sized windows. Let the ceiling be treated with a groundwork of light cinnamon, frescoed in outline with a medium shade of old gold color, the high lights to be tipped with gold leaf. Let the side walls be grounded in a dull sage color as high as picture moulding. For frieze make a slightly darker shade and introduce ornament in colors of old gold, deep crimson and dull pink. The cornice should be treated with special care, and I suggest that the cove should have the main portion tinted in the body color of ceiling and blended down into gold at the completion of the arc. The members of the cornice above the cove should be in the lighter shades so that the whole may blend together towards the ceiling. Woodwork should be ivory white, rubbed to a dead finish. In furnishing this room I would suggest white and gold furniture, with upholstery of light amber tint or otherwise old rose. This would give contrast and harmony combined. Carpet should be of light fawn color, with just sufficient color in relief to show design. This would make a very desirable reception room or parlor.

We will take as another example, a room with a western outlook, a shady retreat as it were. Let the ceiling be of a medium shade of old rose color with stile about eighteen inches around it in peacock blue. Let ornamentation be in the main body of the ceiling, and consist of corners, breaks and lines of geometrical figures, to be in darker shade of body color, with strong lines of deep brown between centre and stile. Let the side walls be in a full and distinct shade of terra-cotta, leaving space for frieze about fourteen inches. Let two and one-half inches on top and bottom of frieze be tinted in free-stone color, the remaining nine inches in purple brown. Now take a double stencil of Grecian key border with eight inch figure, and use light free-stone color for same. As a relief make a panel or break, each three feet around room, the same height in full as frieze, that is, fourteen inches. Let this be a perfect square with a medallion in centre of each panel, introducing plaque pictures of the muses, literature, art and music. For colors let the outside of medallions be in the purple brown, and centres on which pictures are to be painted be pure gold-leaf. The outside edges of the panels may be treated as a mat, and I suggest their being beveled in light and shade. Treat the cornice with care. Let the cove be treated with the free-stone color, and upper members in terra cotta and old rose. Let the lower members be in purple and peacock blue. A great improvement to this room would be to stencil main members of cornice in imitation stucco work, using only colors as herein suggested. For a study, library or music room, I am sure this would gratify the taste of any lover of decorative art. Almost any kind of furniture will be in harmony here.

We will now go to the other side of the house, a room looking eastward. Let the ceiling be in two shades of pearl grey, very light, the darker shade to be placed on the outside edges of ceiling and extending towards center about twelve or fifteen inches, the two shades to be blended, not clouded into each other. Let the ornamentation be in garlands of flowers, twined naturally over a rustic branch. Let this take the shape of ceiling as closely as practicable and be about fourteen inches from cornice. The colors to be cheerful, but not overdone. Nature may be followed very closely on this background without going to extremes. Let side walls be tinted goblin blue, fairly light, with frieze in deeper shade. I would suggest as a pretty design for a frieze a festoon of roses tied at the commencement of each with a bow-knot. Let the cornice be tinted in the three shades of color, only upper members in color same as main body of ceiling. Cove in dark shade of same. Lower members to be in side wall tints, split only by one member in gold leaf. Going over this combination, in my mind, I can fancy how this room would look with a dining table tastefully laid with fruit and flowers interspersed with china and plate.

For a room with a northern outlook, here is a pretty and warm combination: Let the ceiling be painted in a rich cream color, devoid of ornamentation. If the walls are evenly laid out, coat them in a light salmon tint, have them struck out into panels according to the size of the room; let the ornament only form panel by running a chain pattern in border and corners in sage green and deep salmon. Outside this border run a pearl pattern in zinc white. Afterwards line off the whole with three-eighths inch vanish line about one and one-half inches from border. At the top of each panel paint a wreath of flowers tied with ribbon and hung gracefully in center. For frieze let the background be in a lighter shade of wall paper. In working this frieze select a stencil with full pattern, a festoon of various flowers with moderate sized leaves. Use thin, transparent colors for stenciling. After laying on each pattern wipe out high lights. Let the colors be as natural as possible, according to selection of flowers. Let the cornice be treated very lightly in color and allow two prominent members gold leaf on face. The woodwork may be in oak or ash, according to taste. This will make quite a handsome parlor or sitting-room.

I could say a great deal more on the subject, as there is always a sense of pleasure to the decorator while pursuing his interesting occupation. However, I conclude, trusting that my remarks may result in generous criticism, thereby educating us all through debate and practical attempts to improve.

*Paper read by W. T. Cochlan at the Third Annual Convention of the Society of Master House Painters and Decorators of New Jersey.

AUSTRALIAN WOOD PAVING BLOCKS FOR CANADA.

A letter has been received, says the Australasian Builder and Contractor's News, by Mr. Harry Wood, Under-Secretary for Mines and Agriculture, New South Wales, from Captain J. C. Rounding in reference to the offer of the Department in regard to wood blocks for Vancouver, B. C., Canada. Captain Rounding says he conveyed the offer of the Department to his friends in the City Council of Vancouver, and by last Saturday's mail he received a letter from their City Engineer, Mr. T. H. Tracey, as follows:—"I am directed by the City Council, in reply to your favor of the 17th March *re* wood blocks for paving, to say they will gladly accept your offer, and will have the blocks laid in the most substantial manner in a conspicuous place. The street selected is 264 feet by 50 feet between gutters, at the entrance to the C.P.R. station and wharfs, the rest of the street being laid or about to be laid with California bituminous rock on concrete foundations. I have copies of the best London specifications for block pavement, but would be pleased to receive particulars as to the mode of laying you have found best. Should you send more than one variety of wood blocks, I will see that they are laid so that they can be destinguished, and the qualities and life of each noted." Captain Rounding adds that the blocks will be laid in the most prominent and important part of the City of Vancouver, the main entrance to the Canadian-Pacific railway terminus station. The importance of the movement cannot be over estimated, and he has had inquries on the same subject from other parts of the Dominion. He thinks that if Australian wood blocks are once successfully adopted in Canada, the cities in the United States will soon follow suit.

PUBLICATIONS.

We have received from the publishers, the S. E. Hendricks Co., 61 Beekman street, New York, a copy of the 1894 issue of their Architects' and Builders' Guide and Contractors' Directory of America. The book has apparently been compiled and classified in a careful manner. Price $5.00.

Canadians will find the August number of the American Review of Reviews of more than ordinary interest. The articles by Mr. William B. Wallace on the Hon. Wilfrid Laurier, by Attorney-General Longley on "Canada's Political Condition," and by Dr. Albert Shaw on "Toronto as a Municipal Object Lesson," form the most important contribution to an understanding of Dominion interests and policies that has recently appeared in periodical literature.

There has just appeared from the press of Wm. T. Comstock, New York, a new Directory of the Architects of the United States and Canada. Architects who are members of any of the various architectural societies are indicated by figures placed after their names. While the publisher does not undertake to say that this directory is absolutely correct, he states that every effort has been made to ensure its accuracy. It is the publisher's intention to issue the Directory annually. The price has been fixed at the low figure of $1.00 per copy.

PERSONAL.

Mr. John Day, architect, of Guelph, who was confined to the hospital for some time as the result of an accident, is, we are pleased to learn, on the road to recovery.

Mr. Henry Yates, a widely-known and respected engineer and contractor, of Brantford, died at his residence in that city on the 22nd of July. The late Mr. Yates was for many years chief engineer of the Grand Trunk Railway, and supervised the carrying out of several large railway contracts.

EXPANSION OF CHIMNEYS.

It does not often happen that facilities are afforded for exact measurements to be made of the expansion and contraction of a factory chimney. It is generally admitted that boiler chimney shafts should not be attached to the walls of any important building on account of the risk of cracking the walls by the expansion of the heated brickwork; but it is not very easy to obtain reliable information respecting the amount of such expansion, and some persons have doubts whether brickwork really expands or contracts when heated. An unusual opportunity of making measurements on this point has recently occurred at Newcastle-upon-Tyne. The boiler chimney of the college was erected five years ago, and has been in constant use during the interval. As originally constructed it stood alone, 60ft. from the college building, 99ft. high from the concrete foundation, and 100ft. from the ground level. To the height of 33ft. from the ground an interval firebrick flue was constructed, with an air space of 3in. between it and the shaft. The upper 57ft. of the shaft was built of stock brick only, and had a uniform diameter of 6ft. 2in. externally, while the internal flue increased from 3ft. 11in. to 4ft. 8in. in diameter, the strictly cylindrical character of the exterior giving the chimney the appearance, when looked at from a distance of fifty yards or more, of being trumpet shaped, and larger at the top than at the bottom. During the last few months a casing of ornamental brickwork has been erected around the chimney, but independently of it, so that the casing of the shaft forms one of four octogonal turrets surrounding the Royal Jubilee Exhibition Tower, and guarding the principal entrance to the college quadrangle. The near completion of the brickwork surrounding the chimney afforded the opportunity of observing from the top of the casing any movement of expansion or contraction of the chimney itself. As the boiler fires are generally drawn or allowed to die out on Saturday afternoon and relighted on Monday morning, the chimney has an opportunity of cooling down during about forty hours and observations made from the top of the casing wall showed a contraction of the chimney of five millimètres, or 2in., during that time. As the surrounding wall was still about 6ft. below the top of the chimney when the measurements were made, and as the first 33ft. of the shaft remained practically cold on account of the air space between it and the centre flue, it may be taken that the length of brickwork in which the expansion took place was about 50 feet. According to this a shaft 100ft. high should expand 4in. when in use. The measurement was only of a preliminary character made for the purpose of determining whether it would be safe to allow the decorative work at the top of the turret to rest partly on the outer casing and partly on the internal flue, and the result showed conclusively the desirability of keeping the chimney shaft entirely independent of any other structure.

Hayes' Patent Steel Lath . .

HAS NO EQUAL IN ANY PARTICULAR

. . . Used in more important buildings . . .

. . . THAN . . .

all other styles of metal fathing combined.

SOLE MANUFACTURERS

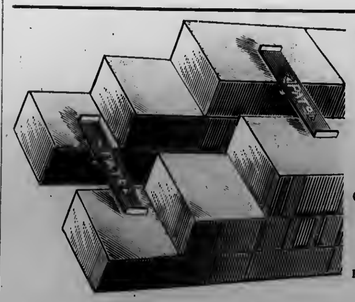
THE METALLIC ROOFING CO.

OF CANADA, LIMITED.

BRANCH OFFICE: 706 Craig Street MONTREAL

HEAD OFFICE: 82 to 90 Yonge Street TORONTO

Send for Samples and Prices



The Wall Tie

WEESE'S PATENT
WALL BRACE OR TIE

USED FOR BUILDING
Warm, Dry, Fireproof Buildings
ESPECIALLY ADAPTED FOR
Churches, Public Buildings, Hotels, Dwellings, etc.

. . MANUFACTURED BY . .

THE MAC MACHINE CO.

BELLEVILLE — CANADA

. . Write for particulars . .

A PAYING INVESTMENT

Elliott & Son
94 Bay St. Toronto.

June 21st 94

C. H. Mortimer Esq.
Canadian Architect
& Builder

Dear Sir, We have pleasure in testifying to the Satisfactory results we have had from advertising in your journal. Inquiries have reached us from Halifax to Vancouver traceable directly to this medium

Yours truly
Elliott & Son

THE PERSPECTIVE PROCESS.

On first learning the meaning of a picture, it would naturally strike the mind, says the Illustrated Carpenter and Builder, that a sure and easy method of carrying any point from its position in space to its position in the picture would give anyone the power of drawing the outline required. Such a process might be laborious, but it would put the whole design within possible reach. This method would be an excellent one for learners to begin with, previously to entering on the use of vanishing points; it would be something like learning to count with pebbles before entering on the common rules of arithmetic. Even without diagrams it may be possible to give such a description of the process as will enable some who have never attempted anything before to put a few simple figures into perspective. Let the picture plane, which suppose transparent, be spread out before the spectator, reaching down to the ground, and bounded on the right by a side wall, which extends both before and behind it. Every point which is to be drawn has a point directly below it on the ground, which call its ground-point; and a point directly opposite on the side wall, which call its side point. All the ground points make, when properly jointed, what the architect calls a plan; all the side points are elevation. The picture would be called a section if points were taken on it opposite to the points to be represented; instead of this a point is carried to its place on the picture along a line drawn to a certain point in front of the picture, which represents the eye of the spectator. This eye-point has also its ground-point and its side-point. The picture has its ground line and its side line, and every point in the picture has its ground-point upon the ground-line and its side point upon the side line. A picture-point is known when we know where the ground-point is by its distance from the side line, and where the side-point is by its distance from the ground line. To lay down a given point on the picture, draw a line from its ground-point to the ground point of the eye; that line meets the ground-line of the picture in the ground point of the picture point required. In the last sentence for ground read side, and we see how to find the side point of the picture point in the side line of the picture. Two lines being drawn on a paper perpendicular to one another, the right side of the paper may represent the side wall laid flat on the ground by turning round its ground line, and the left side may represent the ground plane. The two sides of the line which separates the upper part of the paper from the lower represent the ground line and side line of the picture. Take another paper, or another part of the same paper, draw two perpendicular lines, lay down the ground and side picture points by taking their distances from the paper on which they have been found, and the points of the picture may at once be put in their places. This is an explanation of the principle of a picture and an exhibition of a sufficient method of construction; that is of sufficient power, but not of sufficient facility; every point requires the drawing of three lines.

CREDIT VALLEY BROWN STONE

From Carroll & Vick's No. 6 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure	Height.	Crushing Load.	Crushing Stress per sq. in.	Average Crushing Stress per Square Inch
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	2⅞ × 3	2⅞	131,000	15,188	
C	2 1/16 × 3	2⅞	130,000	14,751	
D	3 × 3	2⅞	133,000	14,777	14,905

14,905 pounds is the average crushing strength per square inch of our Credit Valley Brown Stone.

The highest standard of test attained by any pure Sandstone in America.

IN confirmation of the facts above stated, we have pleasure in directing your attention to the accompanying table, showing the result of the test of our stone, in connection with the series of tests of building stones conducted in 1892 at the School of Practical Science, Toronto, under the direction of a committee of the Ontario Association of Architects.

By referring to the results of the tests above mentioned, it will be seen that the average crushing stress of the majority of Canadian and American sandstones is far below that of ours, the difference in our favor ranging from 75 to 50 per cent.

The Credit Valley Brown Stone, owing to its modest tone, harmonizes beautifully with red or cream colored brick.

It has been reported that there is difficulty in obtaining Credit Valley Brown Stone. To correct this mistaken notion, we wish to state to architects and the public that we have a large quantity of stone ready to ship on the shortest notice, which can be followed up with an unlimited supply. Last year we made extensive additions to our plant and opened up new quarries and mines, and will supply promptly all orders given to us or our agents.

CARROLL, VICK & CO.

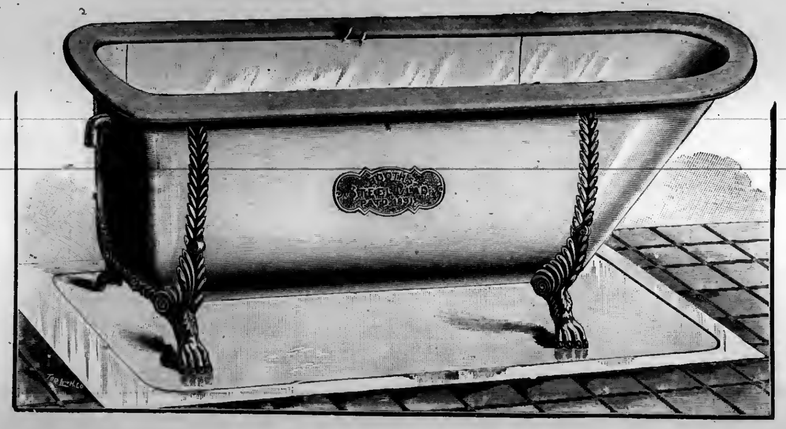
Quarries: Credit Forks, Ont. Office: 84 Adelaide St. West, TORONTO.

Montreal Agents: T. A. MORRISON & CO., 118 St. Peter Street.

THE . . .

"STEEL-CLAD" BATH

Booth's



Patent

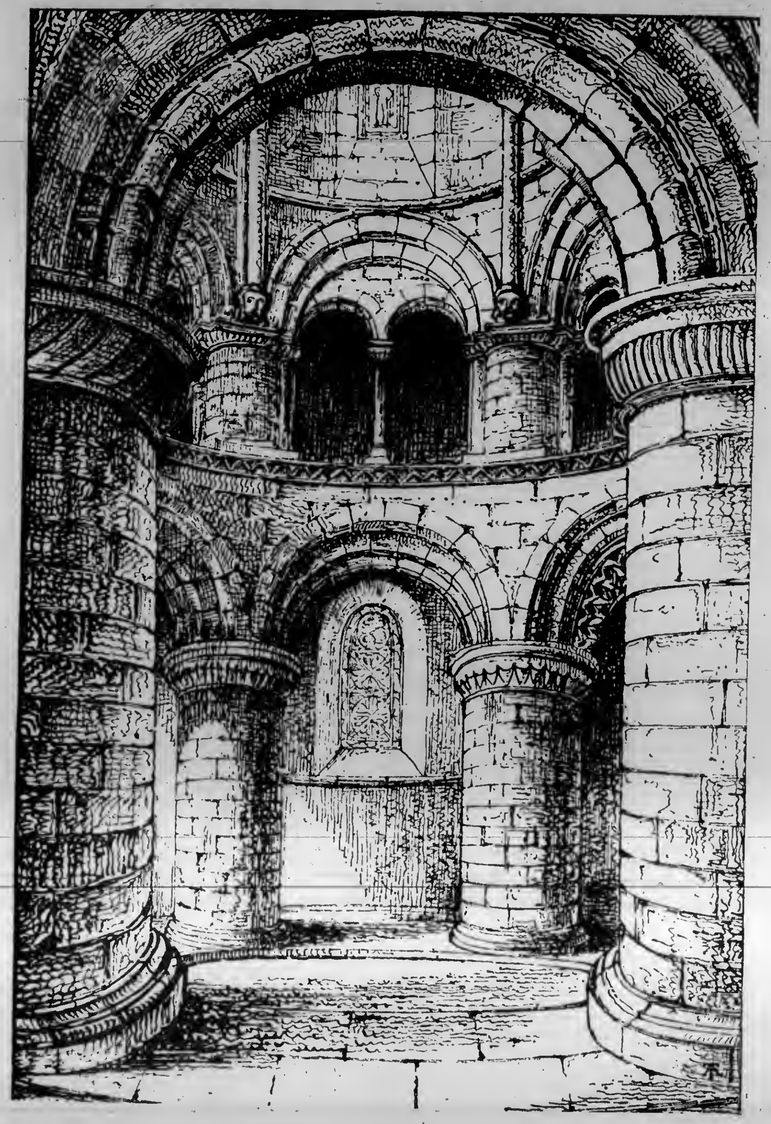
. . . MANUFACTURED BY . . .

Toronto Steel-Clad Bath and Metal Co., Ltd.

123 Queen Street East, Toronto.

MONTREAL ST. JOHN, N. B. QUEBEC VICTORIA, B. C.

ADDRESS ALL COMMUNICATIONS DIRECT TO THE COMPANY.

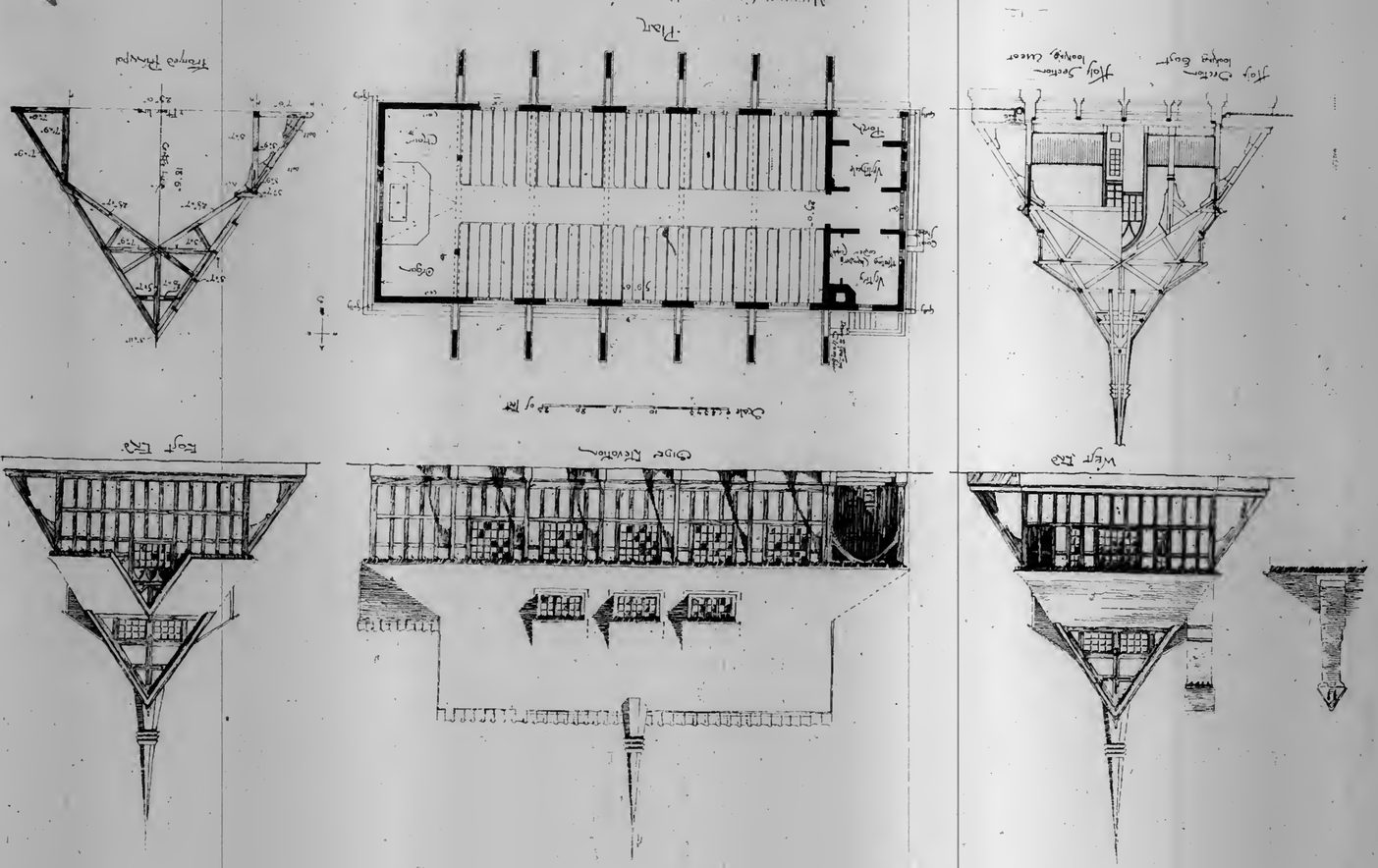


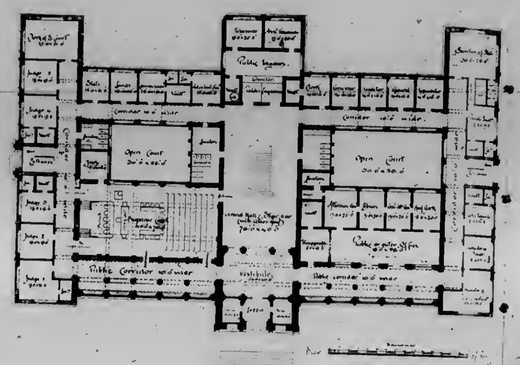
THE ROUND CHURCH OF ST. SEPULCHRE'S, CAMBRIDGE, ENGLAND.

FROM SKETCHES BY ANDREW T. TAYLOR, F.R.I.B.A.,-MONTREAL

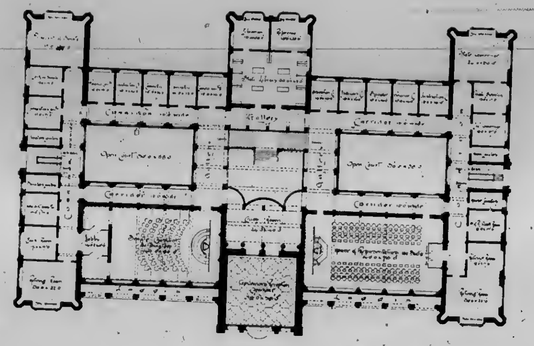
MISSION CHURCH, IKANTEOKE, ONT.

E. SWALES, SUNDERLAND AND DORCHESTER, ENGS., AND H. EATCHES, M.I.A.E. (LOND.), IKANTEOKE, ONT., ARCHITECTS.


Plan
Scale 4 0 2 4 6 8 10 Feet
Side Elevation
Roof Ends
Roof Ends
Roof Ends



Ground Floor Plan



First Floor Plan

DESIGN FOR PROPOSED STATE CAPITOL AT OLYMPIA, WASHINGTON TERRITORY.

R. MACKAY FRIPP, F.R.I.B.A., ARCHITECT, VANCOUVER, B.C.

CANADIAN ARCHITECT AND BUILDER.

VOL. VII.—NO. 9. SEPTEMBER, 1894 PRICE 20 CENTS $2.00 PER YEAR.

THE
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	EDMUND BURKE, Toronto.
1ST VICE-PRESIDENT	J. E. BELCHER, Peterboro'.
2ND VICE-PRESIDENT	W. A. EDWARDS, Hamilton.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI	Ottawa.
FRANK DARLING	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON	Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	J. NELSON, Montreal.
1ST VICE-PRESIDENT	CHAS. BAILLAIRGE, Quebec.
2ND VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
SECRETARY	A. C. HUTCHISON, Montreal.
TREASURER	J. Z. RESTHER, Montreal.

COUNCIL:

A. T. TAYLOR, F.R.I.B.A., R.C.A.	Montreal.
A. GENDRON,	Montreal.
J. B. BERTRAND	Quebec.
ERIC MANN	Montreal.
J. VENNE	Montreal.
G. E. TANGUAY	Quebec.

AUDITORS—THEO. DAOUST, J. E. PEACHY.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
WM. PARK, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JOHN ALDRIDGE.
JAS. CRANG.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
JAS. THOMSON
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

THE term "joiner" does not mean a carpenter, says the Canadian Presbyterian. It means a man or woman who joins all the societies and associations in the community.

THE twenty-eighth annual convention of the American Institute of Architects will be held on the 15th, 16th and 17th of October in New York city. A number of valuable papers are promised for the occasion.

WE print in this number an interesting letter from Mr. G. F. Stalker, in advocacy of a change of method in the designing and erection of government buildings. The attention of our readers has already been called to the favorable reception of the Bill introduced in the United States Congress to provide for throwing open to competition among the leading architects of that country work of this character. This is the system which has prevailed for some time with satisfactory results in Great Britain. The subject is one in which Canadian architects should feel an interest, and which might fitly receive some consideration at the approaching annual conventions of the Province of Quebec and Ontario Associations of Architects. We would be pleased also to print the individual opinions of architects on the subject.

ON every hand there are indications of a revival of trade. The settlement of the American tariff question has had a beneficial influence on commerce in the United States, which is certain to extend to Canada. As the result of the free exportation of Canadian lumber into the United States market, we may expect to witness great activity in the manufacture of rough and finished lumber in Canada, and this must have a beneficial influence on every department of trade. During the depression through which we have been passing, manufacturers and merchants have reduced stocks to the lowest possible point. With increased purchasing ability will come a revival in manufacturing and other industrial enterprises. It is now too late to expect much improvement in conditions this year, but the indications for 1895 seem to be of a very encouraging character.

A PIECE of scaffolding work requiring more than ordinary care was put up in Toronto last month by Messrs. Dill & O'Hearn, contractors, for painting the spire of St. Patrick's church on William street. A scaffold more than sufficient for paint work was necessary to gild the large cross at the top. The height from the ground to the top of the cross is one hundred and sixty nine feet. The construction of the spire prevented access to the inside to a greater height than one hundred and ten feet. Here, through four small window openings, built up beams 6"×12" were placed projecting level five feet, the inside ends made secure by blocking to the spire timbers. On these a platform was laid three feet wide all around. All the scaffolding material was hoisted up to this height with a rope and pulley outside. On the platform, directly over the beams, four corner poles were footed and blocked with diagonal braces to each other and back through the window openings. The balance of the work was carried up in the usual way with poles lashed together and stagings at every six feet of its height. The completed work was severely tested by a heavy storm on Sunday, Sept. 2nd, but stood uninjured. Considerable difficulty was experienced in laying the gold leaf on account of high winds, but this was overcome by pitching a tent twelve feet high on the top staging to cover in the cross while that part of the work was being done.

THE Commissioners of the London Exhibition of 1851, of whom the Prince of Wales is chairman, at a recent meeting decided to contribute £200 a year for five years in addition to a previous payment of £300, in aid of the maintenance of the department for investigating and testing the natural products of the Colonies and India at the British Institute. An English contemporary makes the statement that the Institute "does little but dine and wine its members and tea loungers at sixpence a head." If this be the case the grant in question is not likely to be of much benefit to the colonies.

A NEW application of iron frame and fire-proof construction is likely to find employment in building city residences. A New York architect, Mr. Manly N. Cutter, has recently secured estimates on three houses, showing that this method can be used with very little increase in cost, the difference being only about $200 on a house worth nearly $10,000. This difference would be fully made up by the increased floor space which the iron construction would afford. Mr. Cutter's estimates were based on wrought steel uprights, girders and floor beams, with a woven wire netting fastened to these for walls and floors. For exterior walls it is proposed to use 4 inch brick work outside and a terra cotta lining inside the netting; for party walls, terra cotta on both sides of the wire netting. Concrete floors between iron beams to receive the wooden covering, and ceilings plastered on metal lath. The roof would be constructed same as the floors, and the basement story built in the usual manner up to the cast-iron bed plates for the steel uprights.

ARCHITECTS will note with satisfaction every indication of a growing interest on the part of the general public in architecture. The great amount of attention bestowed on the Chicago World's Fair buildings, by visitors and the press, so enlivened public interest in architecture as an art, as to exert a permanent influence in the direction of a demand for good architecture in all kinds of buildings. The recent publication in some of the leading popular magazines of special articles and illustrations of architectural subjects is another strong indication of an increasing public appreciation of the importance of the subject. We are surprised to see in the Engineering Magazine the opinion expressed that it may be seriously questioned whether the publication of such articles is a healthy indication of a growing and widening taste in architectural knowledge on the part of the general public. Publishers of the great magazines are not in the habit of using material unless in their opinion it is of a kind for which there will be the best demand, and their judgment in this matter is to our mind a satisfactory proof of an awakening public interest in architecture. We should be glad to know what our contemporary would consider the kind of indications on this line to which value could be attached.

THE Dominion Parliament at its last session acceded to the request of the labor organizations that one day in each year be constituted a statutory holiday, to be known as "Labor Day". The object of the organized labor bodies in asking for this legislation was no doubt to direct public attention by this means to themselves and the issues for which they are contending. The idea from this standpoint is a good one. Apart from its advertising value in this respect, however, the holiday is not necessary, as there were previously more holidays on the statute books than the frugal workman desired. The wisdom and right of any particular class of the community to arrogate to themselves the title of "workingmen," is also called in question. Such a step is likely to accentuate the lines of distinction between employers and employees, which many had hoped would in future be less tightly drawn. It is hoped that this result may not follow, but that by mutual effort, conducted on reasonable lines, the employer of labor and the workman whose only capital is his ability to labor, will seek to bring about conditions which will be in the highest degree equitable and satisfactory. The labor organizations will also doubtless find it necessary in the future to seriously consider ways and means of bringing into more harmonious relationship to themselves the great number of non-union workmen. There is a growing bitterness of feeling between union and non-union workmen, which is the outgrowth of arbitrary action on the part of the former, and which, if not removed, will eventually bring about the entire overthrow of the labor organizations. In short, the times demand the adoption of more reasonable methods on the part of all concerned in the solution in all its phases of what has come to be known as "the labor question."

WE print in this number of the ARCHITECT AND BUILDER the letter of another advertiser who has proved the value of this Journal as a medium through which to reach the purchasers of building materials. The abundance and value of the testimony which is being published month by month should convince the most skeptical manufacturer and dealer in such materials, that his business would be helped by a standing announcement in the pages of this Journal. Since the publication of the testimonial letters, in our recent issues, we have been authorized to insert the advertisements of several firms, some of whom were never previously represented in our columns and others who had become weary in well doing and had withdrawn their advertisements. Within the past week we received from a leading firm of architects in Montreal a letter in which they stated that they were inviting tenders for architectural iron work for a certain building, that they had written to the several firms whose advertisements they found in the CANADIAN ARCHITECT AND BUILDER, and requesting to know if we could furnish them with the names and addresses of other manufacturers in the same line. We hope that architects generally will follow the example of this firm, by writing us when requiring materials which they do not find advertised. On this subject the American Architect correctly says: "Architects need all the resources that can be offered to them in the way of novelties in rolled shapes of iron and steel, new modes of constructing fireproof floors and ceilings, new methods of beam protection, improved cements, new marbles, new qualities and colors of brick and terra cotta, and they want to know by simply turning over a leaf in the current number of their professional journal, not by trying to hunt up circulars or calendars, who are the principal terra cotta makers, where are the principal stone and marble quarries, who does concrete work and whether there is any recent improvement in such work, who does copper roofing, and whether it has occurred to any manufacturer, in these days of cheap copper, to furnish roofing plates of low brass or some similar alloy, which would be cheaper, harder and better than pure copper. Certainly if manufacturers and dealers in such materials expect to have their goods used on a large scale, they must be used through the architects, since all important building contracts are made in accordance with some architect's specification, and in order to have them used in this way they must be brought to the attention of the architects who write the specifications, in such manner that when the specifications are being written the name of the thing desired can be ascertained, and inserted in the specification, at a moment's notice."

SOME of our neighbors in the State of New York have taken alarm at the scope of the various plans on foot to utilize the water power of Niagara Falls, and at the unlimited character of the licenses already granted to divert water from the Falls for this purpose. A committee of the constitutional convention of the State of New York now sitting, has presented a report dealing with this matter, which is being opposed by representatives of the power companies. It is to be hoped that the subject will be thoroughly thrashed out. Certainly on investigation it does seem as if there were some grounds for the action which has been taken, and a doubt whether we have not gone a little too fast and too far in granting franchises. It is difficult to get reliable figures on the flow of water over Niagara Falls, but taking those given in the Encyclopedia Britannica—18,000,000 cubic feet per minute, with a fall of 164 feet on the American side and 150 feet on the Canadian side—the gross power would be a little more than 5,250,000 H. P. With such an enormous power to draw from it would seem that we might cut and come again without risk of any appreciable effect upon the natural beauty of the Falls. But on examining the franchises granted a little in detail it appears that if they are availed of to the full extent of the projectors' anticipations, that there would result a serious impairment of the volume of water now passing over the Falls. The present tunnel on the American side is only 100,000 H. P. capacity, but the full projected power on that side is stated to be 500,000 H. P., which at the present available head of 140 ft., would require about 200,000,000 cubic feet of water gross. On the Canadian side, by agreement approved by the Ontario legislature, the power company has the right to take water for a power station occupying a tract of land not to exceed 100 ft. by 1200 ft. The present station on the American side which is of 50,000 H. P. capacity, measures 68 by 200 ft., therefore the limit of the Canadian concession would be about 300,000 H. P., or about 1,200,000 cubic ft. of water. These two principal undertakings would therefore amount to 3,200,000 cubic feet, which the electric railway on this side, the old hydraulic canal on the other side, and existing private and town rights on both sides, would easily swell to 3,600,000 cubic ft., or 20% of the natural flow as given in the Encyclopedia Britannica. One fifth reduction in the volume of Niagara Falls, would involve a ruin of their natural beauty, which would be a disgrace to us as one of the custodian nations of this wonder of the world. Such a catastrophe is only a possibility, and a remote possibility. Unless further powers are granted, on the Canadian side, the concession is probably limited to less than the amount estimated above, by the provision in the agreement that the water shall be led off by the natural channel between Cedar Island and the mainland. But even the possibility of such a catastrophe in the far future, fully justifies the action which has been taken in New York. No shadow of excuse could be urged for destroying Niagara Falls for the enrichment of a few capitalists and a locality. We are far from the time when any pressure of the population on our national resources could justify such utilitarianism.

WE often hear the statement that it is a favorable time to carry out building enterprises during periods of general business depression, such as we have lately experienced, on account of the low prices for material and the eagerness of men for work enabling contractors to tender much lower than usual. There is much truth in this, and it is a perfectly natural condition, but contract prices are in many cases cut lower than there is any reason for within the limits of legitimate business. No building should be erected for less than its value, which should include the cost of all material and labor with a reasonable profit for the contractor. The whole question of prices for building work of ordinary kind seems to be in a badly mixed condition. People have grown into the habit of expecting too much for their money in this kind of work and are inclined to believe it can be done for whatever they choose to pay if they can only get hold of a contractor who will tender as low as possible. Evils too numerous to mention are the result, and if they are lessened or cured it must be by effort on the part of the more intelligent contractors. Briefly we wish to notice a few of the conditions which might be improved by the right kind of effort. When prices are too low in any business there is sure to be an attempt to lower the quality of material or workmanship, and nowhere is this plainer to be seen than in the building trades. Every contractor worthy of the name should stand for first-class work and fair prices. If the contractor for one trade does really good work and the work of another trade forming part of the same job be inferior, the good work must suffer by its proximity to the bad. Contractors can generally ill afford to carry out work for less than value, but it is most likely to be the one who is least able to stand a loss who will cut prices. Nor is the loss to him alone, but because he is unable to handle his work in a business-like way, all other trades are liable to be interfered with and put to actual loss. Contractors should be quite as particular as to who they are associated with as co-contractors on a job, as they are in the selection of their own foreman or other help. There are many items which the contractor should include in estimating besides the cost of material and labor, such as the use of capital invested, risks by accident, bad weather, fluctuation in prices, wear and tear of plant, his own time, etc. After these are allowed for, he should have a profit of at least ten per cent., but we believe comparatively few contract prices are sufficient to leave even this moderate margin. No cure-all remedy can be applied to every case of the low price disease, but if contractors were well organized and working under some carefully prepared code they would be able to remove the greater part of these difficulties. In this way only their combined influence can be made available, and much could be done to prevent the business being handled at unreasonably low prices.

ILLUSTRATIONS.

CHURCH AND PRESBYTERY OF THE PARISH OF THE SACRED HEART, MONTREAL.

The church was built in 1882 from plans by Mr. Jos. Venne, architect, now of the firm of Perrault, Mesnard & Venne, who are now building the presbytery adjoining it. It is of Montreal limestone, roofed with slate; and with a plain and tastily decorated interior. Plans are now being prepared by the above firm for stained glass windows to adorn the aisles and chancel windows, representing the rood of the Holy Cross. The highest spire, on Plessis street, rises to a height of 220 feet above the sidewalk. The presbytery adjoining the church, now in course of construction, is in the style of Francois II, and is also built of Montreal limestone and covered with slate. The interior will be finished in Columbia cedar and nicely decorated.

UNION STATION, TORONTO.—STRICKLAND & SYMONS, ARCHITECTS.

This new station, which is now being constructed by the Grand Trunk Railway Company for the joint use of that Company and the Canadian Pacific, will, when completed, be one of the most convenient and best arranged stations in Canada. There will be two large train sheds, one for the use of eastbound and the other for westbound trains, with three tracks through each shed. The platforms will have an average length of about 1,000 feet, and there will be ample room to accommodate as many as twelve trains, averaging eight cars each, at the same time.

The approach to the station from the city will be by means of an entrance from Front street, the level of which is sufficiently high above the rails to enable passengers to pass from the street over the tracks to any platform, by means of bridges, and without having to ascend any steps, the various platforms being accessible from the overhead rooms and bridges descending to them.

The passenger who is leaving by train enters the station at the main entrance on Front street, opening into a spacious and lofty entrance hall, fifty feet square and thirty-five feet in height, on one side of which are ranged the ticket offices, and upon the opposite side the baggage counter, across which he can claim his baggage, and have it checked for its destination. This entrance hall is being finished in red sandstone, imported from Scotland, and pressed brick work, the floor being laid in marble, the whole presenting an appearance equal in artistic elegance to that of the main waiting room of most of the large modern stations on the American continent.

Having taken his ticket and checked his baggage, the passenger will proceed through a handsome arcade, with shops on either side, where travellers' requisities can be purchased, or where he can pass any leisure time he may have before leaving, to advantage.

The arcade opens at its southern end into a magnificent waiting room, eighty feet square and forty-five feet high. The floor will be of marble, and the walls to a height of ten feet will be of the same material, highly polished; above that it will be finished in carved red sandstone and pressed brick, and lighted from upper story windows on all sides. There will be a colored glass dome in the centre of the ceiling. First-class waiting rooms, lavatories, and ladies' retiring rooms open from this room on the east, and a luxurious restaurant and smoking room on the west. At the south end of this waiting room the eastbound train shed is reached, and across it is being constructed a closed bridge, twenty-six feet in width, fitted up so that when required it will serve as an overflow waiting room. From this bridge access down to the platform is obtained by various convenient stairways, and still farther to the south across the westbound train shed; and this bridge open to the shed gives access by stairways to other platforms.

These platforms extend both east and west, and the bridges are as nearly as possible in the centre of their length, so that the distance from the stairways to the cars is made as short as possible, no matter where the train is standing. All the platforms are being laid with asphalt, and those which extend beyond the ends of the train sheds will be covered with umbrella roofs.

The exterior of the building, of which the principal front is on Front street, is being constructed of Credit Valley brown stone from Messrs. Carroll & Vick's quarries, and red brick, and will have a very handsome elevation. The lofty tower will form a noticeable feature in the landscape. The upper floors of this building will accommodate the general offices of the Grand Trunk and Canadian Pacific Railway Companies.

Mr. Edmund, Wragge as Chief Engineer, and representing the Grand Trunk and Canadian Pacific Railways, has the general supervision of the entire work, Messrs. Strickland & Symons, of Toronto, being the architects.

A practical paperhanger says that the best way of removing solid bronze or gold papers, through which water does not quickly penetrate is to apply two or more coats of very thin paste, then to use a paint burner, taking care to employ the latter cautiously, and following up immediately with a scraper. The burner will not set fire to the paper, as the paste and wet paper will not burn, but it is well to have a pail of water handy in case of need.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The next annual meeting of the above Association is announced to be held in this city on Thursday, Oct. 4th and 5th, inst., in the rooms of the Association, New York Life Building. The following is the programme of the proceedings :—

THURSDAY, OCT. 4TH— 10.00 a.m.—Annual meeting, election of officers and routine business in rooms of Association ; 5.30 p.m.—Read-of papers in same place ; 8.00 p.m.—Opening of exhibition of drawings and conversazione.

FRIDAY, OCT. 5TH.—1.30 p.m.—Visit to the Redpath Library, Erskine Church, Chapel of the Sacred Heart, Power House of the Montreal Street Railway.

A photographic group of the members of the Association resident in Montreal is being prepared by Messrr. Wm. Notman & Son for which forty-two signatures have been procured and which will be presented to the members resident in Quebec, at the annual meeting.

The Association will hold an exhibition of architectural drawings in connection with their annual meeting in the galleries of the Art Association, Phillips Square, from the 4th to the 11th day of October.

The Council of the Association are associated in the holding of this exhibition by the Art Association of Montreal, who have kindly granted the use of their gallery for the purpose, and have promised their assistance and co-operation in promoting the exhibition.

The drawings are to be pen and ink or colour perspectives or elevations of modern original designs or sketches in ink or colour of old work, and in all cases the drawings are to be suitably framed.

Drawings are to be addressed to the Art Association, Phillips Square, and delivered there not later than the 29th September, and removed immediately after the close of the exhibition, the delivery and removal to be at the expense of the exhibitor.

The Council will take every care of the drawings while in their custody but they will be unable to effect an insurance upon them or be liable for damages that may occur.

Messrs. J. Venne and A. T. Taylor have been appointed by the Association a committee in association with Messrs. Wm. Brymner and N. Bourrassa and one member appointed by the Art Association, to select and hang the drawings sent for exhibition.

It was resolved at a recent meeting of the Council that the members of the Council along with Messrs. J. W. Hopkins, V. Roy, A. Raza and A. F. Dunlop be a general committee to make arrangements for the exhibition and conversazione.

AMERICAN PUBLIC HEALTH ASSOCIATION.

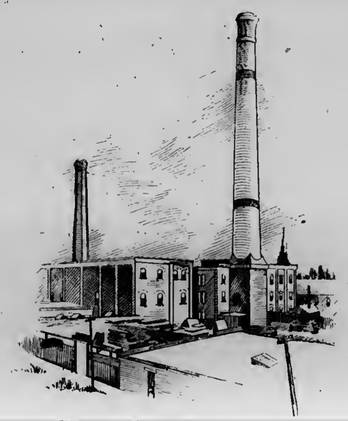
The above Association will assemble in annual convention in this city from the 25th to the 28th inst. The Association is representative of the United States, Canada, and Mexico. Dr. E. P. Lachapelle, of this city, has the honor of being President of the Association this year. A number of papers on sanitary and hygienic subjects will be presented at the approaching meeting.

THE CITY BUILDING BY-LAW.

In a recent issue, the Insurance and Finance Chronicle of this city published an article criticising the existing city building by-laws which it states are entirely inadequate for protection against fire. Although it must be recognized that our building by-law contains many defects, as the building inspector admitted when interviewed on the subject, they nevertheless possess many points that if observed would I think greatly add to the security of our flimsily built tenement houses and their contents. There are no set sizes as to dimensions of dwelling blocks it is true, but section 12 of by-law No. 107 passed in 1877 requires that when "rows or blocks of dwelling houses, stores or warehouses, are built, each tenement, store or warehouse shall be separated by a division wall of brick or stone, subject as to elevation and thickness to provisions of sections 11, 14, and 15 of this by-law," and moreover, section 11 therein referred to calls for the carrying of these fire walls over roof and for coping with incombustible material. If all buildings were built strictly in accordance with this by-law the block of tenements could no longer bear that name, but each tenement or store on its horizontal projection would be a distinctly separate and complete building, with no lateral communications whatever. Although architects are aware of the existence of this by-law, I saw a building recently going up on St. James street west, containing two stores on the ground floor with two tenements above ; these two tenements and stores were simply divided by a common wooden studding partition all the way up from cellar to roof. In that same building also, I noticed that instead of putting in a trimmer around the chimney for supporting the joists, the joists ran right into the chimney and came within five inches of the interior of the flue in spite of the by-law which distinctly forbids this. Numerous other infractions could be cited, amongst which may be stated the building of a single flue to a chimney used by more than one tenement or store, notwithstanding the by-law provides for a separate flue to each tenement or store. The latter infraction is almost of daily occurrence, responsibility for this conditions of affairs should be traced and a reform instituted. It is a well known fact that very often a building permit is only obtained when the building is almost completed. As to the thickness of brick walls, it is amply provided for in the table set forth in the said by-laws. A part of the present by-law which I think ought to be amended is the clause permitting the building of tenement blocks of wooden plank or frame, enclosed with brick. This section of the by-law says that such buildings shall not exceed two stories and a mansard roof in front, and three stories in rear, the highest point of the roof not exceeding 34 feet from the level of the foot-path. It is obvious that it is quite ineffective to have fire walls dividing each tenement if the exterior walls are allowed to be built of three inch plank. It is in this class of buildings that improvements should be made, and no buildings in the future should be allowed to be built of plank or frame. The Building Inspector has prepared a new by-law which is based on the existing building by-laws of the largest American cities, and which I hope will effect an improvement in the class of buildings heretofore put up in this city, and especially the poorer class inhabited by the working people. This by-law is now in the hands of a committee of the Province of Quebec Association of Architects, to whom it has been sent by the Fire Committee for suggestions. Let us hope to see it adopted and properly enforced at an early date.

NEW CHIMNEY AT TORONTO RAILWAY COMPANY'S POWER HOUSE.

WE present to our readers herewith an illustration of what is claimed to be the tallest chimney in Canada, its height being 250 feet. It has recently been completed at the power house of the Toronto Railway Company, under superintendence of Mr. James Hill, and was commenced during the early part of last March. Excavations were made to a depth of 18 feet, at which point solid rock was struck. The concrete foundation, 40 feet square, is built on the rock, and was tapered up till it stood 24



feet square at the surface of the ground, where the chimney proper was begun. For the first fifty feet the chimney is square, the top which is 18 feet 3 inches in diameter, being capped with cast iron. The inside diameter is 12 feet. A ladder made of U-shaped irons is provided as a means of ascending, the ends of the irons being anchored in brick. The smoke from a 10,000 horse-power of boilers can easily be carried by this chimney. An excellent view of the City of Toronto is afforded from its pinnacle.

In answer to an inquiry as to the treatment of the internal walls of a hospital ward, a correspondent to the British Medical journal says that of course a great deal depends on the material of which they are constructed ; but if they are plastered there can be but little doubt that a hard oil paint, or paint coated with varnish, forms the best finish, as it can easily be dusted or washed. As regards color that will depend to some extent on the amount of window space ; where there is plenty of light one can afford to make the walls of such a tone as to be restful to the eyes ; a very common defect in hospitals is making the walls too light. Ordinary hanging pictures are certainly inadmissable ; if they were properly dusted, which they never are, they would be knocked to pieces in three months. If pictures are desired, certain spaces should be reserved for the purpose, and the pictures should be pasted to the wall and varnished over. The same should be done with all tables of rules and regulations which one so often sees hanging on cards. They should all be pasted to the wall and varnished over, the object being that the wall and all upon it should be cleaned at one sweep.

THE BUILDINGS OF THE DOMINION.

BY G. F. STALKER.

UNDER this caption I wrote an article which appeared in the January number of the CANADIAN ARCHITECT AND BUILDER. The principal object of that paper was to advocate the advisability of establishing a system of competition for designs for our national buildings. It is satisfactory to know that the ideas expressed at that time have met with favor by some of our architects, and that there is a possibility of such action being taken as will bring about the desired change.

In the meantime the question has been taken up and definite proceedings instituted for the accomplishment of a similar object in the United States. In a recent number of the American Architect, and in the July issue of the Forum, articles appeared on the subject with reference to the buildings erected by the government of the United States. And, better still, on June 16th of the present year, a bill was introduced into the House of Representatives, "To provide for the securing of plans and for the erection of the public buildings of the United States."

I am not vain enough to imagine that the articles and the bill referred to are the result of my January paper ; but it is very gratifying to find oneself in such good company, and voicing opinions in keeping with the spirit of the times. The crusade which is going on everywhere against monopolies must, in the end, be successful. And success will be swift and certain when resolute action is taken in regard to the breaking down of restrictions that have been placed around an art which can boast of ages of liberty. The experiment has been tried, both on this continent and in Europe, of satisfying the architectural aspirations of nations by limiting the designs for national buildings to the skill of one man, and it has failed in every case. The causes of the failure have not been the same in each instance, but the result has been the same—failure. And if the present system is continued in Canada, we have before us the prospect of a continuance of architectural failures in our national buildings.

If the causes which have produced such unsatisfactory results can be ascertained, it may be suggested, a better era might be inaugurated by their removal, which would not necessitate an entire change of system. The writer of the article referred to in the Forum maintains that the causes of the failures in the United States are, mainly, the incapacity of the government architect ; and, in addition, the impossibility for any man to give sufficient time to the preparation of his designs, and at the same time attend to the routine work of what must, of course, be a large department of the public service.

With the first cause of failure in the United States, we, in Canada, are in no way concerned. No one can lay any such charge against our present government architect. It would, in fact, be almost an impertinence to place him in the same category with the majority of architects who have occupied similar positions in other countries. And, more than that, his special fitness for the position makes it a matter of the greatest delicacy for us in this country to agitate for a change of system.

But the second cause of failure is of universal application. More than one architect has resigned his position on account of it ; and every architect worthy of the name has found it almost impossible for him to give time and study to the proper and more congenial part of his work as architect, while keeping pace with his routine duties. And there is no way out of this difficulty. The mere multiplication of assistants and clerks will not overcome it, while it will materially increase the cost of working the department. So long as the one man system is maintained, the chief architect will find it necessary for him to give by far the greater portion of his time to routine business, a vast amount of necessary and important work of which the general public are profoundly ignorant ; while to or that portion of his duties of which the public take cognizance, and by his success in which, in their judgment, he has to stand or fall, he has to snatch a few odd hours from the worry and irritation of accounts and departmental cross-purposes.

When the designs for our national buildings are, of necessity, under the present system, produced in such an atmosphere, it is surely no great matter of wonder that there should be an imperative demand for a change ! If no other reason could be submitted than this, it would be sufficient to require it. For it must be evident that the object for which the system was instituted, namely, the retaining of the services of a great architect for designing our national edifices, is entirely frustrated by the conditions inseparably connected with such an office. We are, therefore, maintaining an expensive department in order that we may have a certain kind of work done in the best manner, but, from the very nature of the office, and the variety of necessary circumstances connected with it, we fail to obtain the accomplishment of its most important purpose.

Moreover, the establishment of the present system, some thirty years ago, was supposed and expected to be more economical than the ordinary method of securing the services of an architect. But experience has everywhere proved this also to be a fallacy. An examination into the matter proves, that, in the United States, what may be properly set down as architects' charges, in connection with the government buildings, amounts to about seven per centum ; and, in Canada, the charges exceed eight per centum. And this does not include, in either case, the cost of providing and maintaining office accommodation, fittings, lighting, drawing materials, &c., which would amount to about one per centum more.

We are, therefore, paying about eighty per centum more for architects' services, under the present system, than we should pay if the work were done in the ordinary way ; and, as we have seen, we incur this excessive expenditure for an inferior service. That is to say, for a building costing $1,000,000, the architect's charges would amount to $50,000, according to the usual scale, but the cost to the country for architect's services, according to the present system, would amount to $90,000.

But the greatest objection to the system lies in the fact that, by continuing it, we deprive ourselves of the opportunity of obtaining the best designs for our public buildings. This is at the bottom of the efforts now being made in the United States for a complete change of system. This brought about the change in England, and this has given rise to the desire in Canada—a desire which will, before long, develop into action—for a change in our system of securing plans, and of erecting our public buildings. And in the hope that measures will soon be adopted for carrying the purpose into effect in Canada, it may be of interest to consider the leading features of the bill now before the House of Representatives in the United States.

It provides for the appointment of a commission of public architecture, consisting of three architects, two engineers, and, as ex-officio members, the Secretary of the Treasury and the Supervising Architect of the Treasury, who shall procure designs and appoint architects for all buildings hereafter erected by the government. This commission shall select architects to submit designs in competition for all buildings costing $100,000 and over ; and they may appoint, without competition, an architect for buildings costing less than $100,000. The architects in every case must, of course, be well qualified men ; and, where a competition takes place, the successful competitor is appointed architect of the building on the usual terms, and the others receive an honorarium in proportion to the magnitude of the building. Power is vested in the commission for framing rules and regulations governing competitions, and the duties of the successful competitor are clearly set forth, and are in conformity with the usual professional practice.

Such is a brief outline of the American bill, and, with a few emendations, it would not be difficult to construct from it a measure that would be suitable to the exigencies of the Dominion of Canada. For we have seen that, in Canada, we have, as far as our national buildings are concerned, the same anomalies and the same failures as have occurred in the United States and in Europe. It surely cannot be said that we have less "sand" in us than the people of those countries, and that we are content to let things remain just as they are, though we know that the present system is pregnant with harm to our art, and discreditable to ourselves as Canadians ? And we are not so stupid as to imagine that any tinkering of the present system will ever produce any material improvement. We are satisfied that experience proves this to be a physical impossibility. Neither do we blame or disparage anyone who has held the office of government architect. But the experience of England and other countries places it beyond all question, that if we obtained the designs for our national buildings by competition, we would not only have better public buildings, but we would elevate the standard of architecture generally throughout the Dominion.

LONDON PUBLIC LIBRARY COMPETITION.

The information has been received that the competition recently held for designs for a public library building for the city of London, Ont., has at last been decided. A Mr. Matthews, a young student of architecture, formerly of London and Toronto, but now residing in New York, has been awarded first place in the competition, and will have the supervision of the work, which is to be commenced as soon as possible.

CANADIAN VS. FOREIGN CEMENT.

THE manufacturers of Canadian cement are protesting against the action of the Dominion Government in awarding a contract to a Montreal firm for 11,000 barrels of Belgian cement, in the face of the fact that cement of the best quality is now manufactured in Canada, and that the most of the Canadian cement works are at present shut down for want of orders. It is further pointed out that the stave mills in western Ontario are also closed down in consequence of the inactivity among the cement manufacturers who are purchasers of a large part of their product.

The protest of the cement manufacturers seems a reasonable one. Recent tests of the cement used in making concrete pavements in the City of Toronto, showed the cement made in Canada to be as durable, if not more so, than the foreign material. In view of this what necessity is there for the government engineers to pass by our home manufacturers. Mr. A. Blue, of the Ontario Department of Mines, in a paper read a few days ago before the Mining Association, made the surprising statement that of the 150,000 barrels of cement used in making concrete for street construction in Toronto, only 4,000 barrels had been native cement. There was, he urged, no reason why we should have to go abroad for Portland cement, as in Ontario we had an abundance of raw material for producing it.

REMARKS ON ESTIMATING.

As wooden buildings, either frame, balloon or plank, are mostly in vogue in rural districts, the country builder has more to do with them than with any other style of structure, so I will take as my model an ordinary balloon frame house in the country, and which is supposed to cost anywhere between $800 and $3,000, though the method of estimating I am about to formulate will hold good for buildings costing more or less than the sums named.

We suppose the plans, elevation, details and specifications of a building are now before the estimator, and on which he is now figuring.

In making out a "tickler," the estimator should use legal cap paper, using at first only every other line to make his list, as his first attempt will leave many omissions, which, as discovered, may be inserted on the blank lines under their proper heading. Having the paper ready, and any notes you may have prepared, head the first page "Preliminary," under which head may be written :

Preparing grounds and staking out building (giving supposed cost of every item.) ..... $....
Laying out and grading for drains, &c. ..... $....
Miscellaneous expenses in securing contract, ... $....

The next heading should be

MASON AND BRICKLAYER WORK.

— yards excavating ..... $....
Carting and levelling ..... $....
— cords of stone in foundation walls at — per cord .... $....
Brick walls, piers and chimneys ..... $....
Cellar floor, concrete or brick ..... $....
Cesspool and drainage ..... $....
Laying tiles in hearth ..... $....
Building fire-places and putting in grates ..... $....
Work and material around heater ..... $....

CARPENTER WORK.

— ft. in side, end and middle sills at — ..... $....
— ft. in trimming, posts and plates at — ..... $....
— ft. in main, side and end tie girths ..... $....
— ft. in first floor joists at — ..... $....
— ft. in second floor joists at — ..... $....
— ft. in ceiling joists ..... $....
— ft. of studding in outside walls ..... $....
— ft. of studding in gables ..... $....
— ft. of studding in inside partitions ..... $....
— ft. of studding in braces and for doors and windows .. $....
— ft. of studding in common rafters ..... $....
— ft. of hip, valley and jack rafters ..... $....
— ft. of trusses, purlins and collar beams ..... $....
— ft. of outside sheeting ..... $....
— ft. of inside sheeting ..... $....
— ft. of roof sheeting ..... $....
— ft. of gutter, lookouts, etc ..... $....
— ft. of floor lining ..... $....
— ft. of shiplap sheeting ..... $....
— M.M. of dimension shingles at — ..... $....
— ft. of siding (whatever kind) at — ..... $....
— ft. of battens, lattice, &c., at — ..... $....
— ft. of furring and bridging at — ..... $....
— ft. of fencing boards at ..... $....
Fence posts (state number) at ..... $....
Tarred or straw paper ..... $....

To all these items add cost of labor in working and putting in place. Keep account of labor on separate sheets, preserving all for future reference.

M.M. of four ft. lath at — ..... $....
— bbls. of lime at — ..... $....
— loads of sand at — ..... $....
— bbls. of plaster paris at — ..... $....
Water service (if any) ..... $....
— lbs. of shingle nails at — ..... $....
— bush. of cow or goat hair ..... $....

Add coloring matter if such is wanted for interior work or for rough-casting, also cost of pebble gravel.

Follow up this method of itemizing everything that will be used in the construction of the building, from the footings of foundation to coping of chimney top, each class under its own heading. Under "Hardware" place number, description and price of locks ; if more than one kind give each a separate entry. The same with bolts, hangers, furniture, window locks, screws, wardrobe hooks, pulls, grates, brackets, sinks, and everything else in this department.

Under "Plumbing" enter price, description and quantity of piping required, taps, traps, closets, bowls, drains, ventilators, bath tubs, hot water boilers, and all other plumbing requisites with the cost thereof.

Under "Joiners' Work," itemize everything that is to be finished in wood, classifying and describing everything, and giving price per piece or per foot, marking on margin of your paper a rough sketch of moulding, base, rail, baluster, or whatever else it may be. Do the same with any extra sash, doors or ornamental panels or newels. This precaution will serve you in future, and be handy to refer to on many occasions. Mantels, grilles and such like work may be entered in bulk, numbering the style of mantel or grille so that no mistake may occur. Stairs, with full description of riser, tread-strings and finish, may be entered at so much per step, or in bulk, either with or without rail and baluster and newels, making proper provision for landings or offsets. If paneled under soffit, make entry of same and fix price accordingly. Make special entries of labor required to lay down so many feet of this base, and so many feet of the other. Time fitting and hanging sashes, same for hanging and trimming doors, fitting up pantry, shelving and putting up hooks in closets, laying down floors, outside steps, posts, building veranadas, stoops or storm porches, cresting and putting up. Wood cornice—make diagram on margin, give dimensions and cost per foot. Wainscot, paneled ceilings, ornamental dados or fixed furniture, such as dressers, sideboards, cupboards, cabinets and hall racks, should be described and a sketch on the margin, with cost and style of finish. All other joiner work should be entered, with description and cost.

When any tinsmith or sheet metal work is required, a full account of it, giving amount and quality of materials used, with cost per foot, if conductors, leaders or gutters, and per square if for roofing or like purposes. Tin used in valleys or for flashings should be enumerated with full cost.

Next comes the painter, decorator and finisher. Enter quality of paints and oil, number of coats, colors and cost per yard ; style of finish, if on hardwood or stained pine ; number of coats of varnish ; state if rubbed and polished, with cost of same ; describe quality of glass, size, manner of glazing and cost per square. Itemize every particular and of every kind, teaming, carting away rubbish, cleaning up building, and everything where cost is attached.

Having now gone over the whole building, and itemized all that has suggested itself, go carefully over your work and look for omissions ; if any are discovered, enter them at once under their proper heads. Read over your specifications again and again ; examine the plans, elevations and details, until you are convinced you have grasped every detail, then go to work and copy into a convenient blank book, the results of your work, leaving a wide margin for sketches, and a line or two between each entry, and you have a "tickler," a complete and permanent "reminder" for all sorts of wooden buildings costing no more than $3000.

Your first [illegible] answers for an estimate of the particular building you figured on, and, if you find you have made any mistakes as to price of work, or cost and quantity of material, correct in your book so that you will not be misled the same way when estimating on another building.

It is usual in country places for the contractor to get the plasterer, the mason, the tinner, the plumber and the painter to give in an estimate on the work required of their various trades. This practice does very well, but it has the fault of throwing the whole responsibility of their work on the contractor without giving him a corresponding profit. It is better for the contractor to take the whole work, then he is master of the situation, and in a position to make reasonable terms with the other tradesmen.

If space permitted, I might give a column of current prices for building work of various kinds, that might be useful to the country builder, but just now that is impossible. At some future time, however, I may take the subject up.

A. Z. Z.

PERSONAL.

Three Toronto architects, Messrs. Webster, Bousfield and Woolnough, were called upon to serve on the grand jury at the recent assizes. This we take to be a recognition of the level-headedness of the profession.

The sudden death of Mr. C. F. Fraser, late Minister of Public Works for Ontario, which took place at the Legislative Buildings in Toronto last month, has occasioned wide-spread regret. It will be remembered that to the unsatisfactory condition of Mr. Fraser's health was due his recent retirement as head of the Public Works department, which position he occupied for twenty years. The new Legislative buildings were erected under his direction. The late Mr. Fraser was one of the ablest and most honorable of the public men of this country.

The death is announced at Ottawa, at the age of 74 years, of Mr. John Bowes, who for 40 years was employed in the Public Works Department in that city, and was superintending architect of the St. Vincent de Paul and Kingston penitentiaries, as well as the library of Parliament.

ESTIMATING THE VALUE OF BUILDING STONE.—In determining the value of any description of stone for building purposes the inadequacy of tests by chemical analysis is pointed out in a recent paper by a British architect, and, as concerns the more detailed examinations resorted to, the crushing strength, he states, is nearly always in excess of requirements, and is, therefore, to be considered relatively unimportant ; the absorption test, however, gives a fair indication of the power of a stone to resist frost, and in stones of the same class is also a criterion of the crushing strength, which appears to be higher the less the percentage of water absorbed. Still more satisfactory results are obtainable by subjecting the stone, while thoroughly moist, to a freezing temperature, repeating the operation several times, and ascertaining the weight lost from the block. Another inaccurate assumption mentioned is that the specific gravity of a stone is proportional to the strength ; and still another is the conclusion that the higher the proportion of silica the more durable the stone—the incorrectness of this latter assumption being manifest, inasmuch as it would involve the assertion that all sandstones are better than limestones, or even than granite.

DECORATION AND FURNITURE

CREOSOTE STAINS.

WHATEVER the origin of shingles may have been, it is certain, says A. Ashman Kelly in Painting and Decorating, that shingle staining is a modern American method of contributing to the external decorative appearance of residences and other buildings. That they fulfil that object there can be little doubt, even though it be true that the staining is not always satisfactory. Nothing of human origin ever is.

A recent writer calls attention to the practice prevalent in this country, of keeping rural houses glaring with fresh paint, instead of allowing them to become age-stained, as rural cottages of Europe are. Now, the stains we use are, in a measure, the equivalents of those produced by time on bare wood. Rare effects can be had by blending two shades together, and the single-tone stains are also beautiful and effective. There is no use denying their original beauty at least. People like them, and what people like they have, no matter what artisans may say against the object of their liking.

Creosote has for years been known as a most effectual wood-preservative. It was first introduced in England in 1858, and in America in 1865. It is extensively used in all parts of the world for this purpose. It is a product of coal tar, that wonderful and prolific source of so many useful and beautiful products. The distilling process gives us several grades of the article creosote, containing various hydro-carbons. The odor is unpleasant, pungent and strong, but soon disappears upon exposure to the fresh air. An idea of its remarkable penetrative power may easily be obtained by placing it upon a thin board. In a little while it may be detected upon the opposite side by its odor.

Thus may be seen that for an outside stain, a creosote preparation possesses peculiar value. Linseed oil is the vehicle employed to carry it, and the several beautiful shades given these stains, are obtained from ordinary painters' colors, ground in oil to the last degree of fineness. It is upon this point that transparency of colors hinges. Coarsely ground colors will not give clear translucent shades. This, I believe, is all the secret about the manufacture of creosote combination, but some of them are gas-stains, or are made from petroleum oils, and are not by any means to be recommended. It is difficult, if not impossible, to get lead paint to remain over such stains, or to keep the stain from striking through the lead coat. True, shellac varnish, that universal panacea for all painters' difficulties, good for a cut finger or a damp wall, may be used over the stain to prevent trouble, but the operation is costly, and prevention is much better.

The question of durability having been raised, it is worth while to enquire into this objection. Obviously, being in part creosote, a very lasting matter, creosote stain, coosidered solely from this point of view, is durable. But as to holding its color, that is another question. Probably it does it no better than ordinary paint. Some think not so well. A well known manufacturer of such stains declares that he has known of its retaining its original color for nine years, and he adds that it usually wears well from four to seven years. Much, however, seems to depend upon how the work is done. For instance, wet or green shingles are inimical to good wearing, just as with paint. This same gentleman tells of seeing a painter dipping shingles, one side of which were coated with ice. Where shingles are tied up in bundles, it would be well to untie them, and spread them out to dry, before dipping them. It is not unfrequently the practice, too, to employ cheap labor, such as boys or unskilled men, to do the dipping, and good results must not be expected where such is the practice. A quarter of a century's experience has taught me that it takes a skilled mechanic to sandpaper or putty well ; its not a boy's or laborer's work. Neither is shingle staining, simple though the work seems. Mr. Coppins tells us that he "has seen dry-rot in both stained and painted shingles." This could not possibly occur where thorough work has been done.

There was quite a hue and cry against creosote stains in the city of Buffalo, some time ago, and inquiry elicited the fact that some painters there, of prominence, I understand, had been in the habit of changing the original stains by adulteration, and in one or two cases (I forget which) one manufacturer brought suit, wherea shop made mixture had been substituted for the goods called for by the architect's specifications. This lead the New York Association to discuss creosote stains and staining, at one of their sessions, and Mr. Cabot, the well-known manufacturer, was invited to prepare and read a paper, which he did. Since that I have heard nothing concerning this matter.

Finally, as to the durability of creosote stains, it may be said that careful treatment is sure to render the most satisfactory results possible. The wood to be treated should be thoroughly dry. The stain should be keep stirred, so as to yield uniform color and density of material, and only linseed oil used to thin with. The boy or day laborer forgets to stir the stuff, and the boss puts in coal oil or turpentine. I never yet found a journeyman who did not object to using the creosote stains. It burned his hands or destroyed his eyes. It was poisonous. In part, these charges were true. Creosote hurts the eyes and the skin, but it is not poisonous. On the contrary, it possesses remarkable healing powers. It is efficacious on cuts, burns and sores, when other remedies fail. It at first causes some pain, but this soon passes away and healing begins. It is used to cure meat. Men who work in creosote stain works are healthy, and are never known to complain of the stuff injuring them in the least. They become accustomed to it. Painters would, too, if obliged to use it more frequently. A master painter, Mr. McInness, tell us that it burned his paint pots out. Salt, also would destroy his paint, and salt can hardly be said to be poisonous. Another objection to creosote stain is, that it vitiates water that is intended for curlinary uses. In any case where the water from a freshly painted roof is arranged to run into a cistern, allow the first few rains to run elsewhere, after which no trouble may be looked for. It would not poison a person who should drink such water, it would simply taste or smell unpleasantly. Where gas-tar or petroleum oil stains are used, it is likely that there would be trouble with the water as long as the stain lasted. A paint compound containing tar and petroleum and applied to a flat tin roof, I know to have vitiated the water ever after. Should the creosote stains contain poisonous pigments, such as the chromates of lead, their use would be objectionable on roofs intended to catch water for cisterns. Those stains only should be used that owe their coloring to non-poisonous pigments, such as ochres.

HOUSE DECORATION.

IN the concluding portion of "Studies in Design," Dr. Dresser gives the following wholesome advice to house decorators. The progress of the decorative art rests largely with ourselves. I now speak to decorators. If we make our works worthy of patronage, I believe that patronage will be bestowed upon them. I am often perfectly amazed at the conduct of decorators when they are requested to commence the ornamentation of a room, and can only explain their mode of action by assuming their utter ignorance of the art which they profess to practice. They, upon seeing their client, ask how the room is to be treated. "Do you," they say, "wish a wall paper?" "Shall it be a gold wall paper?" "Do you wish the room light or dark?" "I will send you up a number of papers to choose from, and you can select which you please!" Such utterances can only spring from gross ignorance or a foolish timidity. What should we think if, when a medical man is called to see us, he asked how we would like the complaint treated : what medicine we desire ; and if a tonic, whether we would have bark or arsenic? The decoration of a room is as much bound by laws and by knowledge as the treatment of a disease. A surgeon would not cut off an arm simply because a patient asked him to do so ; he would first ascertain whether it was curable. I have no knowledge of the treatment of diseases ; hence I commit myself to the care of a physician. I have no understanding of law ; hence I employ a solicitor. I am called in to decorate a room ; the client is as ignorant of my art as I am of his. Is it not my duty, then, to tell him that the room will look well if treated in such a way, or that its walls might be of such a color? If we have understanding of our art, it is easy to convince others, who are ignorant, that we have more knowledge of the subject than they have ; but we must be able to show a reason for the suggestions we make. Let it ever be borne in mind that every successful work executed by man is an advertisement of his knowledge and skill, and as such tends to ennoble or exalt him ; and that every work that he does which is offensive, untrue, or degrading —no matter who has dictated it—tends to his debasement, and is an advertisement of what can only be censured and should be avoided. I look to decorators becoming the great teachers of art in the country. If we, as ornamentists, get knowledge, and explain to our clients why we purpose treating their rooms in a particular manner, they will readily consent to the production of artistic rooms ; and when once they have lived in an artistic house, they will never again like the white ceiling and merely papered walls, for their tastes will have improved. Let us do all we can to exert an influence such as shall conduce to the rapid advancement of art amongst us. Let us make our decorations as durable as possible, for that which often wants renewing will never grow in favor. A decorated ceiling will last clean much longer than one that is white ; it is, then, an economy to have such. Honest work, which is the expression of knowledge, when associated with the gentlemanly bearing of the decorator, and gentle persuasion, will accomplish all we seek to achieve.

PUBLICATIONS.

The Review of Reviews for September gives surveys of recent Congressional and State legislation in special articles ; the comparative table of tariff rates, especially, will be found useful for reference purposes, as it shows at a glance all the important changes made by the enactment of the new law.

Mr. Fred T. Hodgson, architect, Collingwood, Ont., has compiled and published a useful handbook entitled "The Hardwood Finisher," which contains upwards of 90 pages of rules and directions for finishing in natural colors and in antique our domestic woods, and also miscellaneous rules for dyeing, gilding and bronzing. Copies of the book may be obtained from the author.

STUDENTS' DEPARTMENT.

SOME ASPECTS OF THE MUTUAL RELATIONSHIP OF ARCHITECTS.

We reprint in part the remarks on the above subject delivered by Mr. Macoicax Anderson in his presidential address to the students of the Royal Institute of British Architects, as follows :

You may be called on to aid by your testimony as experts in influencing judgment for or against your contemporaries. It has ever been—and I suppose it ever will be—the case that men will differ. Even the highest code of morality anticipated this in the qualified injunction. "If it be possible, as much as lieth in you, live peaceably with all men." No doubt there are some to whom the injunction does not apply, inasmuch as to live at peace with anyone seems to be with them a sheer impossibility ; but even with those who are peaceably disposed, circumstances will occasionally arise involving a principle which they cannot concede, and which render it necessary to appeal to the help of others either in law or arbitration. I cannot claim to speak on this subject as an expert, my appearance in Courts of law having happily—although unfortunately, too—been restricted to the discharge of the wearisome duties of a juryman ; but it has sometimes vexed me to hear some of my professional brethern, whom I knew to be men of probity, censured by others for appearing as witnesses and giving testimony against them. Such experiences, which are by no means restricted to the profession of architects, may be thought to be unedifying, and I confess that I regard the relationship as perhaps the least desirable and the most inartistic which an architect can occupy ; but yet I fail to see why the witness should be the subject of censure more than he against whom he testifieth. Is it not the fact that the last named is frequently the original sinner? How can light be thrown on a purely technical point other than by the evidence of experts ; and how can such evidence be obtained if none will appear as witnesses? How can questionable or derogatory proceedings be exposed if reputable men will not come forward to testify against them? Further, why should it be thought strange that men of the same craft should differ in the witness-box, so long as it is a patent fact that in scarcely any topic of ordinary conversation in society will the same view be taken? In this relationship the rule of guidance appears to me to be clear and simple. Do not consent to give evidence as to the works or character of a brother architect unless you are perfectly sure that you can testify from the safe basis of experience, and in the honest belief that what you testify is truth.

No dissertation on the relationship in which professional men stand to each other would be complete without some reference to the subject of professional etiquette. We have heard etiquette condemned. We have been told of the triumph of perjudice and jealousy to the detriment of the welfare of client or patient. We have even heard whispers of the neglect of patients rather than the consultation with the rival practitioner which might have saved life. Such rumors—if, indeed, they are true—are at best but exaggerated indications of exceptions which prove the rule. Etiquette gives honor where honor is due ; it rightly exposes impostors. Etiquette appreciates ability and encourages merit ; it scathingly condemns the individual and the society that live on borrowed plumes, assuming virtue if they have it not. Etiquette generously extends the arm of sympathy ; it would rather cut off the right hand than by word or deed injure others for the sake of personal aggrandisement. Etiqutte recognises all honorable methods of advancement ; it rightly looks askance at questionable expedients of self-advertisement, such as are too frequently resorted to. In a word, etiquette is the standard which unerringly gauges the reputation of professional men. Above the level of the gauge is to be found all that is honorable and commendable ; beneath it is all that is grovelling and unworthy. In the Harveian oration delivered at the Royal College of Physicians last October by Dr. Pye Smith, this subject was so happily delineated that I cannot refrain from quoting the words of the Harveian orator :—"Professional etiquete really means the observance of those rules which distinguish a profession from a trade, which makes our callings honorable as well as honest, which check the art of advertisement and direct our ambition to obtaining the suffrages—not of the public which cannot—but of our profession which can—judge truly, rules of conduct which are, in fact, nothing but the carrying into daily practice of the golden rule, to do to others as we would they should do to us."

PLASTER CORNICES.

Cornices are either plain or ornamented. In order to execute a cornice according to a given design, it is necessary to prepare a mould of several members, which mould is usually made of sheet brass, iron or steel, indented so as to represent exactly the forms and projections of the said members, and fixed into a wooden handle previously described. If the protection of the cornice exceeds 10 in., it is requisite to fix up wooden bracketing to sustain the same. This consists of pieces of wood fastened to the wall on which the cornice is to be formed, about 1 ft. apart, to which laths are to be nailed ; the whole is then covered with a rough coat of mortar, allowance being made for the thickness of the stuff necessary to form a cornice, for which about 1½ in. is generally sufficient. To run a cornice properly two workmen are necessary, who must be provided with a pail or tub of set or putty, and a quantity of plaster of Paris. Previous to using the mould they gauge a straight line or screed on the wall and ceiling, formed of putty and plaster, and extending so far on each as to answer to the top and bottom of the cornice to be formed. On the screed thus formed on the walls, one or two slight pine straight-edges are nailed, and a notch or chase being likewise cut in the mould, forms a guide to run upon. When all is so far ready the putty is to be mixed with about one-third of plaster of Paris, and rendered of a semi-fluid consistency by the addition of clean water. One of the workmen then takes two or three trowels full of the prepared putty on his hawk, which he holds in one hand, whilst with the other he spreads the stuff on the parts where the cornice is to be worked, the workman occasionally applying the mould, to see where more or less of the material is required. When a sufficient quantity has been put on to fill up all the parts of the mould, the mould is worked backwards and forwards, being at the same time held firmly to the ceiling and wall, by which means the superfluous material is removed, and the contour of the cornice completed to the form required. Sometimes it is necessary to repeat this operation several times, in order to fill up such parts as are deficient in the former application.

CEREMONIES ATTENDING THE LAYING OF FOUNDATION STONES.

Among the papers read at a recent Congress of Anthropologists at Berlin, was one referring to the above subject. "The mason's ways are a type of existence," said Goethe, and it was shown by Herr Rowald how from the earliest ages his work was started with due reverence, as if it united time with eternity ; the site consequently assumed more importance than an ordinary spot on the earth's surface. A king of Babylon considered it was worthy of record that he restored a pyramid on the original foundations. To this day what is believed to be the foundation-stone of Solomon's temple imparts a sort of sanctity to a mosque. The Capitol in Rome was four times erected on one site. For two thousand years there has been a temple on the site where Cologne Cathedral stands. Auspicious days were selected for laying foundation-stones, and a survival of the old custom still exists in Hanover, for a builder hesitates about starting a new building on a Monday. As far back as the times of the Assyrians the foundation-stones were accompanied by records, which were sometimes placed in cylinders of clay. From the interest attached to the stones it is no wonder that it became a custom to employ more than one. In Eastern ruins four have been found in positions corresponding with the cardinal points, and in the Bible angle or corner-stones and foundation-stones appear to be synonymous. In some Mediæval buildings twelve were laid, probably in honour of the Apostles. Money and precious stones were liberally employed as offerings, but in some parts of Asia and Africa it was not unusual to offer human sacrifices. In Siam a case of the kind occurred recently, and the custom was common when beginning Buddhist monasteries.

USEFUL HINTS.

Sandpaper is at present made with powdered glass instead sand. Glass is readily pulverized by heating it red hot and throwing it into water, and finishing the powdering in an iron mortar. By the use of sieves of different sizes of mesh, the powder can be separated into two various grades, from the finest dust to very coarse, and these should be kept separate. A strong paper is tacked down and covered with powdered glass of the desired fineness ; when the glue is dry the surplus glass is shaken or brushed off. Muslin is better than paper, and lasts much longer.—Woodworker.

One boiler horse-power or its equivalent every hour will in general heat the amount of space given below in the different kinds of dwellings :—Brick dwellings in blocks, as in cities, 20,000 cubic feet ; brick stores in blocks, 15,000 cubic feet ; brick dwellings exposed all round, 15,000 cubic feet ; brick mills, shops, factories, &c., 10,000 cubic feet ; wooden dwellings exposed, 10,000 cubic feet ; foundries and wooden shops, 8,000 cubic feet ; exhibition buildings, largely glass, 5,000 cubic feet. The above table will answer in general for estimating, although men who figure very closely go into calculations in regard to the actual amount of cooling surface which the building has for the sake of being on the safe side.

Moisture and Masonry.—Water is the most destructive agent to construction. There is no quantity so small which, if repeated, is not ultimately fatal. The softest as well as the hardest material must yield to its insidious attack. No adage more true than "Gutta cava lapidem." Our forefathers knew the connection between moisture and decay in soft material. Hence in the buildings of the districts where the soft stones prevail, the bottom courses of the walls will frequently be found to be formed of a hard and impervious stone, the strata of which are called by the quarrymen foundation-stone. Walls always above or always below water may, under certain cirdumstances, be laid without mortar. When between wind and water they never should.

USEFUL OFFICE BREVITIES.

In all levers the power is in proportion to the length of the arm on which it acts, which means that if the fulcrum is close to the body to be moved, the effect is greater than if it were nearer the balancing point or centre where the lifting force would only equal the downward pressure, increasing or decreasing as the fulcrum recedes or approaches it.

All plumb lines drawn to the earth's surface continue to its centre, showing that walls and other parallel erections are not in reality parallel, and if continued to a sufficient height a difference would be perceptible in the distance between them.

The same rule applies to horizontal lines, owing to the earth's curvature, which is 8 in. to the mile, making all lines drawn parallel to its surface similarly curved.

In making patterns for iron castings the iron in pounds is equal to the same weight of pine in ounces. A hollow cast-iron column is capable of bearing as much strain as a solid cast column of the same diameter.

To space any number of articles the thickness of same being given : Place them closely together and measure their combined width, then subtract this dimension from length of distance to be spaced, and divide the number of articles in the remainder.

A simple way to strike lancet Gothic arches is to join the apex and a point of springing, bisect this line, and draw a line at right angles to it. The intersection of this line with the springing line is the radius point.

To find mitres on the Steel Square.

12 × 12 = Square Mitre.
7 × 4 = Triangle.
13⅛ × 10 = Pentagon.
4 × 7 = Hexagon.
12⅛ × 6 = Heptagon.
18 × 7⅛ or 7 × 17 = Octagon.
22½ × 9 = Nonagon.
9⅛ × 3 = Decagon.

Half an ounce of iron loses one-eighth of its weight in water. A mans daily labor could be performed by 4lb. of coal.

Figures on the square for top and bottom cuts on common rafters :—

⅛ pitch	=	3″ rise	12″ run.
⅙ "	=	4″ "	12″ "
1-5 "	=	4⅘″ "	12″ "
¼ "	=	6″ "	12″ "
⅓ "	=	8″ "	12″ "
½ "	=	12″ "	12″ "
⅔ "	=	16″ "	12″ "
Gothic "	=	21″ "	12″ "

For hips substitute 17in. run for 12ft. run.

When a beam is fixed at one end the strain on it is four times as great than if it were fixed at both ends.

To calculate the area of an ellipsoid or spheroid : Call the base 10ft. and the height 7ft. Then $10^2 \times (7 \times 4) = 296$ sum of square of base and four times square of height $296 \div 2 = 148$ and $\sqrt{148} = 12.1655$ square 100t of 148. Then $12.1655 \times 3.1416 \times \frac{11}{28} = 191.09957$. Square feet and area of spheroid or ellipsoid.

Table of the gravity of wood from cork to lignum vitae :—

	Specific gravity.
Cork	246
Poplar	383
Larch	544
Elm and English fir	556
Mahogany, Honduras	560
Willow	585
Cedar	596
Pitch pine	660
Pear tree	661
Walnut	671
Fir, forest	694
Beech	696
Cherry tree	715
Teak	745
Maple and Riga fir	750
Ash and Dantzic oak	760
Yew, Dutch	798
Apple tree	793
Alder	800
Yew, Spanish	807
Mahogany, Spanish	855
Oak, American	872
Boxwood, French	912
Logwood	913
Oak, English	970
Oak, English, sixty years cut	1170
Ebony	1331
Lignum vitae	1333

To find out how many feet there are in one ton of mahogany :

1 ton = 20cwt. = 35,840 ounces in a ton.

Look to mahogany, and opposite you will find 560, which divided into the ounces in a ton, will stand thus :—

560)35840 = 64 cubic feet. Ans.

To find the weight of a body from its bulk :—

Rule.—Cubic feet × specific gravity = weight in ounces.

To find weight of a log of larch 14ft. long, 2½ft. broad, and 1¼ft. thick :—

2.5ft. × 1.25ft. × 14ft. = 43.750 ; then,
43.750 × 544 = 23800 ounces =
13cwt. 1qr. 3lb. 8oz. Ans.

The standard of specific gravity of bodies is water, one cubic foot weighing 1,000 ounces.

"GEOMETRICAL DECORATED" WINDOWS.

The important subject of the due subordination of the mouldings of Decorated windows was very ably worked out by Edmund Sharpe, though at the present day, when Gothic principles are so well understood, some of his comments may appear to give almost elementary information. He remarks on page 51 that "the different orders of the window arch seldom consist of the same mouldings, and do not often even resemble each other. This is, perhaps, less the case with the earliest windows than with the later ones." He proceeds to say, "On the other hand, the rich series of curvilinear arch-mouldings, commencing with Carlisle and ending with Beverley, exhibit profiles of great variety and beauty". Further on, "As soon, however, as the double ogee began to be a prevalent curve, the practice of repetition in the orders of mouldings, both of windows and doorways, became again very common." All this is very interesting. In some thirteenth century work there is good reason for saying the mouldings have the effect of bundles of reeds tied together, and this complaint is justified by their sameness, also by the want of proper prominence and boldness to the leading members of the several groups of mouldings. Again, page 53, Sharpe says, "The section of a tracery bar is usually the same on both sides. This rule, which may be said to obtain throughout the whole of the curvilinear period, has its exceptions in the Geometrical period. Occassionally the circular centrepiece has a different series of mouldings on the inside and on the outside. . . . Where, also, two orders of Foliation are used, not occurring together, a tracery bar will sometimes show a different profile on its two sides." Even were there no Mediæval precedent for what Sharpe has described, there can be no reason whatever why, when the architect thinks fit, he may not act according to the particular circumstances. For example, the employment of what has sometimes been called "edge-tracery" (*i.e.* where the fillet is dispensed with the plain chamfers or hollow chamfers, as the case may be, meet in an arris) is very useful where the tracery requires to be lightened, more particularly in wood-work. For the same mouldings can be used in the same window with or without the fillet. What is somewhat unfortunately termed a "false" mitre is also handy in those parts of tracery where the plan just mentioned does not suit, so as to get a perforation. Even although an architect gives a drawing of the tracery half or full size, he is sure to find that he can improve it when he has seen the masons set it out full size on the boards, as every architect ought to make a point of doing if he possibly can. It is very apparent that much of old Geometrical tracery was never struck in by compasses, and varies in outline where, according to rule it ought to be the same. In modern practice such a procedure is undesirable, but at the same time it will be found that an occasional deviation from compasses is a decided help. It was just remarked that some license might be taken in lightening tracery, but, on the other hand, there is occasionally an advantage in giving, at any rate, an appearance of strength where desirable by refraining to pierce according to routine. What ought to be avoided is any "cut-and-dried" look to a window. It should show the evidence of the care and thought bestowed upon it by the designer, and not look as if turned out from a mill. To make one last quotation from Edmund Sharpe :—"Much ingenuity is often shown in the manner in which these three members of a traceried window [*i.e.* window-arch, scoinson-arch and rear-vault] are respectively arranged and united with its lower part and with one another ; and the subject is one which deserves more attention and study than is usually bestowed upon it." These words might be written in letters of gold, so true are they. But, happily, since they were penned architects have begun to pay a good deal more attention to the point Sharpe alludes to than they did then. But, with the best intentions, what can the unfortunate architect do who is tied and bound by want of funds placed at his disposal? It is most difficult to find room for a window-arch well recessed from the exterior, an ornamental rear-vault, and a bold drop-arch for internal effect—for it means walls of substantial thickness. The successful treatment of a scoinson arch is important, for it gives a charming variety, and prevents a too large soffite where the window is placed at a considerable height. If treated in combination with an order of tracery distinct from that of the exterior of the window the effect is the more enhanced, as it gives that slight feeling of mystesy which is so valuable an aid to the architect.—Builders' Reporter.

Mr. Horwood, architect, recently from New York, has opened an office at 90 Bank Street, Ottawa.

It is understood that the Owen Sound Portland Cement Company, whose works were destroyed by fire recently, is being reorganized under the name of the Georgian Bay Cement Co., with a capital stock of $90,000.

MANUFACTURES AND MATERIALS

WIRE NAILS.

THE increasing use of wire nails to the exclusicn of cut nails cannot be explained says the Architect, Builder and Decorator, by the rules that commonly govern the substitution of one line of gonds for another which has had the field for so long as did the cut nails. It is no uncommon thing these days of advertising to see an old favorite driven from the market by a new and perhaps inferior article, through the judicious use of ink; while a really good article, well established in the esteem of the public, must be liberally advertised in order to hold its own. In this use of nails, however, no advertising seems to have been done, while what little investigation of the relative merits of the two kinds has been made, all seems to have given testimony in favor of the old style of nails. In spite of the fact that repeated tests have shown the cut nails to hold more than the wire nails of the same length and weight, and in spite of the weight of tradition on their side, which is usually of itself sufficient to hold the market for useful articles against any ordinary effort, the wire nails have pretty much driven the others out. Some dealers do not keep any considerable assortment of the cut nails, and others declare that they do not sell a fifth as many as of wire nails. It will not do to say that the favor shown by builders is all a mistake, and accept the testimony of the testing machines as altogether conclusive. There must be something upon which to found the very general belief prevalent among the people who use nails, that the wire nails are the better. Possibly the evidence of the retailer as to the relative condition of packing boxes put up with the two sorts of nails on their arrival at the end of their journey, may have weight. The difficulty the carpenter finds in pulling down his staging when built with the wire nails may be evidence to him of their staying powers. Whatever the cause, he thinks the wire nails will hold more than the others. When the wire nails were first generally introduced, they had only cut nails of the very poorest material to compete with, but that is not the case now, for there is no difficulty in getting cut nails that will clinch almost as well as the old "wrought" variety. In the larger size nails, the number to the pound of a given length is about the same, but in the sizes more commonly used there is a considerable difference in favor of the wire nails—enough to make them the cheaper at anything like the same rate per pound. The present popularity of the wire nails is such that the cut nails must be specified if one has any hopes of securing their use on buildings. That the cut nails of a given length are better for the general purposes of a building, there would seem to be no reasonable ground for doubting, being as they are, so much stronger when driven home. Nails are not expected to hold in a building after they are half pulled out. The "coated" or "cemented" wire nails would probably be of advantage in some building work, as although a more slender wire than the ordinary nails of the same length, their hold when driven home is allowed by all who have tested or used them to be phenomenal. So far as we have observed, they are, however, hardly known among builders. For such places as the lathing of an ordinary ceiling they would add greatly to the security.

A method of drawing designs on glass with an aluminium pencil has recently been brought out in France. This metal, like cobalt and some others, has the property of leaving a metallic trace, like that of a lead pencil, on glass quite free from grease, and the trace is so adherent as to be practically permanent if not removed by hydrochloric acid. The pencil employed has a rotary point, which is found to make the metal adhere better than a fixed point, as in the ordinary pencil.

HOW SLATE IS MINED.

The manner in which slate is mined and cut up for purposes to which it is applied is a process that is known to only a few people, because slate is not found in many places in this country, its principle source being in upper New England and Pennsylvania. It is not taken out of shafts but is quarried out of big holes in the earth.

The slate is blasted out in huge blocks, and is hoisted out by steam and turned over to the men who know how to reduce it to the proper size. Huge blocks of it are taken in hand by these workmen, who cut a niche into one end of each piece. Then they take a chisel and a mallet, and they are so skillful in directing their blows that they can split the blocks of slate in almost any way they please.

If you watch the slab on which one of them is working you will see a little hair line running through it, and presently the block will fall apart on either side of this mark. The workman will make this line straight through the middle or to either corner just as he likes. I do not know just how he does it, but he invariably accomplishes what he sets out to do.

The smaller pieces thus produced are taken in hand by another set of men, who split them up into sheets of the proper thickness for roofing slate. This they do with a long-bladed instrument about the shape of a putty knife, but many times larger, and if you saw them do it you would marvel how they got the sheets off without breaking them, and also how they could split them so thin. Some of these men can take a sheet of slate only one inch thick and split it thirty-two times. The usual number of divisions is sixteen. These sheets are taken and cut into squares by machinery.

Wherever there are slate quarries you will find a great many Welshmen, for the best slaters come from Wales. Boys follow the trade of their fathers, and there are whole families and settlements who know no other means of earning a living. —Exchange.

A size of shellac varnish would be useful on a fresh wall. Ordinary liquid wood filler is often used for this purpose. A coat of boiled oil is preferred by many painters for a size. But these oily surfaced sizes are hardly adapted for wallpaper, unless cut on surface with sandpaper. For water colours a varnished or painted wall is always an ideal wall, because of the absence of suction.

Hayes' Patent Steel Lath . .

HAS NO EQUAL IN ANY PARTICULAR

. . . Used in more important buildings . . .

. . . THAN . . .

all other styles of metal lathing combined.

SOLE MANUFACTURERS

THE METALLIC ROOFING CO.

OF CANADA, LIMITED.

BRANCH OFFICE: 706 Craig Street MONTREAL

HEAD OFFICE: 82 to 90 Yonge Street TORONTO

Send for Samples and Prices

$ $ $

ARE MADE AS THE RESULT OF JUDICIOUS ADVERTISING

READ WHAT ADVERTISERS SAY:

OFFICE OF

TORONTO FURNACE AND CREMATORY COMPANY (LIMITED)

CONTRACTORS FOR ALL STYLES OF STEAM, HOT WATER, COMBINATION, AND HOT AIR HEATING. HEADQUARTERS FOR BUILDERS' AND GENERAL CASTINGS, COLUMNS, BEAMS, GRATINGS, SASH WEIGHTS, ETC.

SOLE MANUFACTURERS IN CANADA OF THE "ENGLE" CREMATING FIRE GLOBET.

TELEPHONE 1907.

8 AND 10 QUEEN ST EAST.

Toronto, June 21st 1894

C. H. Mortimer Esq
Canadian Architect & Builder
Dear Sir,

Answering yours of 19th we are pleased to say we find your weekly edition The Contract Record an excellent advertising medium. The inquiries received from all parts of the Dominion convince us it is the best available means of reaching all parties requiring builders or contract supplies. It goes directly to the purchasers. Yours &c

Toronto Furnace Co
J. McCutcheon Secy

MORESQUE PLASTER DECORATION.

THE Moors employed plaster for the decoration of both the exterior and the interior of their structures, not only for the simple expression of form, but as a basis of polychromy. At Segovia there are several good specimens of exterior decoration, and it will not be out of place to particularize one. The front walls of the Alcazar are covered with a diaper in plaster with most artistic effect. Probably the work was wrought by means of a frame, either of metal or wood, in which the requisite pattern had been cut, as is done with stensils. This pattern was placed flat on the face of the plaster as it dried, and the pattern was cleverly incised, as it were, through the openings. It could also be pressed on the plaster until the surface pattern was impressed. The composition of the plaster for such purposes was doubtedly cared for, as well as the manipulation, for the durability of it has been tested by many centuries of exposure. A band of such ornament can be carried across brickwork, or round a brick-built tower, as it was by the Moorish artists. Examples of such application can be found in plenty, and it is always richly effective. The Moors showed fine judgment in the use of this ornamentation in relation to the whole building on which they applied it, not being led away by the facility they thus had for the employment of detail, but, using the work in uniform masses, or bands, they avoid any expression of pettiness by profuse and meaningless variety.

For the interior courts and chambers mural decorative work in plaster was of fine quality, and was cut and carved in situ by the artist; it was simply sculptured on the spot as stone or alabaster might be carved, no mould being used. The capitals of the columns were thus produced in delicately intricate work. At Toledo there is a synagogue that was constructed in the twelfth century by Moorish artists, and was afterwards forcibly seized and converted to Christian uses, where the application of plaster work of this kind is exemplified with conspicuous effect. The spandrels above the arches are all original carvings of arabesque pattern, showing delicate undercutting as well as surface work of peculiar beauty. In all parts of the structure there is that delightful variety in detail with unity of effect such as artistic handwork can give, but which mechanical repitition will not achieve. The mere play of light and shadow on such a carved surface, if it be white or of a uniform light tint, has a charm of its own; but when the carving is emphasized by colour the effect is most powerful. It is the principle of the work, not existing specimens of it, that we should copy; the same principles that we may see practically illustrated in the Alhambra, and equally in other Mahometan structures. We may not require the splendid harmonies of those wonderful walls for our purposes, but we should none the less learn from them to produce what we do want. We do want art in our plaster work. That plaster may be used truthfully and artistically we may learn from the

CREDIT VALLEY BROWN STONE

From Carroll & Vick's No. 6 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure	Height.	Crushing Load.	Crushing Stress per sq. in.	Average Crushing Stress per Square Inch
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	2⅞ × 3	2⅞	131,000	15,188	
C	2 1/16 × 3	2⅞	130,000	14,751	
D	3 × 3	2⅞	133,000	14,777	14,905

14,905 pounds is the average crushing strength per square inch of our Credit Valley Brown Stone.

The highest standard of test attained by any pure Sandstone in America.

IN confirmation of the facts above stated, we have pleasure in directing your attention to the accompanying table, showing the result of the test of our stone, in connection with the series of tests of building stones conducted in 1892 at the School of Practical Science, Toronto, under the direction of a committee of the Ontario Association of Architects.

By referring to the results of the tests above mentioned, it will be seen that the average crushing stress of the majority of Canadian and American sandstones is far below that of ours, the difference in our favor ranging from 75 to 50 per cent.

The Credit Valley Brown Stone, owing to its modest tone, harmonizes beautifully with red or cream colored brick.

It has been reported that there is difficulty in obtaining Credit Valley Brown Stone. To correct this mistaken notion, we wish to state to architects and the public that we have a large quantity of stone ready to ship on the shortest notice, which can be followed up with an unlimited supply. Last year we made extensive additions to our plant and opened up new quarries and mines, and will supply promptly all orders given to us or our agents.

CARROLL, VICK & CO.

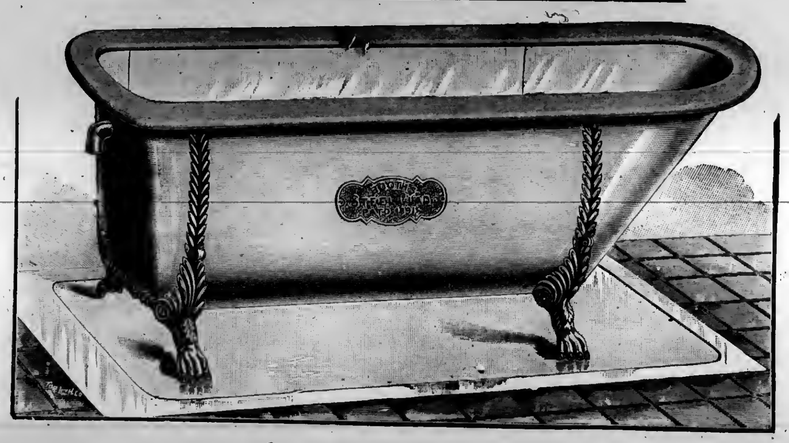
Quarries: Credit Forks, Ont. Office: 84 Adelaide St. West, TORONTO.

Montreal Agents: T. A. MORRISON & CO., 118 St. Peter Street.

THE . . .

"STEEL-CLAD" BATH

Booth's



Patent

. . . MANUFACTURED BY . . .

Toronto Steel-Clad Bath and Metal Co., Ltd.

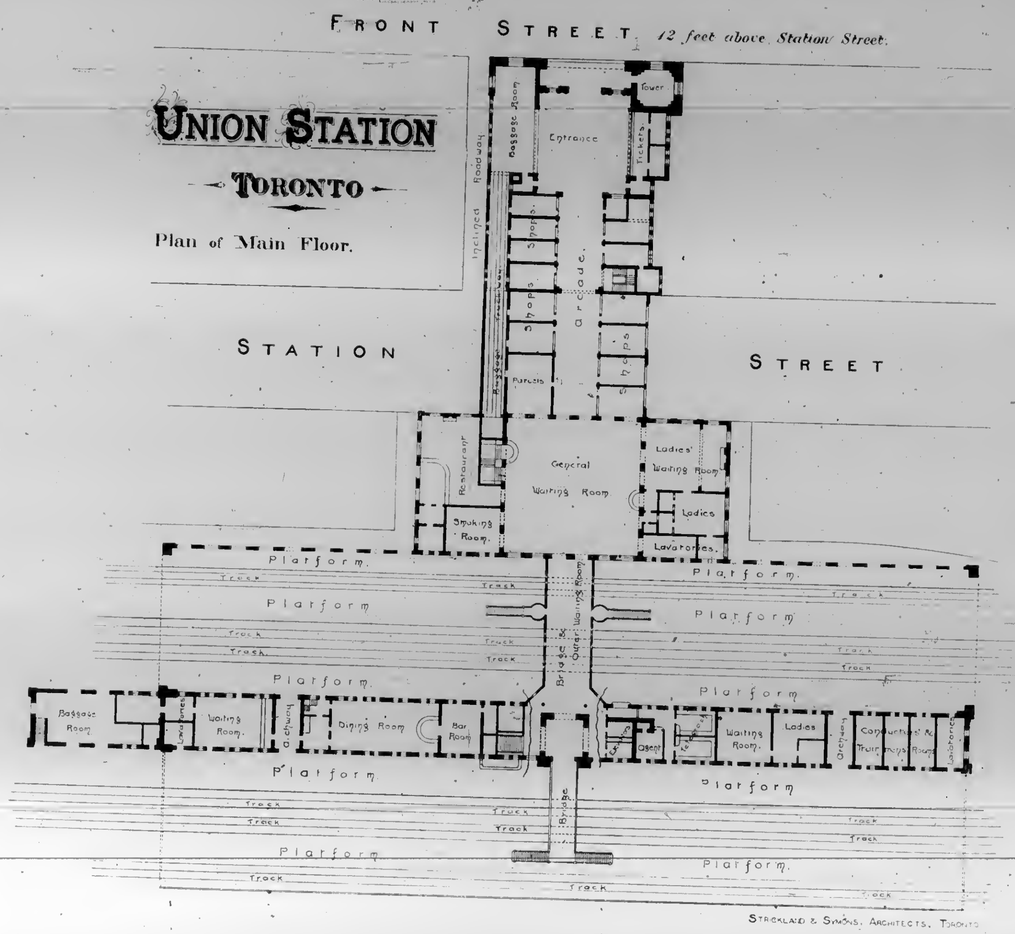
123 Queen Street East, Toronto.

MONTREAL ST. JOHN, N. B. QUEBEC VICTORIA, B. C.

ADDRESS ALL COMMUNICATIONS DIRECT TO THE COMPANY.

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

UNION STATION
TORONTO
Plan of Main Floor.

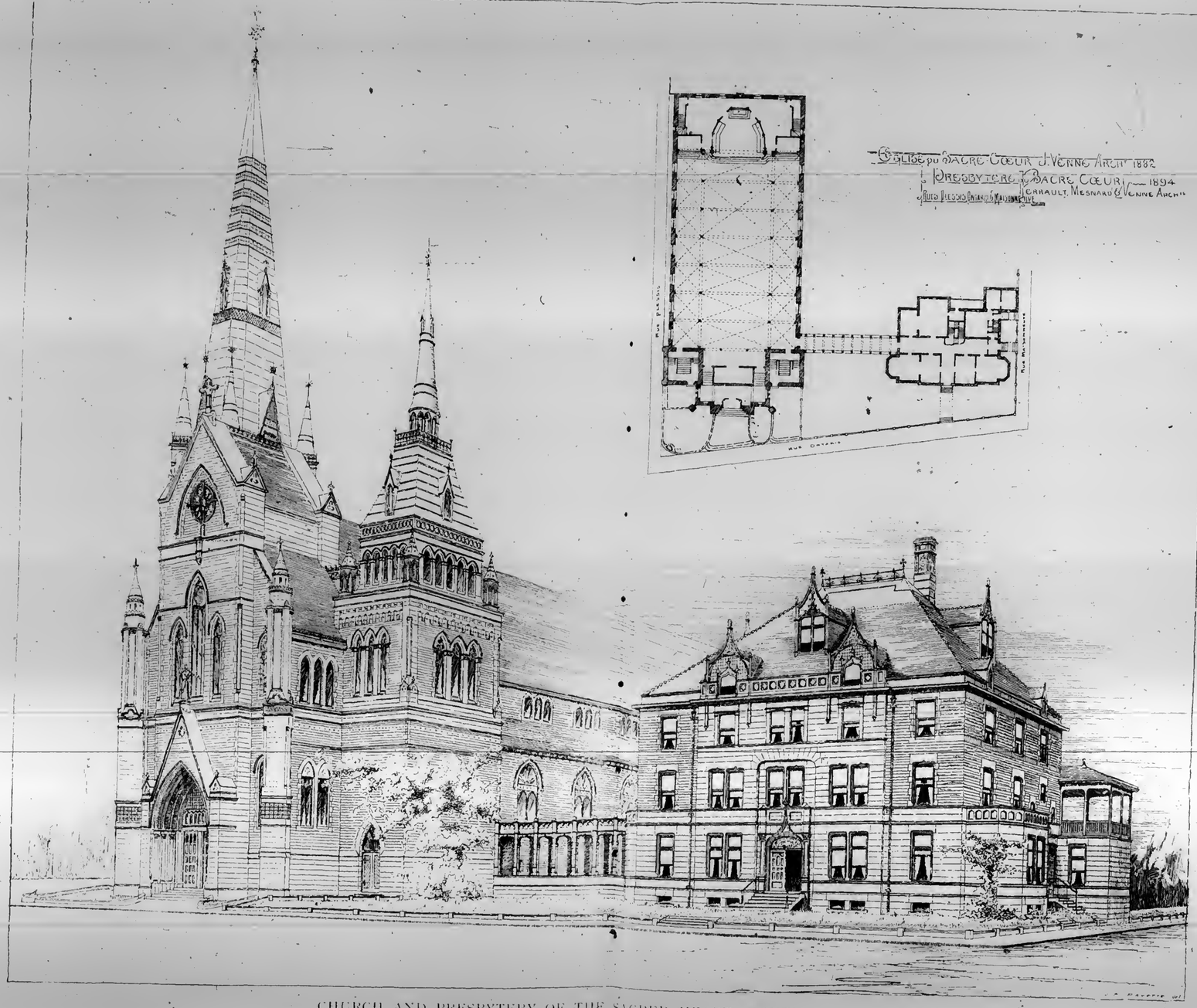


STRICKLAND & SYMONS, ARCHITECTS, TORONTO

UNION RAILWAY DEPOT, TORONTO, CANADA.

STRICKLAND & SYMONS ARCHITECTS, TORONTO.

ÉGLISE DU SACRÉ CŒUR J. VERNE ARCH^T 1882
PRESBYTÈRE DU SACRÉ CŒUR 1893-1894
PERRAULT, MESNARD & VERNE ARCH^TS



CHURCH AND PRESBYTERY OF THE SACRED HEART, MONTREAL, QUE.

PERRAULT, MESNARD & VERNE, ARCHITECTS, MONTREAL

CANADIAN ARCHITECT AND BUILDER.

VOL. VII.—NO. 10. OCTOBER, 1894 PRICE 20 CENTS $2.00 PER YEAR.

THE
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2259.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	EDMUND BURKE, Toronto.
1ST VICE-PRESIDENT	J. E. BELCHER, Peterboro'.
2ND VICE-PRESIDENT	W. A EDWARDS, Hamilton.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI	Ottawa.
FRANK DARLING	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON	Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

A. F. DUNLOP	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
L. Z. GAUTHIER	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. McLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
WM. PARK, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JOHN ALDRIDGE.
JAS. CRANG.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
JAS. THOMSON
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this Journal is mailed each week to persons mentioned in the CONTRACT RECORD'S reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

RECENT tests at the School of Practical Science, Toronto, of samples of porous terra cotta brick of ordinary red brick size, for use as interior linings of brick and stone walls, are said to have demonstrated the fact that these bricks have an average ultimate crushing strength of 12 tons per foot, and that a 6-inch arching is sufficiently heavy for ordinary office building construction.

IN the present number is printed the first of a series of articles which will appear regularly in succeeding issues of the ARCHITECT AND BUILDER, over the nom de plume of "The Bystander." These articles will be written in the form of notes by a member of the staff of this Journal, and will treat of architectural and kindred matters of current interest. The publisher will appreciate any information which friends of the ARCHITECT AND BUILDER may place at "Bystander's" disposal, and which would assist him to give interest and value to his department.

IN our illustration pages will be found portraits of all but two or three of the officers of the British Columbia Institute of Architects. We regret our inability to include in this group portraits of *all* the officers of the Institute, owing to the failure of some to respond to repeated requests for photographs. After delaying publication for several months in the hope of being able to complete the group, we have been obliged to present it in the somewhat unsatisfactory form in which it appears in this number. Friday, the 2nd of November, has been fixed as the date on which the annual meeting of the Institute will be held in the City of New Westminster. We hope to be able to print in our November number an account of the proceedings.

THE citizens of Montreal are considering whether or not they will hold an Ice Carnival during the coming winter. To those who favor such a project we would say, don't do it. No doubt the festivities of these Carnivals are pleasing to many and attract a large number of visitors to the city, but the advertising usually done for the occasion is of a kind calculated to do Canada more harm than good. It is unfortunately true, that outside of this country the opinion of the majority of people is that we are entitled by climate to the exclusive use of all emblems suggestive of cold weather. This is not more true of Canada than of many other countries. In proof of this statement we can point to the variety of crops that are produced here, including all fruits grown outside of the tropics. There is a habit, altogether too prevalent among our people, of representing life in Canada, or thoughtlessly allowing it to be represented, as if the distinguishing characteristic of the climate were extreme cold with almost perpetual snow and ice. We are all familiar with such representations in many Canadian pictures. We wish to protest against such a setting for Canadian works of art, whether in print, on canvas or in more enduring forms, and would like to see our people and artists in every line co-operating to correct the wrong impressions, which, as stated, are already too widespread. Our aim should be to show Canada to the best possible advantage at every opportunity.

THE voters of Chicago are to decide next month whether or not they will erect a new City Hall and Court House at a cost of about five millions of dollars. It is proposed to remove the present Municipal and County buildings which were completed eighteen years ago at a cost of three and a half-million dollars or so, and rebuild on the same ground. All the world knows that Chicago has had a marvellous growth within the last eighteen years, but it is not for this reason alone that a new City Hall is wanted. The buildings to be removed have been undergoing repairs almost constantly since completion. The manner in which the Corporation is setting about the proposed new work is likely to result in another gigantic failure so far as securing the best possible design and economy in the expenditures are concerned. Advertisements are out for a farce competition which will probably secure one set of plans and one estimate, duplicates of plans which, it is understood, the committee in charge already have in their possession and intend to use. The great need in the erection of large public buildings here or anywhere else, is honest competition for architects and contractors, and no effort should be spared to bring about these conditions.

ONE of the principal features of the annual convention of the Province of Quebec Association of Architects this year, was the exhibition of architectural drawings in the galleries of the Montreal Art Association. We are pleased to notice that in addition to the large exhibit of the work of local architects, a considerable number of drawings were contributed by members of the Ontario Association of Architects. The exhibition was attended by a large number of leading citizens, and cannot fail to serve a useful purpose in arousing public interest in the work of the profession and in architectural matters generally. This is one of the objects which the O. A. A. at its last meeting proposed to attain by means of a series of public lectures. It might not be out of place for us to suggest to the O. A. A. the advisability of undertaking an enterprise similar to the one which has been so successfully carried out in Montreal. No doubt the authors of many of the drawings which were exhibited at Montreal, would consent to have them come to Toronto. It is several years since anything in the line of a public exhibition of architectural drawings was attempted here, and there consequently exists the better opportunity for a successful effort in this direction. Reverting to the Montreal meeting, it is to be regretted that there were not more papers, and that the opportunity for a profitable discussion on the two excellent papers presented by Messrs. Baillairgé and Taylor, was not taken advantage of.

A NEW organization was formed in New York last month to be known as "The Employers' and Builders' League." The purpose of its formation is that by careful, conservative action, the interests of owners, contractors and journeymen may be conserved; also that by arbitration and discussion all necessity for strikes, lock-outs, liens and disputes may be avoided. One provision in the constitution of the league in favor of workmen is as follows: "The directors may nominate, appoint and remove when expedient, four journeymen in each craft, who shall be representative conservative men, to be known as master stewards, and these men shall be the recognized medium of communication between the Board of Directors and the journeymen." The organization is purely defensive, with the object of securing fair play for employers and employees. Union or non-union men will all be treated alike. A strong provision in favor of employees is, that every man will have a guarantee from the organization that he will get his wages. The membership roll includes fifty eight employers and every branch of the building trades. We do not understand just why the objects sought for could not have been as well promoted by and through the New York Exchange of the National Builders' Association, but the fact that another organization was considered necessary by a large number of the most prominent New York builders convinces us that the field for its usefulness is plain and raises the question again, why should not Canadian contractors be more generally and thoroughly organized? It would be simply absurd to say that the conditions are so different with us that contractors do not need to work for each others' interests on the lines that are followed elsewhere. The conditions are not likely to be just the same in different large cities or in different parts of the country, more or less remote from each other, but as between Canada and the United States the situation will average very much alike. We firmly believe as much good can be accomplished in Canada for contractors and builders through better organization, as in any other country. It is not our purpose in this connection to set out in detail our reasons for this opinion. We have had occasion to refer to some of them in former issues and will probably do so again in the future. We would be glad to assist by all possible means in promoting a greater interest in this question among contractors, and should they provide a suitable opportunity, will endeavor to point out some methods which could be adopted with benefit to all parties interested.

THE statue of Sir John Macdonald, which was unveiled in the Queen's Park on Saturday, 15th inst., before an assemblage variously estimated at from 15,000 to 18,000 people, and with appropriate ceremonies and speech-making, is the work of Mr. Hamilton McCarthy, R. C. A., the well-known and talented Canadian sculptor. The site selected for the statue, directly opposite the Queen's ave., and in front of the Ontario Legislative Buildings, could hardly have been more prominent or favorable for a purpose of the kind. The criticism, indeed, has been made, that the position is so exceptional that it ought to have been held for a statue of Her Majesty. The work of the sculptor is spoken of in kindly and complimentary terms by those capable of judging of its artistic merits, and it is undoubtedly a marked advance on the statue of Egerton Ryerson, also from the hands of Mr. McCarthy. The statue itself, the work of a Canadian artist, so also is the pedestal entirely a Canadian production. The granite was quarried in the Province of Quebec and was shipped to this city in its rough state. The designing, cutting, polishing, and the whole of the work was done in this city by D. McIntosh & Sons. These unveiling ceremonies naturally suggest a reference to the excellent paper in another column, "Notes on Some Aspects of the City of the Future," by Mr. A. T. Taylor, and which was read before the Quebec Association of Architects at the meeting this month. The particular suggestion of this paper is that the time has arrived, when, in all our larger communities, there ought to be in existence a committee, which will constitute a special artistic authority or tribunal, who will decide in the matter of selection of our monuments, statues, and the embellishment generally of our streets, public squares, etc. Mr. Taylor pertinently remarks: "How intelligent men will consult lawyers on all legal questions, doctors on matters of health, engineers on matters of drainage, hydraulics and machinery, but on matters of art and taste think they are quite capable of judging for themselves". Such a committee, it is to be expected, would be composed of men who were experts in artistic pursuits Were a committee of this character in existence in many cities of Canada, as well as elsewhere, future generations would not be called upon to ask for an explanation why this manner of designing some public building, locating a citizens' park, or placing some statue or monument, had been done with so little regard to esthetic and artistic thought and observation. In how many cities are large amounts of money wasted in undoing, in the line of public work, what had been improperly done in the first place. In this respect the question has an economic bearing that must touch the pocket, even though the artistic organs, to employ the language of the phrenologist, have been but poorly developed. The suggestion, as Mr. Taylor has pointed out, is not chimerical, as a scheme of the kind is in operation in Boston, and New York has also a municipal art society "established with the express object of providing adequate sculptural and pictorial decorations for public buildings and parks." The argument is sometimes used that in the newer cities public affairs are conducted on too utilitarian a basis to permit of thought in artistic directions. Those in the newer cities, profiting by the experience of older communities, might well avoid the mistakes made in this manner, and if no other influence will move the people there is abundance of force, as has already been suggested, in the purely economic and financial bearings of the question.

Sandpiper is at present made with powdered glass instead of sand. Glass is readily pulverized by heating it red hot and throwing it into water, and finishing the powdering in an iron mortar.

MR. CHARLES BAILLAIRGÉ.

WE have pleasure in presenting to the readers of the ARCHITECT AND BUILDER the accompanying portrait of Mr. Charles Baillairgè, the newly-elected President of the Province of Quebec Association of Architects. Mr. Baillairgé was born in the city of Quebec, on the 27th of Sept., 1826, and received his early education at the Quebec Seminary. Subsequently he engaged in the study of surveying, architecture and engineering. Many of the principal churches and other public buildings in the city and province of Quebec were erected from his designs. In 1866 Mr. Baillairgé was appointed City Engineer of Quebec, a position which he still holds. He has found time in the midst of a life of unusual activity to contribute to the technical societies and the technical press of this and other countries a number of valuable papers on a variety of subjects. He is likewise the author of several books.

We are pleased to observe that Mr. Baillairgé is keeping in view the important subject of the proper education of the rising generation of architects, and we hope to see some definite action taken during his term of office in the direction of providing the means of imparting to students the knowledge without which they cannot properly rank as architects.

MEASURING AIR.

SPEAKING of the work of the Massachusetts State inspectors of public buildings, the Boston Journal of Commerce says that, in inspecting the means of ventilation in a school house, great care is taken by the inspectors to secure all the data for an accurate and intelligent report. The barometric pressure, temperature, and relative humidity of the outside air are first taken, together with the force and direction of the wind. The location of the building as to points of the compass, the position and direction of the fresh-air ducts, and location of the inlets and outlets in the rooms, are also noted. Upon entering the room to be examined, thermometers are placed in various positions, on the inlets and outlets, at the teacher's desk, at the breathing line and floor among the pupils, and near the outer door.

MR. CHAS. BAILLAIRGÉ.
President Province of Quebec Association of Architects.

Careful measurements are then made of the volume of air supplied to and removed from the room by the ventilating apparatus. These measurements are made by taking the velocity in feet per minute of the air at the inlet or outlet by a standard anemometer, and then multiplying this velocity by the average working area of the opening in square feet.

For example: The inlets and outlets are usually covered by wire gratings or by ordinary register facings, which obstruct, to some extent, the flow of air, and it is seldom the case that the air is found to be flowing alike through all parts of the opening.

Proper corrections being made for these variations, and for the running of the anemometer, a very close approximation to the actual volume of air passing through may be obtained.

After keeping the doors and windows of the room closed for one hour, a test is made to ascertain the amount of carbonic acid in the air, the amount of this gas present being considered as a fair index of the other and more dangerous impurities in the air of the school room.

This test, unless great accuracy is desired, is usually made with an instrument invented by Professor Wolpert, and called, for him, a Wolpert air-tester. This instrument is very simple, consisting only of a glass test tube, on the bottom of which is a black mark, an inner tube of glass, and a rubber bulb, all of a specified size, and a stand in which to hold the tube.

The test tube is filled to a certain height—marked on the tube—with lime water, and by means of the inner tube and bulb air from the room is passed through the water until, by the formation in it of carbonate of lime, the water is rendered so opaque that the black mark or spot cannot be seen.

A table, furnished by the inventor, shows by the number of times the bulk has been filled how many parts of carbonic there are in 10,000 parts of air.

There are various sources of error, both in the measurement of the volume of air and in determining the amount of carbonic acid, which have to be carefully guarded against by the inspector.

This has been so well done in testing the air that in a large number of tests made with a Wolpert tester at the same time that samples of air were taken for chemical analysis, the average difference between the amount given by analysis and by the Wolpert-test was only 67-100 of one part in 10,000.

Tests to show the circulation of the air through the room are also made, usually by means of gunpowder smoke.

The report of the inspector, when complete, gives, in addition to the outside conditions already noted, the volume and temperature of air supplied and removed, the temperature of the room, the relative humidity of the air, the amount of carbonic acid found in it, and the results of the tests for circulation.

For determining the barometric pressure, relative humidity, and temperature, and also for measuring the flow of air into and out of the room, the very best and most accurate instruments to be procured are furnished to the inspectors by the State.

These gentlemen by long practice and habits of close observation have become very expert in the use of the apparatus employed in testing air supplies to school houses and other buildings, and they are also equally expert in regard to methods and systems of heating and ventilation, their wide experience placing their knowledge and judgment in such matters far above those of men of limited experience in such matters, or mere theorists.

PERSONAL.

The death is announced of Mr. John E. Turnbull, Inspector of government Buildings, in the maritime provinces. Mr. Turnbull was a native of St. John, N. B., and lived in that locality the greater part of his life. He established the first planing mill in New Brunswick. He had reached the advanced age of 76 years.

The marriage is announced on the 18th September, at Rusholme Congregational church, Manchester, England, of Mr. J. C. B. Horwood, architect, Toronto, Ont., to Mary Ethel, eldest daughter of Mr. John Jones, Manchester. The CANADIAN ARCHITECT AND BUILDER would express the hope that, to Mr. Horwood and his bride the perspective of life may never appear less pleasing than at present.

In connection with the mention made in the ARCHITECT AND BUILDER for September of the materials which are being employed in the erection of the new Union Depot at Toronto, it should have been stated that Don Valley pressed bricks and terra cotta manufactured by Messrs. Taylor Bros., of Toronto, are being used in the building.

THE test of steam-pipe coverings, says Heating and Ventilating, leads to the conclusion that it costs $15.48 to run one hundred of naked two-inch pipe at from 70 to 80 pounds pressure for one year of 3,000 working hours, with coal at $2 per ton. With the least efficient of the coverings used in the test, this loss could be reduced to $4, with the most efficient to $2.64. Striking as are these figures they are probably below cost of actual practice, for steam pipe is under pressure usually more than ten hours a day, and $2 per ton is below the average cost of coal. Prof. Charles B. Gibson, in some tests made for the Manufacturers' Mutual Insurance Company some years since, reached the conclusion that with coal at $4 per ton and 3,000 working hours per year, the loss from a naked two-inch pipe was 6½ cents per linear foot, considerably more than Mr. Dickinson's test would show even with coal at $4 per ton. However, the lowest of the estimates shows the importance of covering the pipes and it is a good thing to attend to before the present loss is increased by the coming cold weather.

THE BYSTANDER.

THE interest manifested by Canadian architects in the suggestion to throw open to competition designs for our national buildings, shows that many among the profession have been thinking along the same lines as Mr. G. F. Stalker, of Ottawa, in his article in these columns last month. The Bystander has talked with a number of architects recently, and they have been, without exception, of one mind on this question. The only point on which any seemed desirous of being guarded in their expressions was in their references to the present government architect, of whom all spoke in the highest terms. On this point, it was clearly shown how the force of agitation for a desirable reform may sometimes be broken by the faithfulness and ability of a public official, just as agitation for some reforms have their inception in the incapacity of an officer, where, perhaps, the system itself may not be faulty. As President Burke, of the Ontario Association of Architects, said to the Bystander, "There is a wide difference between the gentleman at the head of this department of the public service in the Dominion, and Supervising Architect O'Rourke, of the Treasury Department of the United States." "But then," continued Mr. Burke, "the principle involved in the suggested change is the same, whether in Great Britain, the United States, or Canada. And loyalty to the most efficient public servant ought never to be allowed to stand in the way of attaining that which principle establishes as right, and experience has shown is wise. In Great Britain the practice of giving the profession generally an opportunity to exercise their talents in designing for public buildings has proven an undoubted gain to the mother land, financially, and also from a strictly professional point of view, in securing a better class of buildings in every respect."

× × × ×

Other architects with whom the Bystander talked were just as definite in their statements as the President of the Architects' Association. If the subject is to be discussed from a public standpoint, there can be little question that the change is imperatively needed, and no doubt this fact has had much to do in securing the passing of the United States bill, a very clear outline of which was given by Mr. Stalker in the article published in last month's ARCHITECT AND BUILDER. En passant, it may be remarked, that the estrangement of opinion between Secretary of The Treasury Carlisle and Supervising Architect O'Rourke has at last culminated in the head of the Treasury Department summarily removing Mr. O'Rourke, and the Architects' Bill, it may be generally conceded, has now, practically, become law. Mr. Glenn Brown, who entered into the question of architects' charges, exhaustively, in the American Architect and Building News of some few months since, comparing cost of construction of many buildings as under the supervision of the government architect, or when in private hands, has presented a case, which in point of financial cost, seems wholly unanswerable. The Bystander does not intend to burden his comments with any large quotation from Mr. Brown's article, but it is to be remarked, that when we find a building, erected under the supervision of a government architect, as was the case with the Custom House and Post Office at Albany, N. Y., costing $811,204, or 102.8c. per cubic ft. to construct, and requiring 11 years for completion, and we place alongside of this a building erected at Kansas City for the New York Life Insurance Co., the work under the supervision of a private architect, and this costing $950,265, or 38c. per cubic ft., and completed in two years, whatever may be the opinion among professional men, the conditions are of a character to set ordinary citizens thinking. This case is only one out of many cited by Mr. Brown in his carefully tabulated statement. Mr. Burke was asked, how so wide a difference in cost was to be explained. Was it a case of the government architect drawing a fat salary? "It is not here the trouble rests," said Mr. Burke. "In fact, compared with the responsibilities of the office and the class of work performed, Mr. O'Rourke was in receipt of a meagre salary. The trouble is in the amount of routine about the business—the curse too often of all public work. There is a whole regiment of employees, civil service officers, connected with the department, and they do their work in a perfunctory manner that is never known in business circles, but that is indigenous to officialdom. Here is where the cost comes in. Push and energy are unknown, and the work is allowed to drag along without much regard to the time actually consumed."

× × × ×

The strongest argument in favor of a change in system, as seen by architects, was the advantage to be gained in the character and style of the buildings to be erected, if thrown open to competition. "It matters little how competent may be the government architect," remarked Mr. Langley, "he is bound to get into a rut, when the work is left continuously in his hands from year to year." A similar thought was given expression to by Mr. Siddall, of Siddall & Baker. "No man," said he, "can give freshness to his work when he is burdened with all the details of management, as must be the case with anyone holding the position of government architect. There is a want of incentive for such an officer to keep in close touch with the advances that are being made in architectural and building lines. "The Bystander was reminded in this connection of a protest he had heard against uniformity in building in general, when this policy is pursued, as it sometimes has been pursued, by communities: "Never lapse into deadly dullness, the modern classic monotony of later Spain." Perhaps it is that arguments of some force can be advanced against any change in the present system, so far at least as Canada is concerned, but the Bystander has so far failed to learn of any of these as he has talked over the matter with those active in the profession. The strength of experience is always worth much, and the fact that the system of public competition has worked so admirably in the public interest in Great Britain, as well as having given strength and encouragement to all interested in architectural pursuits, is to many minds sufficient argument to influence the various Canadian architectural associations to take steps to secure legislation along the same lines. In doing this they would only be following in the circle, along with the mother land, and their neighbors to the south.

× × × ×

A short time since designs were asked for by the Free Library Board, of London, Ont., for the erection of a new building for library purposes in the Forest City. A statement of specifications and particulars was sent out to those architects who desired to compete, and about 20 architects, it is said, in different parts of the province, sent in designs. Within the past month the award was made and to the surprise of those who had adhered strictly, as they believed in honesty they ought to have done, to the requirements set forth in the specifications, they learned that the Free Library Board had accepted the plans of an architect in Brooklyn, N. Y., whose drawings, it is alleged, were not in accordance with the specifications. The party who has been successful in the competition was a former resident of London. It has been stated, now that his plans for the London building have been accepted, that he will return again to Canada. Just how far this is the case, however, the Bystander is not prepared to say, and whether any significance is to be attached to the fact that the award was given to an "Old London Boy" is a matter that the people will decide according to the various ways of measuring up a transaction of this character.

× × × ×

The interest of the Bystander was in ascertaining the feelings of the profession in a case of this kind. Messrs. Siddall & Baker, who were among the aggrieved parties, were seen, and both members of the firm were very indignant over the action of the London Board. They said a protest which they and others had signed, had been forwarded to the Board, but whether any good would come out of it time only would tell. In the opinion of Mr. Baker it ought to be the duty of every architect to protest against conduct of this kind. "What is the use," said he, "of asking for plans on certain lines, if others are to be permitted to deviate from these conditions and undertake to secure, perhaps a little more for their clients as a step to secure the award. A continuation of this practice must inevitably lead to corrupt and immoral methods in competing for work. We have enough of this kind of thing in other walks of life, and if the dignity and character of the architectural profession is to be maintained, we should act as one man, not alone, in denouncing conduct of the kind, but we should unanimously take steps to prevent, if possible, its recurrence in other ways." Mr. Beaumont Jarvis, who had also entered the competition, was spoken to about the matter. He had signed the protest that was being entered, and with Mr. Baker he agreed that the subject was one that might fairly enlist important consideration from the architects of the country.

× × × ×

The Bystander was amused by the rejoinder made to his enquiry by another well-known architect. This gentleman said: "I do not know anything about the London competition. Our firm certainly did not enter the competition, and have not been asked to sign any petition objecting to the award. But these people who have found themselves disappointed ought never to have entered the competition. They ought to have known better than to have expected anything like fair dealing in these competitions. We have long since refused to endeavor to secure business in this manner, having learned from our experience that the man who has the biggest pull on interested parties, or who has become an adept in wire pulling, is usually the one who 'gets there.' We are out of that kind of business." The argument was one, that seemed to give force to the contention of Mr. Siddall, that it was time for architects to unite in an effort to remedy so rank an evil. But when taking steps to remove the mote out of their neighbor's eye, what about the beam that may be in their own? The Bystander has had this question suggested to him through a remark made by a builder a few days ago: "I never think of tendering for work in the hands of Mr. So-and-So, naming a certain local architect, for my experience has been that his office is a close corporation, and tenders for buildings of which he has control never go outside of a certain favored circle." Surely it cannot be that the architects of Canada will allow themselves to be tainted in any way with the spirit, and indeed the practice, of corruption, that seems to float about the air these days as do the bacilli of so many diseases that attack the physical man.

× × × ×

The death on the 7th October, at his home, Beverley, Mass., of Oliver Wendell Holmes, the genial and clever author of the Autocrat of the Breakfast-Table, reminds one of a remark of the dead "Autocrat," when urging people who have information to impart of service to their fellowmen, "to set their thought-sprinklers to work." The Bystander in his journalistic experience has found it one of the hardest things possible to get men—ladies are excepted of course—to tell what they know to others. Every newspaper editor realizes how difficult it is to get men, well informed and with the ability to do the work, to put their pen to paper and to impart from out of their knowledge information of benefit to their fellowmen. It is sometimes almost as difficult to get some people to talk about what they know. They are as mum as an oyster, keeping their thoughts hermetically sealed. The Bystander has no brief from the editor of the CANADIAN ARCHITECT AND BUILDER to quietly probe this journal's readers and ask them to be a little more generous in their discussion of matters of interest to others in the same line of business, but he is quite sure, if the editor is like other editors, that he will appreciate the setting to work of the "thought-sprinklers" of his readers. The Bystander, as he meets with the architects and builders of the country from time to time, will be glad to have them turn the faucet on occasionally and keep him posted in what is uppermost in trade matters.

PUBLICATIONS.

The Rathbun Co., of Deseronto, are sending out a handsome catalogue relating to their porous terra cotta for fire-proofing purposes, with illustrations of the material and numerous public buildings in the erection of which it has been employed.

In the October number of the Engineering Magazine appears a new and very valuable feature in the form of a "Review of the Industrial Press," with an index to all the leading articles published currently in the technical Journals of the United States and Great Britain. The readers of the Magazine are not only made acquainted with the most important matter appearing each month in the technical Journals, but they can be supplied through the publishers with copies of any articles which they may desire to possess at a moderate cost.

It seems probable that a new City Hall for the City of Quebec will shortly be commenced. The Council has been authorized to issue debentures to the amount of $150,000 for carrying out the project. The site which will probably be chosen is the Jesuit Barracks Square.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

A CORRECTION.

OWEN SOUND, 1st October, 1894.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—We noticed in your September number an item referring to the Owen Sound Portland Cement Co., whose works were destroyed by fire, stating that the company is being re-organized under a new name. We wish to correct this statement, as there is no re-organization, or change in the company's name. We will still continue our business under the name of the Owen Sound Portland Cement Co., Limited. The cement works, which are situated at Shallow Lake, about nine miles west of Owen Sound, are being rebuilt at a large expenditure, and we expect to have our factory in full operation again about the 1st of November. Some additions are being made to our machinery, and when completed we will be able to turn out even a better grade of cement than in the past, which was always considered equal to any imported cements. By making the above correction, you will much oblige.

Yours truly,

THE OWEN SOUND PORTLAND CEMENT CO.

A SUGGESTION FOR THE O. A. A.

TORONTO, October 6, 1894.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—Some months ago you mentioned in your paper that the Province of Quebec Association of Architects had opened a reading room and other offices, into which the members could come at any hour of the day or evening, and so on.

Now, what is to hinder the directors of the O. A. A. from doing the same thing. In Montreal the sister association has far more to contend with than we have here. They have not half the number of members, and they have a serious opposition to face which we have not. At our last convention it was considered advisable to do something "to keep ourselves before the public" and show them that we are an association with a definite aim and object, and not to let ourselves be forgotten or overlooked. Now what did we do? We gave a lecture—I will not comment upon it—but we gave a lecture in public, one and only one—and that poorly advertised and worse attended, in a neighborhood not usual for public entertainments. I believe that if we had a fair sized room and had it something like the Montreal arrangement, where we could meet, see each other, discuss common subjects, and have books of reference to study, and so on, and at least a brass plate at the door, the public would know something more about us, and we ourselves could have more interest in our Association. Our management follows a policy of "masterly inactivity." It professes to be doing a great work, but from one year to another, except for a sudden momentary ebullition, I maintain it does little if any good beyond educating—if it does that—the future architect.

Yours truly,

CITY MEMBER.

COMPETITIONS.

The Verein zur Beforderung des Gewerbefleisses, of Berlin, is offering a silver medal and a prize of $750, for the best paper giving a chemical and physical analysis of the iron paints mostly employed. Very little definite information is known regarding the application, duration, effect, etc., of these paints, and the papers above invited should contain (1) a description and classification of the paints mostly used, based on a chemical analysis. (2) A statement of the materials and mixtures which form the most suitable paints for application to all kinds of iron. All papers are to be sent in by the 15th of November next.

According to the permit book in the office of the City Engineer, there have been erected in London, Ont., since the first of the present year, 147 dwellings. Of these 78 are cottages and 39 more pretentious residences. The brick houses erected in the city since New Year's cost upwards of $118,550. In ten instances no figures are given with the permit. The cost of frame houses during the same period was $22,475, with the prices of four not given. Preparations are under way for the erection of a free library building to cost $12,000, while the Y. M. C. A. will erect a $50,000 structure.

THE LONDON, ONT., PUBLIC LIBRARY COMPETITION.

Much dissatisfaction has been caused to the majority of the competitors in the above competition by the action of the Board in awarding first position to a design which in a most essential particular does not comply with the instructions issued to all the competitors. A copy of the specified requirements as forwarded to one of the competitors by the Secretary of the Library Board, is as follows :

[COPY.]

MESSRS. ———— LONDON, June 27th, 1894.
Toronto.

Gentlemen :—In reply to yours of June 26th, would say, Competition is open. We require plan of Basement, showing Lavatory, etc.; plan of Ground Floor ;—plan of First Floor ; Front and Side Elevations.

Size of Building, 50 x 80 feet, of local brick faced with No. 2 pressed bricks.

Basement, size 20 x 50 feet, 8 feet in the clear of St. Mary's or Credit Valley stone, 8 feet to Ground Floor.

Ground Floor to have Librarian's Room, Reading and Ladies' Toilet Room, wood ceiling 14 feet high, pine floor and finished in clear pine.

First Story finished in grey plaster with 14-inch base, no partitions, wall to be at least 7 feet to plate, maple floor.

Roof to be of slate and at least ½ pitch.

Building to be heated with hot air, with gas piping and wiring.

The upper floor to be deafened.

Plan to be drawn to scale of 8 feet to inch.

Elevations to be in black and white.

In case the Building and Heating Apparatus cannot be erected for $12,000 (twelve thousand dollars), the Committee will not pledge themselves to pay any commission.

The successful competitor to receive $600. The man whose plans are accepted to furnish plans, specifications, and superintend the erection of the Building.

Plans to be in by July 3rd.

Yours truly, (Sgd.) C. E. KEENE, Sec.

The CANADIAN ARCHITECT AND BUILDER has also received from a well-known firm of architects the following letter on this subject :

Editor CANADIAN ARCHITECT AND BUILDER.

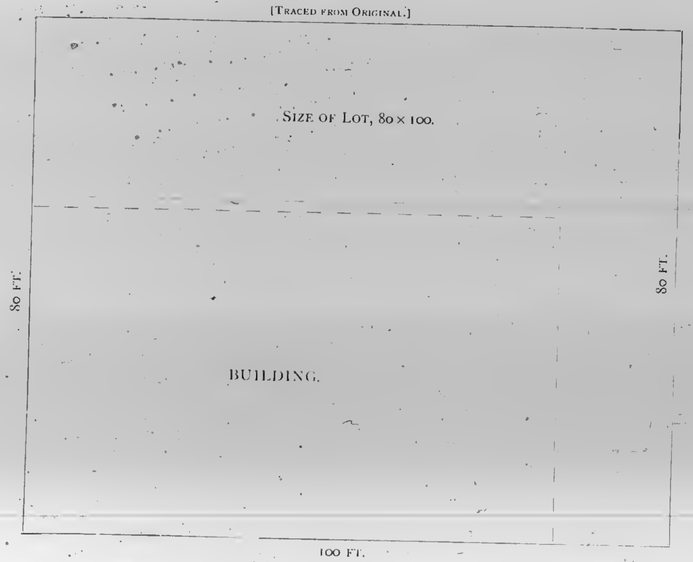
SIR,—The united protest from all the architects who entered the London, Ont., Free Library competition and were so meanly treated by the Library Board, forms but another link in the chain of circumstances adverse to the straightforward practice of the profession of architecture in Canada. It seems inconceivable that a Board occupying such a position of public trust, should have so little respect for justice and fairdealing as to permit the conditions of competition, formulated for the purpose of instructing competitors as to what was required in the proposed building, to be utterly disregarded in one of its most important clauses. Who would dare to assert that it is right to limit all the competitors to a certain clearly defined portion of the lot on which the building is to stand, and at the same time accept the only design which covers nearly the whole of the two sides of the lot—having frontages on each street vastly in excess of the stipulated site? There is something wrong when no steps are taken to rectify such an injustice, although the attention of the Board was at once called to the matter.

The competition was entered upon the district understanding that the design which best met the requirements of a free public library, would be adopted, providing it complied with the proper and reasonable conditions of the Board and of the site. Surely, no sane person would expect reputable architects to devote their time to the elaborate designing of a building, upon the loose understanding that the instructions given did not form part of the competition, or that anything in the way of a library plan would do, if it did not exceed the specified cost, nor, if it did exceed the cost in this case, would it have mattered much? Probably not.

We believe there was an effort made to have the rules of the Ontario Association of Architects, for the deciding of competitions adopted, but without success. The Board did consider the advisability of appointing properly qualified persons to decide as to the best design, but this sensible idea was not adopted. The result is, the adoption of a design which any properly qualified person would have been in duty bound to reject. Probably the small expense of employing competent assistance was the cause of its not being done. It remains to be seen whether they have or have not lost more by the course adopted. The twentieth century is near, and it is high time that qualified architects should demand the discontinuance of this sort of thing. From the personnel of the Board in this case, one would expect considerations of justice to occupy a prominent place. But there has been a wrong done, unwittingly, no doubt, in the first place, but none the less a wrong, and common justice should suggest to them that the least they can do is to try to have it righted.

FAIR PLAY.

[TRACED FROM ORIGINAL.]



Scale of Diagram—20ft. to the inch.

The following protest, in which the fairness of the award is called in question, has been presented to the Library Board :—

To the Chairman and Members of the Free Library Board, London, Ont.

Gentlemen :—We, the undersigned architects, having submitted designs for the proposed Public Free Library, to be erected in London, in accordance with your advertisement of June 1st, 1894, and the conditions furnished by your Board for our guidance in preparing the same, respectfully beg to protest against the acceptance of a design which is not in accordance with those conditions.

We were instructed to make the size of the building 50 feet by 80 feet, and all our designs were made to comply with that reasonable and feasible condition, whereas, the only design which totally ignored that portion of your instructions, has been awarded first place, notwithstanding the fact that it has frontages of one hundred feet by about sixty feet.

We, therefore respectfully beg to submit that we have all been led, by your advertisement, into the expenditure of much time and money, and that in justice to us, you should reconsider your decision, at the earliest possible date, and that the award should be made to the best design conforming to your conditions.

We have the honor to be, Gentlemen,

Respectfully yours,

(Sgd.)	T. A. MOORE.	(Sgd.)	SIDDALL & BAKER.
(Sgd.)	McBRIDE & FARNCOMBE.	(Sgd.)	BEAUMONT JARVIS.
(Sgd.)	M. L. BUFFY.	(Sgd.)	MOORE & HENRY.

(Sgd.) GEORGE R. HARPER, Toronto.

ILLUSTRATIONS.

COMPETITIVE DESIGN FOR THE PROTESTANT ORPHAN ASYLUM, COTE DES NEIGES ROAD, MONTREAL.—JAMES R. RHIND, ARCHITECT.

The sum allowed, viz., $30,000 was small for the accommodation called for, the design therefore had to be made very plain and inexpensive. But an endeavor is made to give a good outline by the grouping of gables and chimneys and the central "fleche" for ventilation.

RESIDENCE FOR MRS. McNALLY, WESTON, ONT.—J. A. ELLIS, ARCHITECT, TORONTO.

The house is built of brown stone and red bricks, slate roof, with a complete system of plumbing, heated with hot water.

"MAPLEHURST," THE RESIDENCE OF DR. CHARLTON, WESTON, ONT.—J. A. ELLIS, ARCHITECT, TORONTO.

In the construction of this house, there has been employed Credit Valley brown stone, and Carlton brick, slate roof, modern plumbing, hot water heating. The house, which occupies a prominent site, contains a conveniently arranged suite of offices.

HOUSES FOR DR. CAMPBELL, MONTREAL.—DUNLOP & HERIOT, ARCHITECTS.

PORTRAITS OF OFFICERS OF THE BRITISH COLUMBIA INSTITUTE OF ARCHITECTS.

STAINING WOOD.

THIS is a subject few writers in the magazines have touched upon, writes James Marks in Painting and Decorating. It is not so well understood as priming or painting ; it requires a knowledge of wood, its nature and the beauty that a stain is to bring out, or at least not mar or destroy. All woods have a transparent look, or what may be termed reflection ; they change as light strikes them. Look at a varnished door of hard wood in one light, the cross stiles will look darker than the upright stiles. Change your position or change the light, and the reverse will appear. Examine a panel of bird's eye maple, or any curled wood, it will change as the light is reflected on it. This is the beauty of real wood, whether varnished or stained, and is a beauty that no grainer has ever been able to imitate.

To stain wood and keep this reflecting power or change of appearance, is or should be the object. It has been done, it can be done, but it very seldom is done. The conditions are against its being done on the ordinary work that is met with in our every-day experience. The first thing necessary is the wood itself ; it must be clear, and free from sap, soft places and knots. Mill dressed lumber should be finished off with a sharp smoothing plane. No sandpaper should be used on the work ; all ends of mortices should be carefully sized, before staining, so as not to appear dark, by the extra quantity of stain they absorb. No lime or plaster should touch the woodwork, or a dark stain will be the result.

Let us varnish a piece of woodwork of this description, say white pine, with three coats of light hard oil finish, or, better, a good No. 1 coach varnish, and all the beauty of the wood is to be seen. Nothing is marred, nothing hid. Next let us stain and varnish, and the chances are that the fine, satin-like reflection is gone. There is something in the stain that mars the fine transparent reflection which is the beauty of all natural wood finish. The grain may be left, and even be brought out, more prominently by an inferior stain ; but this is not or should not be the object sought for, for if the reflection which changes is destroyed with a filler or a stain, then it should not be used.

The average painter concludes that a coat of thin color that produces the desired tint is a stain, and will, and does, in a number of instances, meet the requirements of a stain best, but this is not a proper stain. No coating of any pigment, no matter how finely prepared, or how applied, in oil or distemper, can be applied to wood as a stain without destroying the real beauty of the wood, the reflection.

It is the natural tendency of all woods to darken under varnish or polish ; how this is cannot be readily accounted for, except it be the action of light on the wood shining through the varnish or polish, either of which excludes air ; but when they darken in this way it is always with a change of color natural to the color of the wood in its native or new state. This can be observed in old oak furniture or mahogany, both of which grow old with a beautiful transparent richness, the color of which should be imitated if possible.

Let me give an illustration : I have a strip of ash or light oak, the grain of which is as near to walnut as possible. This strip is to be stained the color of the walnut, and the reflection is not to be destroyed. The stain that will accomplish this is a proper stain and none other.

Staining has taken the place of graining, and while, on account of cheapness, it may be a substitute, so far as the average job is concerned, that is produced with a coat of stain and filler combined, or color stained, it has neither the beauty nor appearance of an average job of graining, and will not until woodwork is properly prepared and staining is properly done ; then be assured it may compete with graining, but it will certainly cost more money. There must be a new idea formed, and a more correct one, of what is needed, and the makers of stains and fillers must be required to produce a stain that will do the work in a proper manner, under skillful workmen, and not advance claims for their goods that cannot be accomplished.

STUDENTS' DEPARTMENT.

ADVICE TO A YOUNG ARCHITECT.

THE following characteristic letter was prepared by the late Mr. William Burges, at the desire of a young architect, who consulted him about the worthiest course to follow in the study and practice of architecture :—

"My Dear Sir,—I venture to submit the following considerations to your notice :—

"You have passed your apprenticeship, done your Academy, and finished the usual Continental tour, and the question now arises as to what you are going to do ?

"If you follow the usual course, you would take an office, hunt up work, and do the same according to your lights, consoling yourself that many architects would do it much worse.

"Of course, there are various sorts of practice, all of which are open to you, and you might become simply a house doctor, or a warehouse architect, or a light and air man, or an architectural policeman (i.e., district surveyor), or a general partitioner ; and it is quite possible to make money by any of these, the amount depending on the extent of the practice, and that again upon the number of friends, besides the amount of the importunity and imprudence by which work may be solicited.

"But reflect ; are any of these men artists ? It is true that when they die they may have made money, but what else will they leave to the world besides that ? Their names are simply written in water.

"Now, it is quite open to you to take to all or any of these lines of practice, to make money, to bring up a family, to become churchwarden and, above all, to be pronounced 'warm' when you leave this world.

"My object in writing these lines is to suggest to you that there is another course open by which you may perhaps be the means of leaving some beautiful things to posterity, and by which your name may possibly survive after you have quitted this life.

"The question arises, 'Why not try to be an artist, an accomplished man, a creator of works of art, and an ornament to your profession ?'

"You have not the excuse that many have for not making the attempt, as I understand you are in a great measure independent of your profession.

"Why not use that advantage to be something more than an idler on the one hand or a money grubber on the other ?

"Try at least for a couple of years. They will not be lost years, even should you eventually not take up the artistic branch of your profession ; for you will to a certain degree have educated yourself in the attempt, and you will be so much the better.

"Supposing you decide to try, let us see where you are. You know something of modern construction, enough to enable you to practice without letting your buildings fall. You can draw well, and in an architectural and geometrical manner ; but I know nothing of your perspectives, and your freehand drawing is woolly, and wants precision. Above all, you are very defective in the human figure. (You have, I presume, a fair knowledge of the history of architecture.)

"Now, I should recommend you to employ your next two years in three principal things :—

"1. The drawing of the human figure. This is easily the foundation of all good taste. I don't mean that you should spend weeks in frizzling up a figure in chalk, for you are not going to be a painter, but that you should learn to draw correctly and know the bones and muscles which go to make up the outline, and, in fact, to be able to account for everything you see.

"2. A serious course of reading of the best and well-known authors. This also will conduce to form your taste. Philosophy and science will not help you so much as works of the imagination. Bohn's Library furnishes fair translations of the best authors at 5s. per volume ; but if the work is a translation, it is desirable to get two or more versions and to compare them together. In the Classics, I should recommend Homer, Aristophanes, Æschylus, Herodotus, Xenephon, Virgil, Horace, Apuleius. Of the moderns, Dante, Chaucer, Shakespere, 'Faust,' 'Robinson Crusoe,' 'Undine,' and Lane's translation of the 'Arabian Nights.' Of course I could mention many more, but these are sufficient for the present.

"3. To carefully study and draw various beautiful things ; and whether the said thing be a piece of jewellery or a piece of iron work or a building or portion of a building—to do it thoroughly, to find its construction, and why this and that is done, the basis of the ornamentation, the particular form of the curves, and never to leave it until you know all about it. The result will be that the next time you see a similar thing you will know all about it, and won't want to study it again. Do everything by common sense ; don't make a drawing when you can make a rubbing, and regard all your drawing in the light of evidence which is worth next to nothing if it is not authentic.

"I consider you very lucky that you have such an opportunity of having your 'learning time' over again, and I am quite sure that if you make up your mind to be industrious, your two years spent in the way I have ventured to suggest will be very happy as well as very useful ones.

"Hoping you are not bored by the above.

I remain, yours truly, "W. BURGES."

ANNUAL MEETING OF THE PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE Province of Quebec Association of Architects met in annual session on Thursday, October the 4th, at 10.30 a.m., in their rooms in the New York Life Building, Montreal, the President, Mr. J. Nelson, in the chair. Among those present were: Messrs. J. Nelson, President; C. Baillairgé, Vice-President; A. C. Hutchison, 2nd Vice-President and Acting Secretary; J. Z. Resther, Treasurer; A. T. Taylor, E. Mann and J. Venne, Councillors; S. Lesage, A. F. Dunlop, Jos. Perrault, L. Z. Gauthier, H. C. Nelson, V. Roy, J. Z. Resther, F. X. Berlinguet, G. A. Monette, T. Daoust, M. Perrault, W. E. Doran, W. McLea Walbank, G. W. Wood, A. H. Lapierre, J. R. Gardiner, A. Boileau, etc.

The annual report of the Council, read by the Acting Secretary, stated that at the semi-annual examination in January four candidates presented themselves for admission to the study of architecture. Of these three passed. During last winter arrangements were made for the members of the Association resident in Montreal to meet once a month at dinner and subsequently to listen to papers and lectures. The Council regretted that these opportunities for social intercourse and instruction were not taken advantage of in the manner it was thought they would have been. Early last fall the Council endeavored to form classes for students engaged in architects' offices, in order to afford instruction in branches of study not usually obtained in an office, and so prepare them for passing their examinations. It was regretted that owing to the difficulty in obtaining teachers and to the lack of interest in the matter by members and students, these classes had to be abandoned. The Council strongly urged upon the Association the necessity of establishing classes for the systematic study of the several branches of architecture, either in direct connection with the Association or in connection with an university. During the year the number of books in the library has been slightly increased by purchase and donation.

The report submitted by the Treasurer, Mr. L. Z. Resther, was of a very satisfactory character.

The reports of the Council and the Treasurer having been adopted, the election of officers was proceeded with, and resulted as follows, the scrutineers being Messrs. E. Mann and A. H. Lapierre:—

President—Mr. Charles Baillairgé, Quebec.
1st Vice-President—Mr. A. C. Hutchison, Montreal.
2nd Vice-President—Mr. A. T. Taylor, Montreal.
Secretary—Mr. J. Venne, Montreal.
Treasurer—Mr. Joseph Perrault, Montreal.
Council—Messrs. A. F. Dunlop, J. Nelson, A. Raza, L. Z. Gauthier, Montreal; F. X. Berlinguet and J. B. Bertrand, Quebec.
Auditors—Messrs. L. Z. Resther and W. McLea Walbank, Montreal.

The most pleasing part of the morning session then took place. It was the presentation of a large photographic group of the Montreal members of the Association to their confreres in Quebec. The photograph, which is placed in an antique frame, is a really fine specimen of the photographer's art. Mr. Jas. Nelson having explained that he and Mr. Taylor had been charged by the Montreal members with the arrangements for the picture, called upon Mr. Taylor to make the presentation. That gentleman alluded to the fact that the Montreal members had already received a photograph group of their Quebec confreres, and the former felt that the least they could do was to reciprocate as soon as possible. It was hoped that the photograph would be received and kept by the brethren in Quebec as a pleasant memento, and that for many years to come their successors might look at it and see the gentlemen who started the Association and carried on the work for so long.

The newly-elected President returned thanks on behalf of the Quebec members, and spoke of the artistic merit of the picture, saying that although the idea of the Quebec and Montreal sections of the Association presenting photographic groups to each other had perhaps originated with the former, the latter had improved upon it in many ways. The photograph represents forty-three Montreal members of the Association assembled in a handsome room, the background being a reproduction of a view of the Senate Chamber in the Palace of the Doges in Venice.

Mr. F. X. Berlinguet also briefly returned thanks, after which the gathering adjourned for luncheon.

AFTERNOON SESSION.

The newly-elected President occupied the chair at the afternoon session, which opened at 2:30, and contributed the following paper:

FOUNDATIONS IN DEEP AND UNRELIABLE SOILS.

An article in the Engineering Record of New York, on "Foundations of High Buildings" by W. R. Hutton, M. Am. Soc. C. E., etc., has reminded me that in the Province of Quebec we have had several failures of an expensive nature to make good, due to faulty foundations as at Joliette, St. Bazile, St. Casimir, Nicolet, etc., and in Upper Canada at Cornwall and elsewhere.

As it is more satisfactory to know exactly how the foundations of certain tall and heavy structures have been built, than to learn from any treatise on the subject how they should be laid down, I shall first summarize Mr. Hutton's article as extremely interesting and instructive to the profession, and then allude to the Canadian cases mentioned. In New York the rock is at from 15 to 50 and 70 feet below the surface, and overlaid by yellow sand mixed with clay and containing pockets or beds of quicksand. Many buildings rest on piles driven to refusal, though not necessarily to, nor always to, the rock. Under the city building law, each pile may be loaded with 20 tons. The permanent wet level is about that of high tide in the harbor and piles, not to decay, should be cut off at or about this level—dry seasons and deep drains, which may lower it being taken into consideration. When a gap occurs in the rock and bottom can not be reached, an arch is thrown over to carry the walls above it, as was done in the case of the Washington (Field) Building on Battery Place.

The method of founding directly on the sand is gaining favor. The "Equitable Building" and the "Union Trust" are so built with wide footings loading the soil to 2 and 2½ tons to the square foot. The "World" and "Times" buildings have similar foundations. Older buildings at only a few feet below the surface have suffered, probably from the lateral flow of quick-sand into deeper neighbouring excavations. The newer buildings are at too great a depth to render such a result at all probable. When test pits are sunk and quick-sand makes its appearance, endangering adjoining structures, concrete should be at hand to promptly fill the pit and prevent the danger.

To save the cost of 15 to 20 feet of underpinning to the old walls of contiguous buildings, the foundations of the "Methodist Book Concern" were built in alternate piers surrounded with sheet piling; the intermediate piers then put in; the whole arched over and the walls raised upon them. In the case of the "Manhattan Life Insurance Building" 353 feet high above street level, with foundations 55 feet deep to rock—a total of 408 feet—piles enough could not be driven to bear the great weight. The system adopted was that of pneumatic caissons. Fifteen of them, of which eleven are square, varying from 13×13 feet, to 21×26 feet, and four circular ones from 9 to 15 feet, in diameter, cover some 4,000 square feet, or about half the area of the site. The coll-ective area of the caisson is proportioned to the maximum pressure allowed by city regulations, namely, from 150 lbs. to the square inch (say eleven tons to the foot), the brick piers being somewhat smaller as they may be loaded to 200 lbs. to the inch, 14½ tons to the foot. The caisson roof is strengthened with I beams. The whole area is excavated to 20 feet in depth below the Broadway level, and the caissons are sunk by means of compressed air 35 feet further to the rock. They pass through 12 feet of fine micaceous sand, layers of mud with sand, of silt, of clay mixed with sand, and a very hard conglomerate over the usual gneiss rock. The caissons were sunk by excavating the soil beneath them from the inside, and by the weight of the brick piers simultaneously built upon them, and to avoid an inflow of quicksand which might occur when the air pressure was reduced by blowing out the semi-fluid material through pipes, it was decided in the beginning to remove all material in buckets through the air locks, but upon trial it was ascertained that the pressure could be maintained while blowing out by running the compression faster, and the soft earth was thus removed. It is to be noted that any flow of quicksand from outside the lines of the caisson might have caused settlements of the neighboring buildings. When the caissons reached the rock they were filled solidly with concrete. "At the date of writing," says Hutton (September, 1893), "nearly all the caissons had been sunk to place and no appreciable cracks had occurred in adjacent buildings, one of which rests on piles at the level of the general excavations (20 feet below street level as already stated), the other on the natural soil several feet above." The cost of these 55 feet foundations is said to have been ten per cent. of the entire cost of the building. A commendable feature in the "Manhattan Life Building" is the symmetrical distribution of the load upon each pier. Commonly foundation walls are built upon the outside edge of the property, with the footings almost entirely inside the thickness of the wall, concentrating upon the outer edge of the foundation pressures much above the average. In the "Manhattan Life," the supports are centrally or symmetrically placed upon the caissons, and strong steel girders extending from side to side of the building sustain the side walls in "Cantilever," to borrow a form of expression from the French. The engineer-contractors of the building, Messrs. Snoozsmith & Co., made an interesting application of the same method in founding the draw pier of the Seventh Avenue bridge, New York. This is a circular pier 59 feet in diameter. Their experience having convinced them that there was great risk of cracks in the masonry from irregular movements of a very large caisson, this one was made annular in plan, 59 feet in outside diameter and 10 feet wide. When sunk upon the site, cemented to the rock and filled with concrete, it formed a "cofferdam within" which it was expected to build the masonry "in the dry" after the water was pumped out, but seams in the rock bottom of the central space admitted water faster than it could be removed by pumps, and it became necessary to cover the bottom with a layer of concrete put in place under water to close the seams and permit the completion of the pier.

In Chicago, foundations are more difficult and costly, due to the fact that instead of only 30 feet to 50 feet, as in New York, there is from 60 to 100 feet of blue drift clay overlying the rock, a material having a greater avidity for water and containing beds of quick-sand, and yet upon this soil Chicago boasts some of the highest buildings yet erected. Formerly platforms of timber were imbedded in the clay, and piles rarely driven to the rock, but the great weight of recent structures requires that piles be driven to the rock, and the tops cut off below all future drainage, that they may be always "in the wet", or detached foundations under each wall and pier, with footings carefully proportioned in area to the weight to come upon them and to the resistance of the soil. The best practice limits the weight to 3,000 lbs. per square foot, or say 1½ tons, but this is frequently exceeded. Some settlement is expected, and it is sought, by proportioning surfaces to weights as far as possible, to render the settling uniform.

As the wide footings when of masonry must be built in high and narrow offsets, forming a truncated pyramid under each pier or wall, thus robbing basement floors of much of their height, the practice in Chicago and elsewhere, due to the comparative cheapness of iron or steel bars and beams, is to form the footings of tiers of these bars laid on a concrete foundation, each successive tier laying across or at right angles to the one below, or along and across the wall alternately, and as their greater transverse strength allows of a greater breadth of offset, the reduced thickness of the walls is reached more rapidly or in a lesser height, not exceeding from 18 to 30 inches instead of from 7 to 8 feet in some cases where of masonry. The weight is said to be also thus reduced by about 4 per cent. of the load upon the pier. The bars or beams sometimes of second hand railroad iron, are first dipped in hot asphalt or tar, carefully bedded on and filled in, and covered with concrete to protect the metal from rust. Such a foundation is of course, dependent on being at such a depth that the adjoining soil be undisturbed. As on account of the soft nature of the clay, as glaziers' putty, it must flow laterally if not prevented from doing so, just as water supporting a vessel in a lock would do, or dry sand, any structure, if not laterally retained by some solid surrounding. Some large buildings in Chicago have been erected upon a continuous platform of concrete, covering the whole area of the structure. The serious, irregular settlement of a prominent public building constructed in this way, accompanied by cracks in the walls and in the concrete platform, has brought the method into disfavor. It has been applied with better results when the platform has been made with iron beams covered and protected with concrete.

It has been observed in Venice, a city founded on the marshy bottom of a lagoon, that many large buildings constructed in the 14th century and before, rest upon a platform of masonry broader than the building it supports. The masonry itself rests upon a bed of puddled clay which shows signs of a powerful artificial compression. These structures show no notable change, while many others of later date, built upon piles, show by numerous cracks the irregular settlements they have incurred. It is said that the tower of St. Mark's does not rest on piles.

A different method has been adopted for a part of the foundations of the new "Stock Exchange" in Chicago. The foundation is generally upon piles about 50 feet long driven into the hard clay which overlies the rock; next to the "Herald Building," however, which adjoins it, wells were substituted, lest the shock of the pile driven close to its walls should cause settlement and cracks. A short cylinder 5 feet in diameter, made of steel plates, was first sunk by hand, reaching below the footings of the Herald building. Then around and inside the base of the cylinder, sheet piles about 35 feet long were driven, and held in place by a ring of steel inside their upper ends. The material inside the sheeting was excavated, and a similar steel ring was placed inside their lower ends; by means of wedges the lower ends of the sheeting were forced back into the soft clay, until another course could be driven outside the lower ring. This operation was repeated until the excavation had reached the hard clay about 40 feet below the cellar. In this material the excavation was continued without sheeting, in the form of a hollow truncated cone to a diameter of 7½ feet, and the entire excavation was filled with concrete. The wells are spaced about 12 feet, the loads upon them vary; some of them will carry about 200 tons—something less than 4 tons to the square foot. The material excavated was a soft putty-like clay to a depth of 40 feet, where a firm clay was reached, deemed capable of carrying the weight proposed. The rest of the foundation is upon piles spaced 3 feet between centres, to be loaded with about 30 tons per pile, similar piles having been tested to 50 tons at the Chicago Library foundation. They are driven with a Vasmyth steam hammer without brooming, are cut off below lake surface, capped and filled in with concrete. A series of short transverse I beams distribute the load transversely, and longitudinal beams prevent local settlements.

The foundations of the Washington monument at Washington have heretofore been well described, but having been commenced in 1848, now some 45 years ago, a description of the method employed may not be uninteresting or uninstructive to the younger members of the profession. This structure, when I visited Washington in 1856, had obtained a height of 156 feet. The monument was commenced on a national subscription then limited to $1.00 per head, to afford every citizen the advantage of contributing his mite towards honoring the memory of the great man whose name it bore, and I myself have the honor of being one of the original subscribers, the receipt for which, of the size of an ordinary bank note, engraved on white paper of the consistency of a bank of England note, with a cut of the finished monument at one end of it, I probably still have in one of my souvenir albums. Almost every nation of the earth had contributed a souvenir in the shape of a block of its most precious stone or marble, bearing a fitting inscription, and which were so placed as to be seen and felt and read step by every one ascending the inner stairway, reaching, at the time of my visit, to the then top of the structure, and intended to be continued upwards to the full height of 600 feet then proposed; while hundreds of similar blocks from all the crowned heads of Europe, not excepting His Holiness the Pope—blocks of solid copper and nearly solid gold and silver and the like, were either incased in the monument or lay strewn about the ground awaiting each its turn to do honor to the "Father of his Country," the hero of liberty and independence.

At the date of my visit the works had been for some time interrupted, owing to unequal settlement of the foundation. In 1878, says Hutton, the work which had been in the hands of the Washington Monument Association was turned over to the general Government and completed with money appropriated by Congress. The work as finally constructed is a plain shaft 500 feet high with a pyramidion on top of it 55 feet in height. The shaft is 55 feet square at the base, 30 feet at top, the interior being say 20 feet in diameter, and weight over 90,000 tons. The original foundation was of rubble masonry in lime mortar, 23½ feet thick and 80 feet square at the base, the footings thus projecting 12½ feet all around beyond the outer lines of shaft. The soil upon which it rested was a sandy clay; 13 feet below this was a bed of gravel. The area of the base was too small, and the soil under it not sufficiently resisting to carry the final weight. A mass of concrete 13½ feet thick, extending 23 feet 6 inches outside of the old base, and 18 feet under it, increased the bearing surface and carried it down to the gravel. The concrete extended 5 feet under the walls of the shaft itself. The construction of this block of concrete under a shaft 156 feet high and weighing 36,000 tons, was a delicate operation, accomplished in this way:—On the east and west sides, near corners diagonally opposite, cuts or trenches 4 feet wide and 13½ feet deep were made from the outer lines of the foundation, and extended by tunnelling 18 feet under the base of the old foundation. When completed they were filled with concrete, and other cuts opposite to them were made in like manner, carried under the old base and filled with concrete. The removal of so much bearing surface in these two tunnels under the old foundation was sufficient to cause motion in the structure, and after this but one cut was made at one time. The work was continued and completed by this system of narrow cuts, which were filled with concrete until the entire sub-base was finished. After this, 10 feet in thickness of the outer part of the old foundation was removed in sections 10 feet wide and replaced with concrete extending 10 feet out on the new base.

Being under the impression that when I saw the monument, at that time 156 feet high as stated, it inclined somewhat out of the perpendicular, and as Mr. Hutton in describing the underpinning and strengthening of the foundation did not allude to the fact, I wrote him through the Engineering Record and my letter and his answer appeared in a recent issue of the journal, to the effect that it did incline slightly, but that its rectification was effected through the process of underpinning, though he does not say precisely how. I remember, however, that previously to strengthening the foundations in the manner described, it had been proposed to excavate beneath the monument, introduce a series of upper and under sills of heavy timber with uprights or posts between them, introducing some hundreds of jack-screws and letting down the monument gradually on one side to the level of the other. This process I applied myself in a modified form and on a smaller scale in bringing back to verticality a factory chimney some 80 feet in height at Hook's mills, in Grant street, Quebec. After cutting away a wedge shaped slice of the brick work from beneath the shaft, or between it and its foundation, by means of jack-screws it was let down by so much, the thickness of the wedge sawed out bearing the same proportion to the breadth of base as did the inclination over to the height of shaft, which inclined some two feet from the perpendicular.

Gravel and sand are counted among the incompressible materials for foundations, when prevented from spreading sidewise. The resistance to lateral spreading is usually furnished by the adjacent sand, and when this is insufficient the surface rises as the building sinks, precisely as water does around a vessel in a lock, with the additional weight of an in-going cargo.

I have said that from faulty foundations several Canadian structures have been wrecked to a considerable extent, but I shall only here allude to the new Joliette church, from having myself seen it now two years ago, and the blame ought to be fixed somewhere for a fault which it will probably cost all of $10,000 to make good. The tower of this fine edifice, when I saw it, had actually sunk not less than eleven inches below the adjoining masonry of the sides, tearing itself away completely from the adjoining walls or remainder of the facade; and as lateral portions of the facade had also sunk, though to a less extent, and were bringing down the side or aisle walls of the edifice, the church wardens had the whole front of the facade cut away from the sides to allow of any future sinking of the tower without dragging the sides with it to destruction. The other churches I have mentioned as at Nicolet, St. Casimir and St. Bazile, have been affected I am told, exactly in the same manner, and due to a similar cause, to wit, the omission on the architect's or contractor's part to so proportion the breadth of footings as to cause every square foot thereof to bear an absolutely equal load on such a soil as at Joliette, where there are some eight feet thick of sandy clay overlying some 20 to 30 feet of mud or of clay of such a soft and semi-liquid nature that anyone can drive an iron rod into it to a depth of 20 feet or more. And this proportioning of the area of footings is such a simple thing to calculate that it is criminal to say the least, to neglect doing it. Again, in this case of the Joliette structure, the foundation I am told of the tower and remainder of the front elevation were sunk to a greater depth than those of the aisle walls, a very foolish thing to have done, as it left less of the comparatively solid upper stratum of sand between the wooden platform under the walls and the soft clay below, thus increasing the tendency of the heavier walls to penetrate into the soft substratum. Now the architect who planned the structure, it is said, disclaims all responsibility in the premises, as not having been employed to superintend the construction of the building; and the contractor says that neither is he responsible as he executed the plans as prepared by the architect, and so between them both it appears that the parish will have to foot the bill of reconstructing the whole facade and tower at the parishioners' expense.

I had the honor at our last meeting in Quebec of reading you a paper on the "Necessity of a School of Architecture for the Province of Quebec," or I should more aptly have said, "for Canada as a whole," since similar failures have occurred in Ontario; and now I presume it will not be denied that such a school is of paramount necessity, where an aspiring architect may be taught the importance of sounding and boring the soil he plans to build on, and in any case where not on solid rock or an unyielding base, not fail to spread his footings in a way to make them truly proportional to the respective weights they will have to bear.

Errors so expensive to make good should not occur again as at St. Bazile, where the walls sank some two feet, and the masonry had to be almost entirely rebuilt at a cost of some $12,000. At Cornwall, the settlement was not less than two feet ten inches, and occurred all at once, I am told, on or during a single night—the front wall tearing itself away from the remainder of the church and sinking bodily and equally, though, or in a way to allow of making good the levels of the door-ways without the necessity of demolishing and rebuilding the front and tower.

Foundations may be considered the engineering part of architecture, and it is strange and hard to see how, while an engineer will never attempt to drive a pile or sink a caisson or start the foundations of any structure without sounding the soil he has to build on, an architect can consider himself less liable to the danger of unequal settlement. The CANADIAN ARCHITECT AND BUILDER, in an article in its November issue of last year, insists on this engineering knowledge on the part of architects, and it is to be hoped, that the absolute necessity of the thing will now be seen and not forgotten in the future.

Not settlement is to be guarded against, but solely inequality of settlement in the different portions of a foundation. It is just as easy to erect a heavy structure on a mud foundation and insure its permanent verticality, as to cause a heavy iron-clad to ride at ease and upright on its bed of water. This can be done, as said, by thoroughly proportioning the area of base of each portion of the structure to the weight it has to bear, which will insure absolute equality of settlement in any homogeneous soil; but if one or two corners of a structure be on rock or any such unyielding foundation, then becomes it peremptory in the other portions to reach the rock or rest on it by the proxy of piles or pillars driven down to an equally unyielding bottom; or if not, to see by trial how much the soil can bear without sensible compression, and divide the weight, or spread it out over such a number of feet as will meet the requirements of the case. If a reliable bottom is to be reached by piling through a bed of stiff or compact and so to say incompressible sand, it must not be forgotten that material aid can be had by applying the loosening, disintegrating power of water. I had to do this myself when boring in 1876 for the tests as to the nature and impermeability of the soil or river bed to be built on. The sand was so compact that a two or three inch tube could not be driven into it to more than a few feet without the aid of a jet of water forced down through an inner and smaller pipe, and which loosened and disintegrated the sand beneath the outer pipe in a way to cause it to sink to a depth of 70 feet to rock bottom, while room was made for the advancing pipe or pile or borer by the water forced down, as said, through the inner tube, coming up or returning through the space between the tubes and bringing up the loosened sand with it. Ordinary wooden piles may be driven in the same way through stiff and otherwise unyielding soil, by the use of water under pressure forced down through a pipe or hose attached to the side of the pile and reaching to its shoe or point, and easily removable, and to be used again on each succeeding pile. This most effective mode of loosening the soil is much used and has been for some years past, in pursuing excavations under water, and in fact, in all possible situations, and the material removed, it must be remembered, can now, instead of having to be so removed by cartage, be blown away to any distance by forcing it through pipes of adequate size or even rubber or canvas conduits under air pressure, or which is the same thing, by pumping out the air in front or ahead of the material to be discharged or removed, when the mere atmospheric pressure of over 2,000 pounds to the square foot blows the stuff along to destination.

The most advanced practice in caisson foundation building, is perhaps that now being pursued in putting in the piers for the American Surety Company's building in course of erection opposite Trinity church, corner of Broadway and Pine street, New York, by Bruce Price, architect of the new Frontenac Hotel, Quebec. These foundations are 70 feet deep to bed rock, while the building of 22 stories, or 360 feet in height above road level, and therefore higher than Trinity church itself, will have a total height of not less than 430 feet, its cost being put down at some $2,000,000. Messrs. Snoozsmith & Co. are the engineering firm of contractors. I say "engineering," because now-a-days, the responsibility for solidity and permanency of construction, devolves on the contractors equally with the designing architect. These firms of builders employ the highest engineering talent, for it must not be believed, as popularly thought, that all the engineering difficulties are in advance wrought out and solved by the designers, on the contrary, Sir Benjamin Baker, in the construction of the Forth bridge, where the twin

spans are each some 1,700 feet from pier to pier, gives the greatest credit to the contractor's engineers for their many ingenious devices in carrying out the work. In the case under consideration—the American Surety Company's building,—there are (13) thirteen brick piers on as many rectangular steel built caissons of ½" stuff, braced on the inside. The caisson is 7 feet high beneath the roof of heavy I beams, its sides carried up two feet all around above the roof, with a two feet filling of concrete on which the brick piers rest. The whole foundation was excavated bodily, and taken out down to 20 feet beneath the roadway, at which depth water was reached. The caissons were then put in place—not all of them together, but in alternate series, so as not to risk deranging the foundations of adjoining structures, sunk to a lesser depth than that to be arrived at. To each caisson is applied a tube of oval horizontal section, and of such size, some 3 x 5 feet inside drain, in the clear of jointing flanges, as to allow of the men passing up and down, to and from their work, and to give passage to the buckets, go and come, by which the excavated material is raised from within the caisson to the surface. The brickwork upon the caisson progresses as the caisson sinks gradually to destination with its increasing burden of advancing masonry. As the pier advances or is added to in weight, additional lengths of iron shaft, or well, or vertical tunnel-way, are added and bolted on, air-tight of course; and as the shaft gains height, the air lock rises with it. The construction and use of the air lock, though presumably well known to all, from having now so often and for so many years been used, as in the construction of piers of the Brooklyn Bridge and elsewhere, is a mere cylinder, a component portion of the shaft, high enough and of sufficient size for several men to stand in at a time. It has an under and an upper door or hatchway, through which the workers in the caisson pass up and down or to and from their work. If there were no water to contend with, the simple shaft way through the pier would be sufficient, the men working under ordinary atmospheric pressure, but the water has to be kept out to allow of excavating to the required depth to reach the rock. The pressure of the incoming water is counteracted, resisted by the pressure of the air from within the caisson outward. This pressure increases with the depth, and hence the necessity of the air back, wherein, while the ingoing and outgoing gang or band are in it, the pressure of the air, by opening a cock in the floor for the ingoers, one in the roof for the outgoers, is gradually increased or diminished in a way to accommodate the lungs and give no trouble to the individual —cause him no discomfort. This would seem to be slow work, but on the contrary, it is, under the trying and difficult circumstances, very rapid, when we consider that as much as 52 feet has thus been sunk in a single week, or nearly nine feet per diem, which would entail a delay of only 13 weeks or a little over three months if each pier had to be sunk separately to destination, whereas three to four of the piers can proceed stimultaneously, and the work be done in a month or a little more.

In the manipulation of the caissons, great ingenuity is shown, to remove no more earth than that which is vertically under the caisson, to avoid disturbing adjacent buildings. In sinking caissons in river beds, no such precautions have to be observed, and the material excavated in semi-fluid state can be blown out instead of bucketed out, as was done in the case of the Brooklyn bridge foundations, where on one side of the river, after the caisson reaching bottom at 40 feet depth of water, there remained 40 feet of sand still to be removed to reach the rock foundation, and this immense mass of some 70 × 100 × 40 feet, say 10,000 cubic yards, was actually blown out by air pressure through the twelve four inch pipes provided for the purpose,—two to each of the six compartments into which each caisson was divided—the pipes running from the floor level of the caisson, through the roof thereof, and up through the masonry as it progressed, with an elbow at the top of each, throwing the stuff out into the river. A caisson for the foundations of a building has also sometimes to be moved laterally, and this is done and has been done effectively, with its load of brickwork on it, by thrusting it forward by struts and jack-screws from the off-side, while the on-side, or that to which the pier is to be moved, is caused to be gradually worn away by the disintegrating action of water already alluded to, the operation being performed by jets of water under pressure, some of them from above downward, while others as effectively do their work from beneath the lower edge of the caisson upward.

Mr. A. T. Taylor also contributed the following paper:

NOTES ON SOME ASPECTS OF THE CITY OF THE FUTURE.

MANY fanciful pictures have been drawn in literature of the condition of man in the future on this earth, most of them with more than a strong tinge of romance. There seems no doubt that in the near future the hygienic conditions of life will be greatly improved, and that the physical surroundings will more and more be laid under tribute to minister to the well-being, comfort and pleasure of mankind. It behooves our profession to be in the forefront of all such movements.

As a population aggregates at particular centres, and crowds together to make up our large towns and cities, problems of how best to house and minister to its physical, mental and higher nature, present themselves for solution to all earnest-minded men. The wise solution of such is not optional, for if neglected or ignored they bring their own Nemesis in misery, disease and death.

In a city's growth there are two elements which go to make the ideal in what we may call its externals, viz.: 1st, wise and comprehensive building by-laws; 2nd, wise and artistic guidance in the laying out and beautifying of its conformation, its buildings and their surroundings, and general embellishments. These two aspects concern us very closely as architects, and I think need no apology for being brought before you to-day.

The necessity for the first of these has been more recognized than the second. Most towns of any importance have formulated some kind of building system to govern the erection of buildings, their general strength and healthiness.

In the case of our own city, the present by-laws have been amended from time to time, and are still somewhat inadequate, so that it is felt by many that the time has come when an entirely new building by-law should be prepared; and as you have heard from the Secretary's Report to-day, a Committee of our Association is working upon this at the present time. It is no easy work—nay, it is impossible, to frame such laws as to please everybody, or to cover every possible contingency; but it shou'd be the desire of such a committee to frame them so that good building—both as regards materials and workmanship, may be the result, and bad building discouraged. It is unrally, of course, follows that such laws require to be enforced, and they will need firm and judicious enforcement.

Many new materials are employed and many new modes of building adopted, so that building laws of to-day require to be more extensive and all-embracing than of old. It is proverbial that a skilful, and if there is such a thing, an unscrupulous lawyer, can drive a coach-and-six through any Act of Parliament, and it is difficult to make by-laws that unscrupulous jerry builders and dishonest contractors may not evade, or that ignorant and stupid men—architects in nothing but the name—may not stumble and blunder over. It is in checkmating the one and helping the other that these laws will be most useful, and with the plumbing by-laws recently enacted, incorporated, the result should be a reduction in the death rate, fewer fires, healthier homes, and greater peace and contentment. Only in a very general way can such by-laws take cognizance of the design and appearance of the buildings. Were it possible to get a proper authority, thoroughly competent, to criticise and pass judgment upon all designs of buildings to be erected, it would no doubt be an advantage to the appearance of our streets, and such abortions and hideous eccentricities as we are all, unfortunately, too familiar with, would never see the light. But this authority would have to give the widest latitude in choice of style, and any special predilection on the part of such authority in favor of any particular style would have to be controlled. The tendency of all such tribunals is to stereotyped forms, which would have to be avoided, but the careful selection by such a tribunal of men of undoubted ability, but with opposite predilections as to styles, &c., would effectually check this. Personally I am in favor of such a tribunal, but such must be selected, not for political service or as nominees of any party, but for their recognized artistic knowledge and abil ty.

In Europe certain restrictions as to the he ght of buildings have long been in vogue:—Thus, in Paris, no front wall on any street can be higher than 65 ft.; in Vienna the limit is about 77 ft., and in London, in new streets less than 50 ft. wide, the height of a building must not exceed its distance from the opposite side of the street. The wisdom of such rules is now being recognized by our neighbors across the border, where "sky scrapers" have so flourished as to utterly destroy the unity and symmetry of the streets; and enactments are being passed in some cities limiting the heights of buildings. It may be that in the near future some such enactment will be necessary in our own city.

In France, I understand, they go further than this, and the municipal authorities of the cities have supreme control over the treatment of the exterior of buildings—the style of architecture adopted, etc.

I referred to the danger of stereotyped forms in designs controlled by a tribunal of fixed predilections, and I would take the opportunity of referring in this connection to a similar and more imminent and grievous danger in connection with the designs of all government buildings emanating from a department of the government. A well-timed letter from one of our profession in Ottawa appeared in the last number of the CANADIAN ARCHITECT AND BUILDER, which all would do well to read. The system has been felt to be unsupportable in the States, and, as you all know, a bill has recently been passed to throw open the designing of public buildings to the profession at large. Without disparaging in any way either our Dominion or Provincial government architects, I think I will have the unanimous support of all, when I say that, in the nature of the case, better results would follow if wise selections of architects were made from the profession at large for such buildings.

We pass on to the second aspect, viz: Wise and artistic guidance in the laying out, beautifying and embellishment of the streets, parks, buildings and surroundings of a city. This has been grievously neglected. Cities have been allowed to grow either at haphazard, like our own city, and then millions of dollars expended on widening the streets and cutting new ones through dense population; or have been laid out in simple grid-iron plan, as prosaic and inartistic as it is possible to imagine. The relation of a building to its site and the relation of the site to the building, has been too often ignored by authorities and by architects. As an example of the first, I may cite the new Boston Public Library, which is, to my view, very unsatisfactory in relation to its environments; and as examples of the second, I may refer to nearly all of our public buildings, which are planted down without any regard to vistas, or of being made central features in our streets. Paris is a notable exception to this, and in the laying out of her squares, gardens and streets, and in the arrangement of her public buildings and monuments, she is an example to the world.

On this continent, Washington is perhaps the best laid out city for such effects as I have named. All cities of the future, which are not simply the development of the cowpath of the country and the lane of the village, will be laid out with some regard to numerous open spaces, radiating boulevards and noble buildings, placed in such positions as to afford beautiful vistas. There will be more gardens and parks, because men will have learnt that these are greater moral factors in the well-being of mankind, than crowded tenements and low saloons.

Charming effects in cities are often obtained by curved streets of large radii. Who has not delighted in the windings of the Strand and Fleet Street in London, or endorsed Wordsworth's encomium on the beautiful High Street, of Oxford, when he describes it as "The stream-like windings of that glorious street?"

I have touched on the designing of public and government buildings. I would like to venture a word or two on the selection of our monuments, statues, and the embellishment generally of our streets, public squares, etc.

Is it not the truth, that very few of these are satisfactory to a cultured taste? In nearly all large cities and towns, monuments, statues, &c., are often so inartistic, so unworthy of their position, that we are led to wonder what dreadful crime the unfortunate man committed that he should thus be held up to the ridicule and pity of future generations. We are not wholly innocent of examples of these ourselves—nay, in many respects we are very guilty. Under existing arrangements, is it surprising that this should be? It would be surprising if it were otherwise. The selection and arrangements for these memorials and adornments are generally in the hands of men—very worthy, no doubt, but not educated in art, and therefore not capable of deciding such matters. It is extraordinary how intelligent men will wisely consult lawyers on all legal questions, doctors on matters of health, engineers on matters of drainage, hydraulics and machinery, but on matters of art and taste, think they are quite capable of judging for themselves.

I have long cherished the dream, that in the city of the future, all such questions will be relegated to a special artistic authority or tribunal, who will decide such matters. Is it too much to hope that this may be realized in the near future in our own city? This is by no means a Utopian idea, for such a scheme has already been put into operation in Boston, where they have succeeded in getting an Art Committee appointed to supervise all such matters as I have spoken of. There the Committee is composed of five members, who serve without any remuneration and consist of the following: The Mayor of the city, the Chairman of the Trustees of the Public Library, the President of the Institute of Technology, the President of the Art Museum and the President of the Society of Architects. Would it be possible to have such a Committee appointed here? It seems to me that some of our worthy aldermen must be exceedingly perplexed, when they try honestly and conscientiously to decide matters of taste and art, and that they would gladly hail the assistance of such an Art Committee, who could give an "ipse dixit" on these things.

We have made marvellous progress in art matters in the last few years, but there is much still to be accomplished if we won'd not be outstripped by other cities.

The art attainment of a people is a measure of their civilization. I think it is quite within our province as an association of architects to take the first step in endeavoring to have such a tribunal appointed. The members might consist of say, the Mayor, the President of the Art Association, the President of the Royal Academy or some representative of the same, the President of the Association of Architects, and say a representative from the

Government Board of Manufactures or such other bodies as might be arranged. Had such a committee been in existence I feel sure some monuments which have recent y been put up in our city would have been relegated to the limb o of Philistinish things, and we should have been spared many painful sights.

Both New York and Boston go further even than this, however, for in these two cities Municipal Art Societies have been established, with the express object of providing adequate sculptural and pictorial decorations for the public buildings and parks. I understand that the first work done in this way in New York was the decoration of a wall in the new Criminal Court Building, and other work of a similar kind is contemplated. All such efforts are entirely praiseworthy, and the liberality of generous-hearted men might well find an additional channel in the beautifying of our public buildings by painting and sculpture.

Nature has done much for our city, rolling a magnificent river past our doors, and heaving up a beautiful verdure-clad eminence for our habitations to cluster round; let us do our part in making these habitations worthy of their natural surroundings, so that they may be healthy, comfortable and beautiful—worthy dwelling-places of a happy, virtuous and contented people.

These two papers were listened to very attentively and were much appreciated. On the proposition of Mr. W. E. Doran, seconded by Mr. J. Z. Resther, a hearty vote of thanks was accorded the contributors for the papers, after which the meeting adjourned.

THE CONVERSAZIONE.

A delightful conversazione was given in the evening in the galleries of the Art Association to inaugurate the opening of the Exhibition of Architectural Drawings under the auspices of the Province of Quebec Association of Architects. There was a large and fashionable assemblage of people.

Gruenwald's Band discoursed sweet music, and refreshments were served during the evening in the large class room adjoining the gallery. The evening was a thoroughly enjoyable one. This is the first Exhibition of the kind held in Montreal, and has proved more successful than the promoters had ventured to hope for, and may be taken as a favorable augury of what will be accomplished in the future.

The following is a list of the drawings exhibited:

Gordon & Helliwell, Toronto—Church of the Messiah, Toronto; residence of Captain S. Crangle, Toronto; Town Hall and Market, Orillia, Ont. Darling & Curry, Toronto—Church of St. Mary Magdalen, Toronto; Organ of St. James Cathedral, Toronto: Competitive Design for Ontario Legislative Buildings, one large perspective in pen and ink, and two elevations of the same. Frank Darling, Toronto—Head Master's House, Port Hope School, Ont.; house at Niagara; house on College ave., Toronto. W. A. Langton, Toronto—Sketch St. Hilda's College, Toronto. Siddall & Baker, Toronto—Nos. 12 and 14 Colborne street, Toronto (stores); railway station at Janesville; staircase to Music Room, Nordheimer's Building, Toronto; perspective of Competitive Design for Government Buildings, British Columbia. Thos. Fuller, R.C.A., Ottawa—Public Building, Brockville, Ont.; Public Building, Sorel, P. Q.; two views of Public Buildings at Galt, Ont.; design for Superintendent's residence, Experimental Farm, Ottawa; Public Building, Victoria, B.C.; Drill Hall, Toronto; Public Building, Charlottetown, P.E.I. R. Dawson, Toronto—Residence of A. T. Lytle. A. T. Taylor, F.R.I.B.A., Montreal—Interior sketches of house at Ottawa; street scene in Louvain; Hon. Geo. A. Drummond's residence, Montreal; Bank of Toronto, Montreal; Bank of Montreal, west end branch, Montreal; seconded premiated design for Glasgow Municipal Buildings, Scotland; the Engineering Building, McGill College; the Redpath Library, McGill College; interior view Bank of Montreal Head Office; Almhouses, Chiselhurst, England; scene in Perugia, Italy; the Cathedral, Malineo, Belgium; the Physics Building, McGill College; Bank of Montreal, Vancouver, B. C.; Siena Cathedral, Italy: view in Ghent, St. Antonio, Padua. A. C. Hutchison, R.C.A., Montreal—Residence of C. E. L. Porteous, Montreal; residence of W. W. Ogilvie, Rapids Farm; Cote St. Antoine Academy; Erskine Church, Montreal; Young Women's Christian Association Building, Montreal; design for a Bank; Montreal High School; Window, Front Gable Erskine Church, Montreal. Brown & McVicar, Montreal—Residence of F. G. Guadinger, Montreal; residence of George Hyde, Montreal; Taylor's Church, Montreal; Masonic Temple, Montreal. David R. Brown, Montreal—Westminster Church. D. Norman McVicar, Montreal—Tower of Eglise St. Jean, Amiens; Calle off Graod Canal Venice. Miss M. P. Taylor, Edinburgh—St. Giles Cathedral, Edinburgh; Norman Staircase, Canterbury; interior of St. Mark's, Venice. Edward Maxwell, Montreal—Study for residence of H. Vincent Meredith, Montreal; group of three sketches for country houses; view in hall of house for General Manager Bank of Montreal, also exterior view of same; business premises of R. Sharpley & Sons, Montreal; residence for Hugh A. Allan, Montreal; residence of D. McIntyre, Montreal; Competitive Design for Masonic Temple, Montreal. J. W. and E. C. Hopkins, Montreal—Merchants' Bank, Montreal; residence of R. B. Angus, Montreal; business premises of John Murphy & Co., Montreal; North British and Mercantile Insurance Co.'s Building, Montreal; Bank of Montreal, Ottawa; the J. C. Wilson Building, Montreal; Montreal Street Railway Co.'s new building, Montreal. E. C. Hopkins, Montreal—St. Patrick's Cathedral, Dublin. Dunlop & Heriot, Montreal—St. George's Church Tower; houses for Dr. F. W. Campbell, Montreal; proposed residence for Hugh Graham, Montreal. A. F. Dunlop, R.C.A., Montreal—Residence, Edgehill avenue, Montreal; Ice Grotto, Victoria Rink, Montreal; "Dunlop of Dunlop," Ayrshire; St. James Methodist Church. J. C. A. Heriot—Design for a Country House; design for a Country Church; design for a Suburban Residence. Perrault, Mesnard & Venne, Montreal—Church for Pawtucket, U. S. A.; Church of the Sacred Heart; Laval University, Montreal; Banque du Peuple Building, Montreal; perspective of first scheme for Monument National, Montreal; elevation Monument National, Montreal; design for a church. A. Raza, Montreal—St. Bridget School, Montreal; residence for Ald. A. Dubuc, Montreal; residence for Ald. J. Brunet, Montreal. W. McLea Walbank, B.A.S., Montreal; residence for Dr. F. Buller, Montreal; competition design for Masonic Temple, Montreal; competition design for Montreal Board of Trade. R. Findlay, Montreal—Residence of Jas. Morgan, St. Anne de Bellevue; Sun Life Building, Montreal. Roy & Gauthier, Montreal—Competition design for Chicago Court House, U. S. A.; houses St. Louis Square, Montreal; Sacred Heart Church, Ottawa, Ont.; college at St. Thérèze, P. Q. J. R. Rhind, Montreal—Competition design for St. John the Divine Cathedral, New York; competition design for Masonic Temple, Montreal; premiated design for Protestant Orphans' Asylum, Montreal. A. Flockton, Montreal—Residence of L. H. Taylor, Montreal. J. and H. C. Nelson, Montreal—Design for an Educational Institution. J. Rawson Gardiner, Montreal—Design for Business Block; Choir Bolton Abbey; Old Houses, Sussex. Eric Mann, Montreal—Design for an Office Building. A. J. Cooke, St. Lamberts—The Founder's Tomb, St. Bartholemew, Smithfield; design for a Reredos; design for a Font. C. Dufort, Montreal—Design for a Chamber of Commerce. G. A. Monette, Montreal—Design for a Villa Residence. P. B. Williams, Montreal—Design for Memorial Front, St. Michael's Mission, Stepney, London, E. C. L. A. Venne—Design for a Country House; study for stained glass, Head of our Lord, a fragment of window, and design for stained glass and decoration exhibited by Messrs. Castle & Son and Messrs. Spence & Son; also a large cartoon for a window by Castle & Son, and five decorated plaster medels of the Alhambra, which were kindly loaned by Mr. R. B. Angus for exhibition.

On each side of the two doors are beautiful examples of old Chinese wrought iron work, lent by the Hon. Geo. A. Drummond. They are all four floral studies of chrysanthemums and lillies, most interesting and perfect in their design and finish. In the entrance hall two vigorous plaster models are exhibited by Mr. Hall, and in the doorway is hung a beautiful eastern camp sent by Mr. D. A. Watt.

Mr. A. T. Taylor contributed some fine water color sketches of picturesque views and scenes in Italy. Amongst the many beautiful buildings erected in the Romanesque style by this author, the West End Branch of the Bank of Montreal, the Redpath Library and the Bank of Toronto may be mentioned. Another good bit of designing by the same author is his competitive design for the Glasgow Municipal Buildings, of a classical character, and rendered in pen and ink, which was awarded the second premium amongst a large number of competitors. Mr. Edward Maxwell has also some very effective water color sketches, and his study for Mr. H. Vincent Meredith's house is nicely rendered.

Mr. A. C. Hutchison has some good pen and ink drawings—for instance, Mr. C. E. L. Porteous' house—original in conception and good in rendering, as are also his drawings of Erskine Church, his St. Antoine Academy and his house for Mr. Ogilvie.

The design of Mr. J. C. A. Heriot for a suburban residence possesses some merit.

We are glad to see the design of Messrs. Darling & Curry, of Toronto, for the Ontario Legislative Buildings, which ought to have been erected, and would have been an ornament to Toronto, and their perspective of the magnificent Church of St. Mary Magdalene, Toronto.

Mr. J. R. Rhind has an ambitious design submitted in the competition for the St. John's Cathedral, New York, showing an immense deal of labor both in design and draughtsmanship.

Mr. A. F. Dunlop shows a view in pen and ink of St. James Methodist Church, which hardly does justice to the beauty of the original.

Siddall & Baker's design for the Government Buildings at Victoria, B. C., is well shown by a crisp pen and ink perspective.

Mr. Thos. Fuller has enriched the exhibition by a number of small but most daintily rendered water color perspectives of buildings he has designed.

Messrs. Perrault, Mesnard & Venne show a good sepia perspective of their Laval University, Montreal.

Mr. Findlay, amongst other things, shows a very picturesque country house at St. Anne's, and Mr. A. Raza two city residences in the Renaissance style and elaborately decorated.

For the first undertaking of the kind ever attempted in Montreal, the Exhibition is a marked success, and it ought to encourage the Province of Quebec Association of Architects to hold similar exhibitions at regular intervals in the future, which would do so much for the education of the public and the profession at large.

CANADIAN CEMENT, LIME, AND CLAY PRODUCTS.

UNDER the title "The Utility and Value of some Common Mineral," the following interesting particulars were presented in a paper by Mr. A. Blue, at a recent meeting of the Ontario Mining Institute:—

The two most abundant minerals in this country are clay and lime, and they are likewise among the most useful. They furnish the raw material too for mineral industries of the first importance, in which a large amount of capital and many laborers are employed. Yet in the vulgar opinion, clay and lime are not worthy of being called minerals, and the seekers after gold, silver, copper, nickle and iron would scorn to recognize the workers in clay and lime as fellow miners. I think it will not be hard to show, however, that these very common minerals possess a value not in any degree inferior to the metals, and that they are deserving of much greater attention than they have yet received in this country, at the hands of moneyed men, and men of the best technical training in the mineral industries. But let it be premised, that in this paper lime (using the term in its colloquial sense) will be dealt with only as material for the production of cements.

As to the extent and growth of the industries, information is afforded by the census reports of the Dominion Government. But for comparative records we can only go back to 1881; no account was taken of cements in the Censuses preceding the one for that year, and the earlier statistics of the brick industry are of no use in showing its growth.

The statistics of the two industries in Canada and the Province of Ontario respectively, are given in the following table for the years 1880 and 1890:—

	Canada.		Ontario.	
	1880	1890	1881	1890
CEMENT:				
No. establishments	9	19	3	12
Hands employed	115	243	29	128
Wages paid	$38,151	$85,969	$7,000	$39,245
Value of product	91,658	251,175	20,200	153,400
BRICK AND TILE:				
No. establishments	500	627	400	463
Hands employed	4,129	6,737	2,768	3,791
Wages paid	$968,600	$1,428,480	$415,311	$797,257
Value of product	1,541,892	2,684,713	971,158	2,154,152

The noticeable feature in these statistics is the large share Ontario claims in the progress of the ten years. Ten new cement establishments were added, and all but one are credited to Ontario. The number of hands employed by the industry increased by 128, and all but 29 are returned for Ontario works. The amount paid for wages was greater in 1890 than in 1880, by $47,809, and two-thirds of it was earned in Ontario. The increase in the value of product was $159,517, and three-fourths of it belong to Ontario. The progress of our Province in the manufacture of brick and tile was less conspicuous in the decade, although in number of works, employees, wages and value of output, she exceeds all the other provinces combined. In the increase of works from 1880 to 1890, her share was 63 out of 137; of workmen employed it was 1,023 out of 2,608; of wages paid for labor it was $391,946 out of $819,799, and of value of articles produced it was $1,182,994 out of $2,042,821.

But assuming the absolute accuracy of these figures, there is one aspect of them that arrests attention, viz: the relativity of the cost of labor to the value of product in Ontario and the other provinces. For the whole Dominion, in 1880, the ratio of labor to product was 1:2.53, and in 1890 it was 1:2.50 a proportion which every one would be disposed to accept as likely. For Ontario, however, the ratios of labor to product were 1:2.40 and 1:2.70 for the former and latter years respectively, while for the other provinces they were 1:2.95 and 1:2.27. The use of improved machinery would account for this disparity to some extent, although not wholly. So also would fluctuations in the price or the efficiency of labor. The latter cause can be dismissed as improbable, in view of the proximity of the provinces: and while the former might flatter our vanity, it would, in view of all the circumstances, be fatuous to claim for it more than a very modest share of potency in the radical disturbance of ratios. The real cause will probably be found in the different scales of values adopted in different parts of the country, and it is to be regretted that in the Census enumerations account was not taken of quantity as well as of value.

In the statistics collected by the Bureau of Mines last year, the manufacturers of cement in Ontario, gave the value of their product as $127,415, while the number of workmen they employed was 224, and the amount of wages paid for labor $60,208. Their product included 74,353 barrels of natural rock and 31,924 barrels of Portland cement. In 1890 there was no Portland cement made in our province, but the value of cement manufactured that year according to the census was greater than last year by $25,985, while the number of workmen employed was less by 96, and the wages paid for labor less by $20,963. Had we the output for the Census year in quantity, the cause of the discrepancy would more clearly appear. The Bureau's returns of brick and tile for 1893 are also much lower in value than those of the census for 1890, but this is no doubt due to the fact that the financial stringency of last year caused many works to close down early in the season, while others were idle the whole year. The number of men employed was 2,874, the amount paid for wages $531,686, and the value of product $1,339,873—the ratio of labor to product being 1:2.52.

It has been shown that on the basis of values the manufacture of cement in Canada increased from $91,658 in 1880 to $251,175 in 1890. The whole of this product was consumed in the country, but it was far from supplying our needs. In the fiscal year 1880-1 we imported hydraulic, Roman and Portland cements to the value of $53,765, and in 1890-1 to the value of $313,690. But since the fiscal year 1886-7 the Trades Tables, give us the quantity as well as the value of cements imported, and they show that the demand has been largely on the increase.

The following table gives our imports of Portland and Roman cements for each of the seven fiscal years, 1886-93, the great bulk of which was the Portland variety:—

YEAR.	BARRELS.	$
1886-7	102,750	148,054
1887-8	122,402	177,158
1888-9	122,273	179,466
1889-90	192,322	313,572
1890-1	183,728	304,648
1891-2	187,233	281,553
1892-3	229,492	316,179

The total importation in the seven years was 1,140,200 barrels, valued in the Trade Tables at $1,720,570; but to this should be added the $455,445 of customs dues paid to the Government, the costs of freight and insurance and the profits of importers, in reckoning the price paid by the consumers—an aggregate of not less than $3,250,000. In these seven years the increase in quantity was 123 per cent., and in value 115 per cent. But a more striking evidence of the growing demand is afforded by a comparison of the imports of Portland and Roman cements for 1880-81 and 1892-93. In the former year their value was only $45,646, and in the latter it was $316,179, being an increase of nearly 600 per cent. in twelve years. This is a rate that perhaps has not been equalled in any other article of Canadian importation. What is the secret of it, and is the demand likely to be maintained?

The answer to these questions may be summed up in a very significant term of very modern usage on this continent, viz., good roads. The setting in of the era of good roads in this country, as well as in the United States, does not date back ten years, but in that short period much has been learned on the subject, and the street engineer is now as much of a specialist and quite as useful in his way as the military engineer or the mining engineer. The Roman roads of Europe, which have lasted out the traffic of two thousand years, have taught him the invaluable lesson that the only sure way to make a good road is to lay a good and strong foundation. But instead of using stone material, as the Romans did in constructing their great military roads, he has adopted the concrete used by them in the construction of temples and other public buildings, some of whose walls have been standing 2,400 years. The great dome built by Agrippa, the friend of Augustus, "the immortal monument of the Pantheon," as Gibbon described it—now the church of Santa Maria della Rotonda—is an edifice in concrete, and though ravaged by fire and assaulted by the Huns and Goths, it is still intact after more than 1,900 years. Concrete is the street engineer's material for street building, and his chief reliance in the making of it is not Roman or any other kind of natural cement, but the stronger and more durable Portland. In Toronto during the last five years not less than 150,000 barrels of cement have been used in making concrete for street construction, and of this quantity Mr. Rust tells me that not more than 4,000 barrels have been the native hydraulic cement. "Up to the last year or two," he says, "it was all imported Portland cement from Europe." In other towns and cities of the Dominion cement is also being used in steadily increasing quantities in building sewers and streets, and the results are so uniformly good that the material promises to grow steadily in favor. It is almost certain then that for many years yet to come the demand for Portland cement will continue as experience proves the utility and permanency of the concrete roadbed.

But why should we remain dependent on foreign sources of supply for Portland cement? We have in Ontario abundance of raw material for producing it. In scores of localities beds of white shell marl of large extent and excellent quality are found, some of them at the bottom of lakes in which myriads of fresh water shells yet survive, to add to the thickness of the deposit as one generation follows another; others of them on the sites of lakes long ago filled up with peaty mould or drained by continual elevations. This marl, if unmixed with sand, clay, peat, or other matter of mineral or vegetable origin, is almost pure carbonate of lime, and furnishes the principal material for the manufacture of Portland cement. The necessary proportion of clay is a matter of experiment, but in all cases the purer and more uniform the quality of the marl, the easier it is to get a right mixture. Our manufacturers in Ontario have acquired their experience slowly and dearly.

Mr. Rathbun told me that it cost him five years of testing, with the aid of a chemist, before he was convinced that it would be safe to start his works. Mr. Butchart also told me that it cost his company several thousand dollars, a visit to some of the best Portland cement works in England—where he was admitted as a special favor—and the service of two experts in the construction of a suitable plant, before they could produce a commercial article. But the Rathbun Company and the Owen Sound Company have succeeded, and during the last two years they have been producing a Portland cement which satisfies every requirement.

Mr. C. H. Rust, Deputy City Engineer of Toronto, makes this statement concerning it, in a letter which I have just received from him:

"Since 1892 we have used a quantity of Portland cement made by the Rathbun Co., at Napanee Mills, and by the Owen Sound Co., at Shallow Lake. Both these brands are quite equal to the majority of the imported cements, and no doubt, when their facilities for manufacturing are increased nearly all the cement used in this city will be of home manufacture."

The Owen Sound Co., has recently had the misfortune to lose its mill by fire, but it is understood that a new one is in course of erection. The company has a large supply of raw material alongside of the works, suitable clay for mixing being found immediately below the marl, and doubtless the capacity of the new mill will be made to meet the growing requirements of the trade.

The only other Portland cement works in the Province are at Marlbank in the County of Hastings. The site was chosen because of its nearness to a very large deposit of marl; but although English capital was put into the business, and presumably English experience also, the enterprise had to pass through the usual ordeal of disappointment and delay before a successful beginning was made.

The output of those three mills last year was 31,924 barrels, but one of them did not start until late in the season, and another only worked half the year. Had their capacity been six times as great they could hardly have supplied the quantity of Portland cement imported by

Canada during the fiscal year 1892-3, and obviously therefore there is ample room for home manufacture to grow. With raw material so abundant and accessible, and with capital seeking new channels of investment, and labor seeking employment, why should we not produce in the country all the Portland cement that our market requires. An article of uniform quality will always be in request by customers, and with care on the part of the manufacturer there is no reason why he should not be successful in supplying a distinct brand. But as long as we are dependent on foreign makers we cannot hope to be supplied with cement of uniform quality, for where larger orders have to be filled it is a common practice even of large mill owners to buy lots from other manufacturers and so make a prompt shipment. The result is that there are as many brands as makers, and with cements of different qualities, some quick setting and some slow setting, it is hardly possible to make a first-rate concrete. This is a risk which may easily be avoided if orders are placed at home, with the home manufacturer, and the good results obtained from our Ontario cements are no doubt due to the fact that orders are honestly made up, each manufacturer being jealous of his own reputation.

As regards the products of clay, it is not necessary that much should be said. Taking the various articles of common and pressed bricks, terra cotta, tile, sewer pipe, and pottery, the number of men employed in their manufacture in Ontario last year was 3,109, with earnings of $601,686. The aggregate value of their products was $1,684,873, or more than one-fourth of all the mineral products of the Province in the same year. This fact alone suffices to prove the importance of our clay industries; yet it is obvious that they are capable of greater development. The manufacture of pressed brick and terra cotta began here only five years ago, and last year, in spite of the collapse in the building trade, the value of the output of six works was $217,373. It gave employment to 224 workmen, and paid them wages to the amount of $80,686. The improvement already noticeable in the architecture of our cities as a consequence of the use of pressed brick and terra cotta is bringing this material fast into favor, and it may be said that the earth affords no better building material than a properly burnt brick, and none which so readily lends itself to the production of handsome architectural effects. In the strong and fine-textured shales of our Hudson river and Medina formations, conveniently situated and easily quarried, Ontario is favored above most Provinces and States in America.

The same shales are also found to be suitable for the manufacture of sewer pipe, with proper mixtures, and last year the output of two establishments employed in this industry was $230,000.

Another clay industry is now on the eve of commencement, and if successfully established it promises to be a great boon to our towns and cities, viz: the manufacture of vitrified brick for street paving. In Ohio, Illinois, Iowa and other American States, this has grown to be a very important industry, and it is supplying a material for street construction which on all points of merit is not equalled by any other material hitherto employed for the purpose. Many mistakes were committed by the first makers of paving brick, and there is much yet to be learned as to the clays or clay mixtures which give the best results, as well as to the proper degree and duration of heat to produce a hard, tough and impervious brick. But much is already known, and with careful experiments and close observation many works are enabled to produce with regularity a high percentage of paving brick of uniform quality from every charge of a kiln. A number of experiments have recently been made in Toronto, Hamilton and elsewhere in this Province, and although each expert will assure you that he alone knows the secret, and that no one else has the clays for a right mixture but himself, you may rest assured that in a matter of this sort the key and the ward are not so hard to match as the tribe of experts would have you believe. In several instances encouraging progress has been made, especially with the Medina and Hudson River shales.

We may, therefore, I think, look with confidence to an early beginning of the production of paving brick in Ontario; and when that time comes we shall no longer be at the mercy of trust concerns like the owners of Pitch Lake asphalt, as illustrated the other day in the case of a contract for paving in the city of Hamilton. When we are producing Portland cement from our own shell marls and clays to the full extent in which it is required for street concrete, and paving brick from our own shales to cover the concrete, we shall be as independent as we ought to be in supplying ourselves with the materials of such everyday requirements as are called for in the building of good roads. In so doing also, we shall be utilizing our raw materials of clay and lime, otherwise of no value, finding profitable investments for capital lying idle in the banks, and giving employment to hundreds, if not thousands, of men who for lack of work to do are finding it hard to win their daily bread.

With one suggestion to the professors and instructers in the School of Practical Science, Toronto, and the School of Mining, Kingston, I close. Reference has been made to the experiments conducted by the manufacturers of brick and cement, preliminary to the building of works to commence production on a commercial scale. These experiments demand patience, exactness and scientific method, as well as the use of costly appliances. Why should they not be taken up in our technical schools, where there are professors having the necessary expert knowledge and training, and the appliances for making tests and ascertaining results with unerring accuracy? The importance of the clay industry has been so well recognized by the State Legislature of Ohio, that a course of practical and scientific instruction in the art of clay-making and ceramics has been added to the educational work of the state University, and the first term of the department opened yesterday. Work of that character is as much needed in Ontario as in Ohio, and the professors of our scientific schools cannot too soon prepare to enter upon it.

DISCUSSION.

Mr. R. W. Prittie said he had been for a number of years interested in the brick industry, particularly in the manufacture of paving brick. This article was coming largely into use in the States, and he had seen pavements which had been down for 16, 18 and 20 years, with but little repairs. It was giving the utmost satisfaction, and made a superior pavement in every respect, being smooth, lasting, easily cleaned, and affording a good foothold for horses. He was interested in a large vitrified brick factory which had been started at the Humber, near Toronto, last year, and was got partially under way when the financial crash on the other side affected the enterprise and brought it temporarily to a stop. He hoped, however, that the operations would yet be begun. It was the company's intention to put up a plant capable of turning out 50 millions of brick per annum, and employing 400 men.

Dr. A. P. Coleman, in reference to a remark in Mr. Blue's paper, thought it only fair to say on behalf of the School of Practical Science, that they had begun the work of testing cement, brick and similar materials. If provided with proper appliances, the authorities of the School were perfectly willing to engage even more extensively in such work.

Mr. J. Latimer asked if there had been any development in fire clay.

Mr. Blue—Not in Ontario.

Mr. Bell—There are good deposits of fire clay in Nova Scotia, but they are not made use of.

Mr. J. M. Clarke said it was well known that the manufacture of articles like vitrified brick in Ontario had engaged the attention of outsiders more than the people of the province. Outsiders were now investigating the subject with the view of beginning the manufacture of paving brick here.

BEARING POWER OF FOUNDATIONS.

From the valuable note-book of Mr. E. L. Corthell, of the Western Society of Engineers, we have been permitted to extract the following data respecting the bearing power of foundations.

Clay.—From 2 to 8 or 9 tons per square foot, without allowance for friction.

Sand.—The different kinds vary greatly in bearing power. Sand mixed with loam will not bear more than 5 tons per square foot. 9.3 tons per square foot were placed on fine gravel and sand at Urk viaduct; masonry piers on cylinders 4.8 inch diameter; friction neglected.

In India, on coarse sand in deep foundations, not over 9 tons are used.

In experiments 20 tons have been put on sand without measurable settlement.

Friction.—Side friction varies from 300 to 600 pounds per square foot.

All the above are in gross tons = 2,240 pounds.—B. Baker, April 17, 1888.

Clay.—Black Friars Bridge, 5 tons per square foot. Settled badly.—Randall Hunt, Engineering and Building Record, June 23, 1888.

New London Bridge, 5 tons per square foot on piles, = 80 tons per pile. Settled badly.

Newcastle-on-Tyne, 1½ tons per square foot; no settlement.

Fargo, Dakota, four-story building, 2½ tons per square foot; failed. Then 1½ tons per square foot; no settlement.

Cleveland, new viaduct, 1 to 1.7 tons per square foot.

Washington Monument, 9 tons per square foot, inside edge. Clay and sand, 3 tons per square foot, outside edge.

Sand.—Coney Island pier, 5 tons per square foot.

New York Steam Company's chimney, 4 tons per square foot on fine sand settled.

Brooklyn Bridge anchorage, 4 tons per square foot.

Nantes Bridge, 6.8 tons per square foot; settled.

Berlin, considered safe, 2.3 tons per square foot.

Sometimes used to 4.1 tons per square foot.

Albany Capitol, 2 tons per square foot; settled.

Cairo Bridge, fatigue weight:

Channel piers, 3.34 tons per square foot.

River Piers, 33.08 tons per square foot.

Friction on sides taken at 4,000 pounds per square foot; fine sand.

Sioux City, Pier III; sand, 2.04 tons per square foot.

Soft Soil.—India, one ton per square foot used.—Journal of the Association of Engineering Societies.

TO TEST WHITE LEAD.—Those who desire to test in a practical way the merits of white lead will find some useful hints in the instructions issued by an American Association of Master Painters. Substantially it is as follows:—Coat a board primed in ochre with a mixture of one ounce of oil and two ounces of lead. Then put on a second coat over the entire face of board, excepting a small portion in the middle. When this is done, put a third coat over all, excepting another small space, with a mixture also of one ounce of oil and four ounces of lead. Allow one week to elapse between each coat, and paint the boards while in an upright position. The board will, when finished, have been painted as follows: In the middle there will be a narrow space showing ochre priming, and on the left of it another similar space of one coat of lead; on the right of the ochre priming space, as well as on the left of the one coat space, will be similar small spaces, each being covered with two coats, and on the right and left respectively of these will be a larger space, covered with three coats. After the last coat has been on three or four days, place the boards where they will get a southern exposure, and if put over a roof at least two feet above same. If the boards are dry to the touch, they should be placed out of doors for a day or two between coats. The brush should be used to finish the mixing, and the boards should not be sandpapered. The test being one of comparison a separate board must be painted with each of the leads about to be tested. It will not be necessary to use a separate brush for each board if there are so many of them. Benzine is chosen as being more volatile than turpentine to wash out the brushes. Keep the brushes in oil when not in use. The test is intended principally as one of durability, and as after long exposure the covering qualities of the different leads will not be easily determined, they should be noted at the outset.

PLUMBERS' EXAMINATION PAPERS.

THE following are the examination papers used in the Examinations in plumbing by the city and Guilds of London Institute:—

ORDINARY GRADE.

1. (*a*) How would you make a reliable joint between a lead branch and an iron soil-pipe? (*b*) How would you make reliable joints in a stack of iron pipes receiving wastes from baths, sinks and used lavatories, with hot-water supply? (*c*) Describe the cements used for ordinary jointing purposes and their composition.

2. (*a*) Give the composition of ordinary and fine solder, and the melting point of each. (*b*) If a pot of solder is "poisoned," *i.e.* rendered porous or unworkable by the introduction of some foreign substance, how would you remedy it? (*c*) What fluxes are used for jointing copper, brass, lead and iron to lead?

3. Describe the process of autogenous soldering: when should it be used, and what are its advantages?

4. How should sheet lead be set out and cut in order to line a sink 2 feet long by 1 foot wide inside, 12 inches deep at back and sides, and six inches deep in front, with 7lb. lead, turned over on top edges 1½ inches all around? Describe or show by sketch. What would be the total weight of the lead? What would be the total weight of the solder you would use?

5. Show what you consider the best possible arrangement of waste-pipe from a sink, bath or lavatory, with its discharge to drain.

6. Sketch various forms of defective traps with which you are acquainted, and also improved kinds you would recommend in place of same.

7. The well supply to cistern in an old house having permanently failed, it has become necessary to lay on the supply from the town main: what alterations would have to be made in order to efficiently accomplish this?

8. The drain receiving large quantities of waste water from scullery sinks is frequently choked: what remedies would you suggest?

9. Enumerate the common defects found in waterclosets, which are bad in principle and construction, and show by sketch what kind of fittings you would suggest in place of same.

10. Show or describe what you consider the most complete arrangement of waste-pipes and services for a range of three urinal basins with automatic flushing tank over, and proper surface drainage from floors, with the sizes of the various pipes?

11. What precautions would you take in fixing the water pipe (*a*) from a refrigeratnr where food is stored, (*b*) from a sink or lavatory?

12. Sketch a lead bend, elbow and set-off, and enumeraie the various tools required in the formation of same.

HONORS GRADE.

1. What cisterns and pipes would you recommend for the storage and distribution of (*a*) rain-water, (*b*) hard-water, (*c*) sea-water? State your reasons for such selection.

2. Describe the process of manufacture of milled sheet lead and pipe.

3. Show in the accompanying sketch of sectional house, having a water-closet on each floor, bath on first floor, lavatory on ground floor, and sink in basement, the plumbers' work required and the positions you would suggest for the above-mentioned fittings. Describe the form of each fitting you would use, and the size and the arrangements of the various service, soil and waste pipes.

4. Show on the accompanying plan what arrangement you would adopt for a complete system of drainage for the house described above, and give the various sizes of pipes, &c.

5. A water-pipe running alongside a leaking drain receives an injury: describe the circumstances under which sewage can be sucked into the pipe at the point of injury while the pipe is charged with water. A cistern kept charged with water is situated in the roof of a house having three stories. A service pipe from this cistern supplies a bath on the first floor and a bath on the ground floor. Under what circumstances can water in the bath on the first floor be made to discharge through this pipe into the bath on the ground floor?

6. Describe the principles of a common syphon, and state what is the greatest height a syphon will draw water when once set in action.

7. It is impossible to obtain a good fall to a system of house drains: what precautions would you recommend to prevent stoppage? What do you consider the best and also the least fall to be allowed for a 6-inch main drain?

8. Describe or show by sketch what methods you would adopt for ventilating a water-closet apartment which is not placed next external wall, and give your reasons.

9. (*a*) Give some of the causes of "humming" noise in rising mains to cisterns. (*b*) What defects in a system of hot-water circulation will cause noises in the pipes, &c.? (*c*) Give causes of concussion in pipes and their remedies.

10. Describe or show by sketch the "cylinder" system of hot-water circulation and the "tank" system, and give the advantages and disadvantages of each: explain the reason of hot-water circulating in the pipes.

11. Show by plan and section how you would arrange a lead flat, 22 feet by 20 feet, giving size of bays and gutters and formation of approximate weight of the whole?

12. What precautions would you take for the protection of fittings and service-pipes from frost in a country house situated in a very exposed position?

A HOUSE HEATING GAS FURNACE.

At the recent Industrial Exhibition in Toronto, there was exhibited by Mr. A. H. Dixon, of Toronto, a house heating gas furnace, the construction and modus operandi of which are thus described: The furnace has a large fire chamber; the air is admitted to the burners on both sides, through a perforated shield in fine streams over the top of burners. The products of combustion pass from fire chamber into the radiating drum, which entirely surrounds the fire chamber. Between the outer and inner casing of this drum is placed a partition which forms a flue and causes the product of combustion to pass four times around drum before reaching the exit flue to chimney. Besides the large surface of the outer and inner casing or sides of the drum, a series of tubes are placed in the drum, which extend through both top and bottom heads of drum and through the partition forming the winding flue, forming another large heating surface, as the cold air enters into the bottom end of the flues, and comes out heated at the top and passes into the dome of the furnace. The evaporating pan is placed on the top of the fire chamber, connecting to an outside reservoir; in this way the moisture from the inner pan distributes evenly to all the different pipes leading from furnace. The dome of the furnace is provided with an opening and allowing ready access to the water pan.

ENAMELLING CAST IRON.

It is noted as a somewhat singular fact that there are not more than two processes for enamelling cast iron, notwithstanding the amount of ingenious effort put forth in this direction. One of these is the hot process, in which the iron, heated to a vivid heat, is powdered with a flux powder, borosilicate of lead, distributed with a sieve, then heated, and, when the flux fuses, it is powdered afresh with glass more soluble, forming the glaze of the enamel; but this operation is attended with danger, and is not adapted to large articles or for decoration. The second process, which meets the objections named, consists in dressing or coating the article first with magnetic oxide, then dipping it in borosilicate of lead, coloured by metallic oxides, to which is added a little pipeclay, in order to give rather more body. The article thus covered cold, by dipping or with brushes, is put into the furnace, the enamel adhering and vitrifying at the usual furnace temperature used by enamellers, and by putting a coating of coloured enamel with a brush on a first coat simply plain, it is possible to make any decorations desired.

CONCERNING CHIMNEYS.

AMERICANS do not make as much of chimneys as do most of the builders of European countries. The builder is not sufficiently honest about his chimneys. Either he gives them undue prominence, overloads them with decoarted material, or he treats them as though he were afraid of them. The chimneys of Amsterdam are beautiful indeed and add greatly to the picturesqueness of that city. Likewise in Paris, while they are there treated in a way somewhat more decorative than is common to the rest of the world, they are handled in an honest way, no effort being made to conceal them, and their decorative works is that of artists. There is often the idea that the chimney should maintain a symmetrical relation to the rest of the building. However, in no section of the world do we find a high regard for symmetry in chimneys successful; on the contrary, we find the most beautiful chimneys in that part of the world where they are allowed to have largely their own way; coming out of a building in unexpected places and unexpected ways and decorated by the hand of an artist.—The Clay Worker.

A very important conference on the practical setting and workmanship of artisians is likely to arise out of the Building Trades Conference that was held recently at the County Hall, Springgardens, London. It will perhaps be recollected that on the motion of Mr. Gay, chairman of the London Building Trades Federation, it was decided to appoint a committee to consider the whole question of apprenticeship. That committee has carefully considered the matter. A draft has been prepared of the preliminary report, which it is proposed should be discussed at a general conference of all the trade unions and industrial bodies that evince a desire to attend. Among the subjects are the following: To consider the existing opportunities for a boy to obtain a thorough training as a skilled artisian—viz., (a) apprenticeship—its gradual discontinuance and its possible restoration; (b) technical instruction—its proper direction, whether theoretical or practical, the character of the existing classes and their comparative utility, the local distribution of the classes with relation to the needs of the district, the character of the supervision of the existing classes, the restriction of the classes to men actually engaged in the various trades, and the question of assisting the various teaching bodies.

A WILLING WITNESS

TO THE BENEFITS DERIVED FROM ADVERTISING

GEORGE CLATWORTHY.

GENERAL AGENT FOR Willer's Patent Sliding Blinds, AND Wilson's (of New York)

Patent Rolling Blinds
English Venetian Blinds
Rolling Steel Shutters

Telephone No. 1740.

46 Richmond STREET WEST

Toronto, July 6th 1894

C. H. Mortimer Esq
Canadian Architect & Builder
City

Dear Sir,

Being an advertiser in your paper of some years standing, I have much pleasure in testifying to the good results obtained therefrom.

About a year & half ago I ceased to advertise, & business at once declined.

In your issue for June (last month) my adv. again appeared in the Architect & Builder & already as a direct result enquiries are coming in from all quarters & far distant points - from Nova Scotia in the east to British Columbia in the west.

This I think is a pretty good test of the value of your paper to Builders' Supply men, as an advertising medium.

Yours truly
Geo. Clatworthy

A NEW STONE ELEVATOR.

The Engineering and Mining Journal for August 4th describes the Jeffrey stone elevator for the handling of crushed stone, ore, broken coal, and similar materials. An illustration shows the elevator used in connection with a stone crusher, receiving the product directly from the delivery chute of the crusher and discharging it into a revolving screen at the top. The elevator is constructed of two strands of steel chain covered completely with a continuous line of buckets, which prevents the gritty material from coming in contact with the chain and the other principal wearing parts of the machinery, thus greatly increasing its life. The buckets are made of heavy steel with riveted seams, in sizes to suit the capacity. The peculiar shape of these buckets makes it possible to operate the elevator at a very slow speed, at the same time effecting a cleaner discharge than is produced by high-speed machines, to say nothing of the saving of wear and tear. At suitable intervals wrought-iron cross-bars are attached to the chain, carrying rollers at each end, extending outside of the buckets, which support the weight of the chain, bucket, and the material; this causes a roller friction, reducing the strain on the machinery to a minimum and requiring the least possible amount of power.

Here are a few facts about the Chicago Masonic Temple: The frame of the building is of steel bolted together, 4,700 tons of steel having been used. The walls are of stone and pressed brick with marble and bronze trimmings and terra cotta partitions, 2,200 tons of the latter entering into the work. There are eighty-eight miles of electric wiring, and the plate glass would, if laid flat on the ground, cover four acres. The pumping apparatus used in running the battery of fourteen elevators would easily supply water for a city of 60,000 souls. The elevators run at a rate of nine miles an hour and each elevator runs every year 123,136 miles. There are twenty-one stories and on the top floor is an observatory and roof garden.

ARCHITECTS and ENGINEERS
APPLY TO
THE NEW COLOR PROCESS CO.
214 ST. JAMES ST., MONTREAL,
for Instantaneous Reproductions in Colors of Drawings and Plans

WILL SAVE YOU . . . . . .

MONEY Copies on Manilla Paper 4c. per sq. f ot.
LABOR No recoloring by hand.
TIME We print without the aid of the sun.
ERRORS We give exact fac-similes.
TRACING CLOTH We print direct from originals on paper.
DISSATISFACTION We guarantee uniformly perfect work.

Originals sent from a distance returned with copies same day as received.

Hayes' Patent Steel Lath . .

HAS NO EQUAL IN ANY PARTICULAR

. . . Used in more important buildings . . .

. . . THAN . . .

all other styles of metal lathing combined.

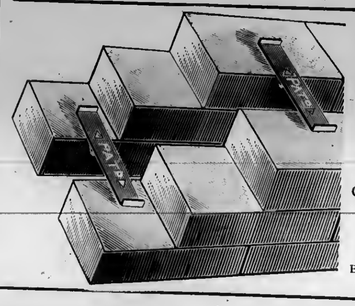
SOLE MANUFACTURERS

THE METALLIC ROOFING CO.
OF CANADA, LIMITED.

BRANCH OFFICE: 706 Craig Street MONTREAL

HEAD OFFICE: 82 to 90 Yonge Street TORONTO

Send for Samples and Prices



The Wall Tie

WEESE'S PATENT
WALL BRACE OR TIE
USED FOR BUILDING
Warm, Dry, Fireproof Buildings
ESPECIALLY ADAPTED FOR
Churches, Public Buildings, Hotels, Dwellings, etc.

. . MANUFACTURED BY . .
THE MAC MACHINE CO.
BELLEVILLE - - CANADA
. . Write for particulars . .

Don Valley Pressed Bricks

TWO HIGHEST AWARDS AT CHICAGO
Gold Medal for Bricks -:- Gold Medal for Terra Cotta

EXTRACT FROM THE REPORT OF JUDGES ON WHICH THE AWARDS WERE GIVEN:

"In our estimation there are no bricks on the Exhibition Grounds to be compared to those manufactured by the Don Valley Brick Works."

OFFICE AND SHOW-ROOMS:
60 Adelaide Street East - - TORONTO

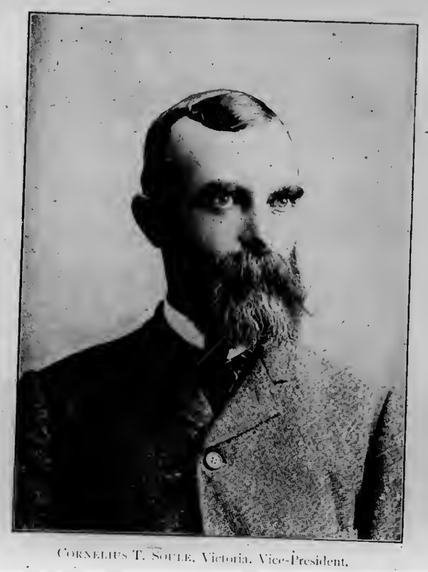
Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

E. MAILLANDAINE, Hon. Treas.

RICHARD P. SHARP, M.S.A., N. Westminster
Hon. Sec.

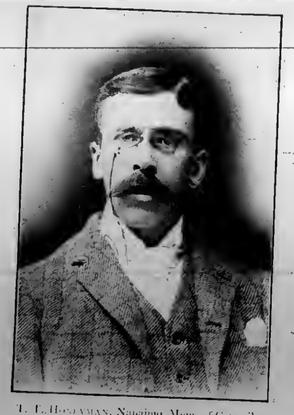
JOHN GERHARD CLARKS, Victoria, Member
of Council.

C. OSBORN WICKENDEN, Vancouver, President.



CORNELIUS T. SOLLE, Victoria, Vice-President.

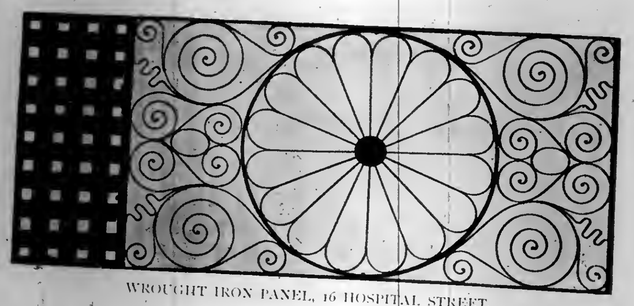
THOS. HOOPER, Victoria, Mem. of Council.



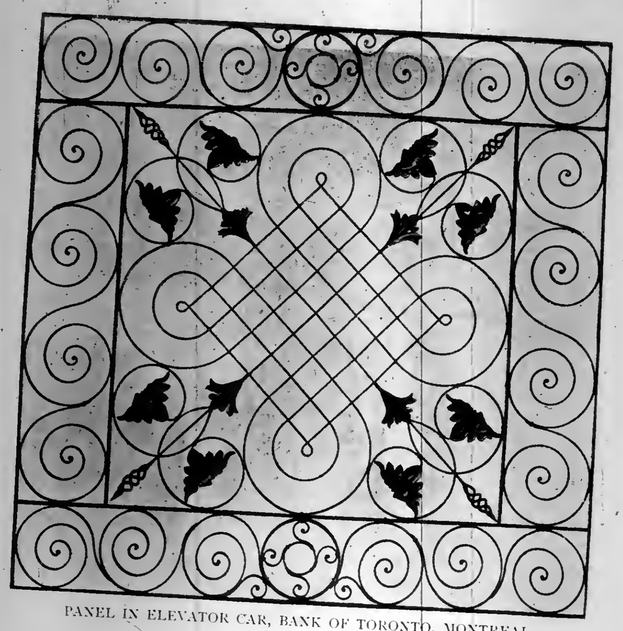
T. E. HOLTSMAN, Nanaimo, Mem. of Council.

ALAN E. MCCARTHY, Vancouver, Member
of Council.

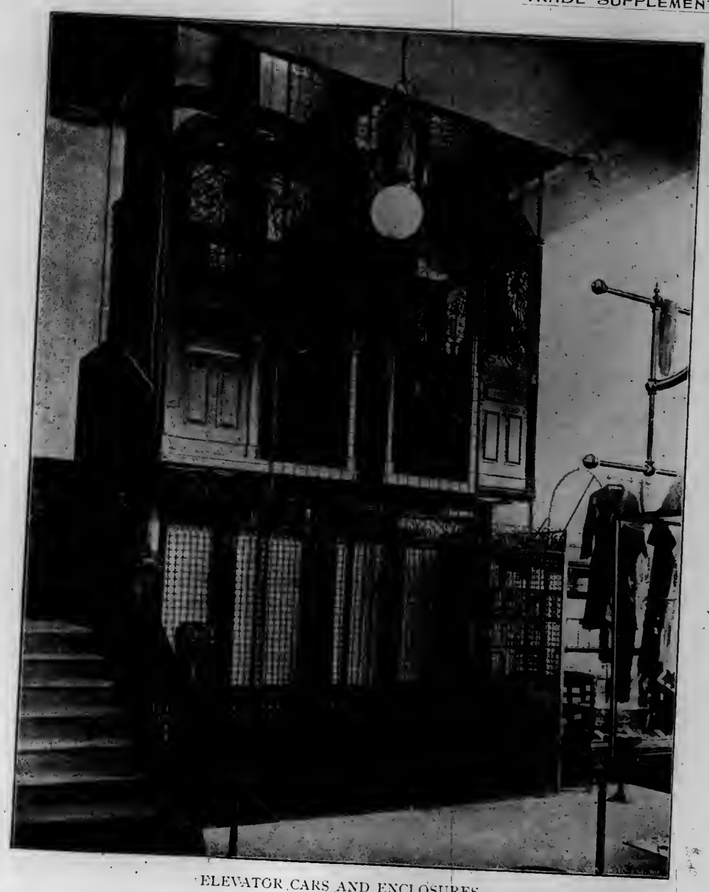
OFFICERS OF THE BRITISH COLUMBIA INSTITUTE OF ARCHITECTS.



WROUGHT IRON PANEL, 16 HOSPITAL STREET.

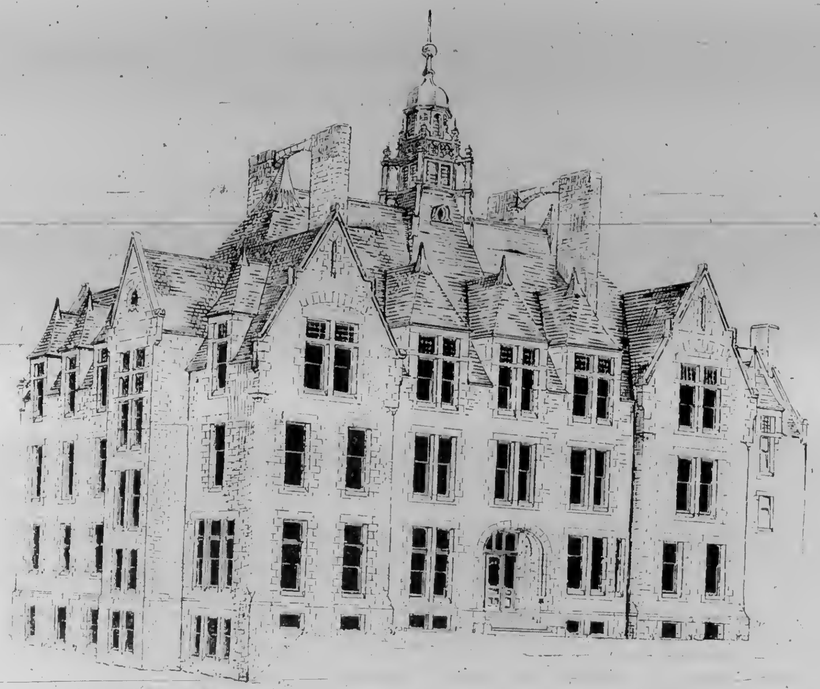


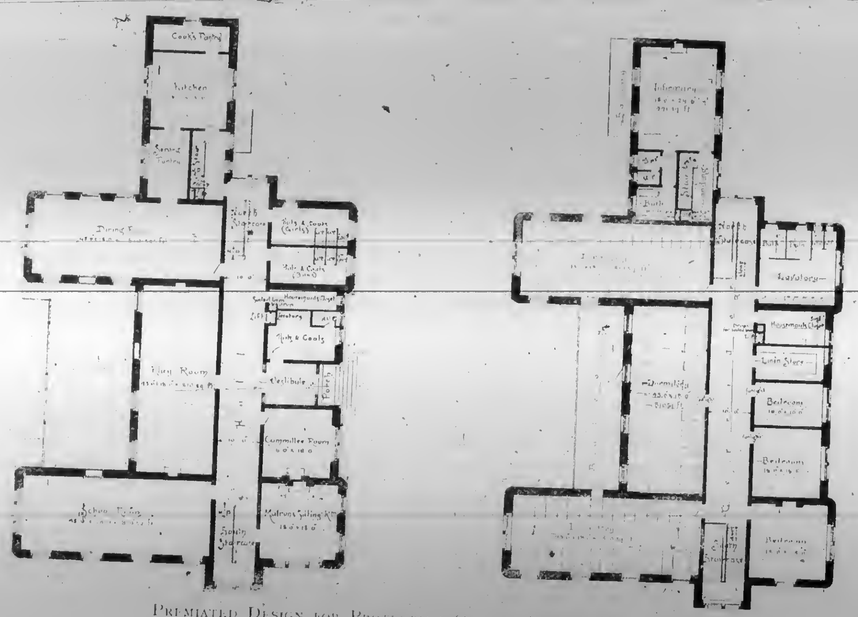
PANEL IN ELEVATOR CAR, BANK OF TORONTO, MONTREAL.



ELEVATOR CARS AND ENCLOSURES
IN MESSRS. JOHN MURPHY & CO.'S NEW DRY GOODS STORE, MONTREAL.

DOMINION ORNAMENTAL IRON CO., MONTREAL.
T. J. BALDON, Manager.





PREMIATED DESIGN FOR PROTESTANT ORPHAN ASYLUM, MONTREAL.

J. R. RIDDI, ARCHITECT.

RESIDENCE OF ALEX. MCNAIR, ESQ.
WESTON, ONT.
JAMES A. ELLIS, ARCHITECT
TORONTO, JUNC.
Kitchen
Dining Room
Parlor
Hall
Porch

CANADIAN ARCHITECT AND BUILDER.

VOL. VII.—NO. 11. NOVEMBER, 1894 PRICE 20 CENTS $2.00 PER YEAR.

THE
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2269.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	EDMUND BURKE, Toronto.
1ST VICE-PRESIDENT	J. E. BELCHER, Peterboro'.
2ND VICE-PRESIDENT	W. A. EDWARDS, Hamilton.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI	Ottawa.
FRANK DARLING	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

A. F. DUNLOP	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
L. Z. GAUTHIER	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. MCLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
WM. PARK, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JOHN ALDRIDGE.
JAS. CRANG.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
JAS. THOMSON
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD'S reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc..

THE Royal Institute of British Architects proposes to expend the sum of £200 00 a series of systematic tests of brickwork.

THE project for the erection in Toronto of a first-class hotel, is assuming more tangible shape. The names of responsible gentlemen—one a successful hotel proprietor—are given in connection with the undertaking. Preliminary plans for the building are said to have been prepared, and should financial obstacles not block the way, there appears to be every likelihood that the erection of the building will be proceeded with during the coming year. Toronto is emphatically behind the times in point of first-class hotel accommodation, and there is little doubt that if an hotel embracing every improvement is erected at a cost of a million dollars, as proposed, it will prove to be a paying investment.

BUFF bricks and terra cotta have been used in quite a number of the larger buildings erected within the last year or two, and now under way, in Toronto and Montreal. The appearance of these materials is pleasing in many but not in all instances. The red and brown shades for brick work will probably remain in greatest demand for all classes of work. The lighter colors have some advantages in certain positions, but never give the effect of strength and solidity that the darker shades do. Among their disadvantages may be mentioned their greater susceptibility to injury by smoke and dust. They can always be used with good results for trimmings and in combination with other shades, but their suitability in large masses depends largely on the surroundings of the proposed structure.

CONTRACTORS for masonry or brickwork should give as much attention as possible to the various uses of concrete and cement work, for which there is an increasing demand. These materials will undoubtedly continue to grow in favor, and the contractors who are best prepared to handle such work intelligently will most uniformly obtain good results, and reap a corresponding benefit. The proper use of cement requires far more care than ordinary mortar, and with it a contractor has more risk of loss through bad material or inexperienced workmen. In fact, the better kinds of concrete work should only be placed in the hands of the most skilled artisans. Concrete well finished in cement is the ideal cellar floor for dwellings, and its adoption for this purpose will be greatly increased as the importance of making houses moisture-proof becomes better understood. Laid in a similar manner, it is a favorite material for first-class sidewalks, and is unequalled for making a suitable road-bed for any kind of pavement. For foundations it is indispensable, while its value for fireproofing, and its adaptability to many other purposes in building are only beginning to be understood. In no kind of work should a contractor be more particular as to the quality of his materials. Whether using native or imported cement, he should be sure that it is in good condition, and not try to do work with any less than the quantity necessary for a thoroughly good job, but rather insure perfectly satisfactory results by allowing a margin on the side of strength. In our next issue we shall publish a number of carefully selected standard formulas for mixing concrete and cements.

THERE is a suggestion for wide-awake manufacturers and dealers in building supplies in the advertisement of an architect which appears in this number, inviting information concerning such materials. The cheapest and most effective method of affording information of this character to architects is by means of a standing announcement in the pages of the ARCHITECT AND BUILDER, which will be found on file for reference in the offices of 90 per cent. of the architects of the Dominion.

SOME recent remarks of Judge Ferguson, at Ottawa, in regard to the terms of a certain contract being very hard on the contractor, have attracted considerable attention from the local contractors, some of whom say that they do not get fair treatment as contracts are at present made out. While admitting that the various stipulations are intended to act as a preventative against fraudulent contractors, they claim that there are clauses not needed even for this purpose. We have long been of the opinion that the usual form of building contract would furnish good material for the careful consideration of contractors, with a view to securing some changes. One clause only will be cited here, viz., "That in the case of several contractors being employed on the work, no trade is to be considered complete till the other several contracts are also completed." Contractors are every day signing conditions which, if rigidly enforced, would compel them to perform work as part of the contract without having had adequate opportunity of estimating its cost. Other conditions might in various ways be made burdensome to contractors. To the credit of the architects it can be said that their large powers are seldom abused, but there is a difference between them in this respect, which is properly taken into account by contractors in tendering. It is hardly fair to ask contractors to sign articles of such a nature as can only be required as a general protection from unreliable persons. Owners are encouraged to believe that with such ironclad conditions the architect is sufficiently armed to insure a first-class job from any one regardless of price. Contractors would be justified in objecting to such clauses. The architect is supposed to stand as the independent interpreter of the obligations between proprietor and contractor, but since he is in the pay of the proprietor it is only reasonable to expect that he will be more particularly interested on the side from which he receives his commission. It follows that the contractor must look after his own welfare, and the clearer and more definite contracts can be made the more satisfactory will be his position and the less embarrassing that of the architect. We believe the architects would gladly meet the contractors for the consideration of questions of this kind. We have no hesitation in saying that the Uniform Contract used in the States and approved by the American Institute of Architects and the National Association of Builders, is better than the forms in use here, but it also is capable of being improved.

THE annual convention of the American Institute of Architects held in New York last month is likely to have a marked influence towards bringing about some changes in practice. Many valuable papers were read; some of these called out spirited and interesting discussion. The president's address contained brief references to the past year's experience and suggested lines of discussion for the Institute to take up. We quote only a few sentences as follows:—"There is great virtue in the formal publication of any truth."—"It is a good thing for the Institute to publicly express its views concerning vital matters of professional conduct." "Whatever the Institute condemns the architects must conform to, and stand squarely on its decision, or lose caste in the eyes of the profession and of the public."—In the discussion on his address, the president recommended that the Institute especially express its views regarding the practice of doing work without proper remuneration, either in competition or otherwise, and that such practice be stamped as unprofessional. If this was published as the view of the Institute, it would have great weight, while the same belief expressed by the members to each other privately would have no influence whatever. The report of the Committee on Competitions was approved and the committee continued to prepare a code embracing the views expressed in the report. It is not proposed to make any change in the rate of 5 per cent. on the cost of the work for full professional services, including supervision, 3½ per cent. for preliminary studies, general drawings, specifications and details, and 2½ per cent. for the same, less details. A radical change is proposed, however, in charges for preliminary studies, as follows:—

Minimum charge $50.00.

For works costing	$ 5,000 to	$ 50,000,	1 per cent. of proposed cost.
" " "	50,000 "	75,000,	$ 550.00
" " "	75,000 "	100,000,	650.00
" " "	100,000 "	150,000,	750.00
" " "	150,000 "	200,000,	950.00
" " "	200,000 "	250,000,	1100.00
" " "	250,000 "	300,000,	1250.00
" " "	300,000 "	350,000,	1350.00
" " "	350,000 "	400,000,	1450.00
" " "	400,000 "	450,000,	1550.00
" " "	450,000 "	500,000,	1650.00
" " "	500,000 "	600,000,	1750.00
" " "	600,000 "	700,000,	1900.00
" " "	700,000 "	800,000,	2000.00
" " "	800,000 "	900,000,	2200.00
" " "	900,000 "	1,000,000,	2350.00
" " "	1,000,000 "	1,250,000,	2500.00
" " "	1,250,000 "	1,500,000,	2850 00
" " "	1,500,000 "	1,750,000,	3050.00
" " "	1,750,000 "	2,000,000,	3300.00
" " "	2,000,000 "	2,500,000,	3500.00
" " "	2,500,000 "	3,000,000,	3950.00
" " "	3,000,000 "	4,000,000,	4300.00
" " "	4,000,000 "	5,000,000,	5000.00

The rate is about 2½ times the square root of the lowest estimated cost. This rate seems excessive for inexpensive buildings, but is about right for buildings of great cost. It is expected that architects will not enter competitions unless paid for their services according to the above schedule, and it is hoped to discourage competitions for buildings of low cost. The table of charges quoted is to supersede the former rate of 1 per cent. on estimated cost for preliminary studies. Competitions are not to be entered into except for public buildings, and then only on condition that four competitors shall be paid at the schedule rates, and one employed as architect with compensation at the minimum rates fixed by the Institute. The paper on High Buildings brought out in discussion a variety of opinions regarding the durability of iron skeleton construction. In a paper read on fireproofing it is assumed that if protected from fire such buildings are practically indestructible. Mr. Post, who has had a large experience in erecting this kind of buildings believes their life will be but short. His opinion, supported by others, is, that the most serious drawback is the effect of rust on the iron. In view of this he argued in favor of cast iron for columns instead of wrought iron or steel. These ideas were strongly opposed, but the conclusion is unavoidable that every possible precaution should be taken to protect iron work from rust in whatever position it may be placed, and also as far as possible to arrange the construction so that it can be examined and painted from time to time. A paper on elevators treated exhaustively of the mechanism of the modern electric elevator, showing its advantages over other kinds. The opinion is expressed that little improvement in these appliances is to be looked for in the near future, for the reason that in every industrial development there are forms of machines which early become typical and remain so, and that machines are now in use of so high efficiency as to leave little margin for improvement.

Some experiments were recently made by the Buildings Inspection Department, Vienna, on the protection of iron from fire by incasing it with brick. A wrought iron column, 12 feet long, and built up of channels connected by lattice bars, was used. This was set up in a small chamber constructed of brick, and the column was loaded by levers. This done it was surrounded by a 4½ in. brick wall laid in fireclay mortar. Between the wall were fixed samples of fusible metals, which should serve as a gauge of the temperature attained. Various samples of stone concrete and other materials were also placed in the chamber within the column. This chamber was then filled with firewood, which was lighted, and the doors were walled up. An examination of the room after the fire had burned itself out showed that the walls of brick laid in Portland cement retained their strength whilst most of the natural stones left in the chamber had been destroyed. The ceiling had been lined partly with plaster of Paris and partly with terra-cotta tiles. Both were damaged. The inclosure round the iron pillars was still standing firm, though corners of the brick-work were chipped 1 in. or so, and the fireclay mortar was largely washed out of the joints. On removing the casing, however, the pillar inside was found to be uninjured, even the paint being unscorched, and the fusible plugs only showed a temperature of 149 degs. Fahr.

THE BYSTANDER.

THE social element in human nature goes a long way to smooth down the rough places everyone meets in his path-way in life; and when this feature of character is found wanting in man, either individually or collectively, the circumstance is likely to produce comment. The Bystander heard the charge made a short time since that the architects of this city were an exclusive and unsociable body of men. "There could be no doubt, but that they were a fine class of men," said a member of the profession, "and when assembled in their annual gathering, they are hail fellows well met, and an enjoyable, as well as a profitable, time can always be spent in their company. When, however, they get outside of the walls of their association meetings, they are as unsociable as members of some of our religious bodies, when disassociated from the organized body, or on the ordinary six days of the week." The complaint of this friend was that each one seemed to be so taken up with his own personal affairs, no opportunity was given to cultivate that spirit of cordiality that ought to exist, he believed, among any class of people engaged in the same calling. The Bystander has always held that not alone is it an agreeable thing for men in the same business to get together occasionally, but that it is a very profitable matter. Our ideas are broadened as we rub shoulders with one another. The suggestion was made, as one means at the present time of bringing the brethern together and helping to break down this barrier of exclusiveness, that the drawings that had been sent for exhibition at the Quebec Association by the Toronto architects, should be placed on exhibition at some central point in the city, where each could learn what the other had done on this occasion, and thus meet, exchange views and become better acquainted. On this matter of personal sociability, the Bystander thinks of a remark made by Henry Ward Beecher, that people sometimes charge others with being unsociable, when they themselves are the real source of the trouble. He said, "I have known persons to cross to the opposite side of the street, when seeing an acquaintance coming along, having the notion that he would not care to speak to him, where the real fact is the individual in question only wanted the opportunity to cultivate a better acquaintance."

× × × ×

An old saw that finds many illustrations in everyday life is that which tells that extremes meet. Human nature seems born to run to excess, for no sooner is the folly or the excess of yesterday learned, than to day the di position is to go to the opposite extreme. Only a few years ago, and a year is a short period in the history of a country, times were flush almost the world over, and little importance was placed on the out-go by any class of people. Reaction came, as it had come before, and as it will come again, and multitudes struck hard bottom. To-day there is seen, as a result of this change, the extreme of the prodigate age, and "cheap," and "squeeze" is the policy of the day. Everybody sees this kind of thing in the ordinary commercial transactions of life. The Bystander has been impressed with the fact that this prevailing spirit of hard times has few, if any, limitations. How it crops out in the matter of building contracts. No value would seem to be placed by many on their own individual time or labor, or that of their employees. Chatting the other day with a city architect, he said: "Let me show you what encouragement there is to embark in contracting and building in these times. Here are the drawings for a house that I figured down to $5,000, without heating, which added would represent several hundred dollars extra. Now in my judgment this figure could not possibly stand any paring, and even allow a living wage to the contractor and the opportunity to pay his men the current wage of the day. What is the situation? I have just now let that contract to a man in this city who agrees to construct the house according to plans and complete it with heating, all for $4,800." How is he going to manage it? was a natural question to ask. "It is just like this in his case," said the informant. "This man is a mechanic himself; within his family are bricklayers and stone masons. They will keep the work largely within their own hands. None of them can make so much as a journeyman's wages, but work is slack and they are glad to get anything to do and accept any price." From one point of view this seems a common sense method to adopt. Better half a loaf than none. It is a method, however, that may someday serve as a boomerang. Many workmen who are not situated as the parties who took this contract and able to work together, are tied down to the regulations of their trades unions, and they must walk the streets day in and day out. The Bystander is informed that with certain trades the carrying on of work during the depression of the past few years has been absolutely blocked because of the determined attitude assumed by workingmen in the matter of wages. And yet the winter approaches and those who would not deviate 25c a day from the standard wage, when capital has been earning its smallest interest, would accept a half wage for a day or two at the city's expense to toss snowballs in the air. Of such it may well be said, with Milton: "They feel by turns the bitter change of fierce experience."

× × × ×

A pleasant hour was spent by the Bystander a short time since in the studio of Mr. J. W. L. Forster, the well-known and talented portrait-painter of this city, whose portraits of Mayor Kennedy and other prominent citizens have from time to time elicited many encomiums. Excelling in his own special line of art he is also able to take a long view of artistic affairs. He sees a close relationship between the work of an artist, using the term in its usually accepted sense, and that of the architect. Both, in fact, are artists, and Mr. Forster expressed the view that each might learn something from the other by an occasional interchange of opinions. The conversation getting down to something specific, a discussion followed touching the matter of interior decorations. The view was expressed by this artist that the artistic effect of a room might be largely enhanced, if the plan were adopted of darkening the lower part of the windows and allowing the natural light from the heavens above to pour into the room, rather than the imperfect light there comes through a window as now constructed. And suiting the action to the word he illustrated what he meant by darkening his own window at the lower part, closing out the light in that manner, but allowing it to come in from above. "Now," said he, "observe the softening effect on everything in the room, the carpets, the furniture, and even the clothes that one may wear." How would it answer to arrange for a social gathering some evening of the artists and architects of the city?

× × × ×

Everyone has not the courage to speak out in meeting, but were it not for some brave mortal doing this occasionally, things could come easily to a standstill in some of our best regulated organizations. A letter in the October CANADIAN ARCHITECT AND BUILDER proding the Executive of the Ontario Association of Architects is a case in point. The Bystander has learned that some of the profession do not take kindly to the criticism. This, however, is not the unanimous view. It is held by not a few leading architects that the Ontario Association of Architects could show an increased measure of activity, and then not over-exert itself. It is to be remembered that the annual meeting is near by, and yet very little has been done to secure a successful and profitable gathering. Aside from this, members of the profession say to the Bystander, why should we exist only for the sake of getting together once a year? Other associations map out programme enough to keep themselves fairly in the front the year through. Furthermore, whilst a large number of the members of the Association are residents of Toronto, yet a number are outside of the city, and they would like to know occasionally what the Executive is thinking about. The letter of "City Member" is believed to have more truth than poetry in it. At the same time, a member of the Executive has said: "Let this writer reveal himself and we will give him the opportunity to show his activity." Others are wont to quote Byron, and say:

> Seek roses in December; ice in June;
> Hope constancy in wind, or corn in chaff;
> Believe a woman, or an epitaph,
> Or any other thing that's false, before
> You trust in critics.

× × × ×

There recently visited this city the correspondent of an American lumber journal, and in a published letter, he made this statement: "I found at Toronto, and the same is presumably more or less true of other border cities on the Canadian side, that considerable yellow pine timber and joist was being used in the construction of public and other large buildings. Some of these are

alter plans drawn by American architects, who appreciating the superiority of yellow pine as bearing joist specify that kind of stuff." Those who have interested themselves in lumber matters are aware that an effort has been made to create a market in the eastern states for the yellow pine of the south, and bring it into competition with white pine, a large part of which now goes to these states from Canada. To only a small extent, however, has this wood been successful as a rival to white pine, except for some common uses, where price was a consideration. Knowing these conditions it seems clear to the Bystander that yellow pine, when used in Canada, has not found any large place here on its merits, but simply, as this American journal has suggested, because American architects have designed plans for the buildings where such pine is used, and have not lost an opportunity to promote the interests of a wood grown in their own country. The injustice to Canada of giving the work of designing public buildings to foreign architects does not, therefore, come home only to the Canadian architect, but as it seems here to other interests in the country as well. It would be taking a narrow view of conditions to say that the interests of any concern, or of the public, should be sacrificed by refusing to place in outside hands work that could not be done at home. But with the high standing of the profession in Canada, and their work is before everyone to testify to the fact, is it not disloyalty to our country and people to seek talent abroad for the designing of any of our buildings, public or private?

× × × ×

Looking around the other day among the new buildings in the business part of Toronto the Bystander met Mr. Henry Langley, of Langley & Langley, in the store of John Catto & Co., which is being constructed under his direction. Mr. Langley was engaged just then in inspecting a case of terra cotta brick. Architects and builders have evinced more than average interest in the terra cotta used in the construction of the Catto building. It is made by the Rathbun Co. Taking a cursory glance at the front of the building one might notice that it bears an embossed appearance. The bricks are combed, Mr. Langley says, and afterwards cut to proper size, giving a very tasty effect. The Bystander had heard some complaint of the quality of this terra cotta. "The trouble has been," said Mr. Langley, "things were rushed too much at the outset, and the plant of the Rathban Co. overtaxed. As a result some of the terra cotta was not burned sufficiently." A feature of the bricks which attracts attention is the small oblong shape. So far no large quantity has been used in building construction in Toronto. In Buffalo and other American cities this brick is used largely, the first lot, it is said, being imported from Scotland. Its introduction here may be taken, perhaps, as a movement to get away from the staid routine that is often a serious fault in the construction of buildings, both for public and private purposes, in all our cities.

× × × ×

The work of brick-making in Canada has grown apace since the early inhabitants of Babylonia found on the plain in the land of Shinar clay for their construction, and "said one to another, Go to, let us make brick and burn them thoroughly, and they had brick for stone and slime had they for mortar." The reference in another paragraph to the class of brick that has been used in the construction of the new store of John Catto & Co., is an illustration of Canadian progress in brick-making. Said Secretary Phillips, of the Builders' Exchange, a few days since: "Really commendable and substantial progress in brick-making has been made in Canada within the past few years. One does not need to go far back in memory to talk of bricks at $40 a thousand. To-day we are getting a good pressed brick for $16. Brick-making has become a very thorough study with some of our manufacturers. I do not know just what amount of money, for example, Taylor Bros. have expended in experiments in order to reach the high degree of perfection that is shown in their pressed bricks, but the sum has been considerable. And what has occurred with them has had a parallel, in a measure, with the Rathbun Co. and other manufacturers. Despite a duty of 25 % Canadian brick-makers have been able to send into the United States large quantities of their bricks." Methought these were complimentary words for Canadian brick-makers. They furnish proof that thoroughness and a determination to reach as nearly to perfection as possible are elements certain to achieve success. Brick making is an industry full of large possibilities. The Bystander has been asked as to the resisting power of fire bricks. An authority on the question says that fire bricks will resist a crushing force of from 600 up to 3,000 pounds per square inch.

AN INTERESTING ARBITRATION.

An important arbitration has recently been concluded between the corporation of the City of Moncton, N. B., and the Moncton Gas, Light and Water Co., to determine the amount which the city should pay the company, in consideration of the transfer of the company's property to the corporation.

In 1878, the company were given a charter by the provincial government to construct works and supply water and light to the city, on such terms as could be agreed upon between the company and city, for a period of ten years. The necessary works were constructed, Mr. E. H. Keating, the present City Engineer of Toronto, and the late Mr. Gilbert Murdoch, of St. John, acting as consulting engineers on the work. The works were extended from time to time afterwards, an electric lighting plant being added in 1888. Terms were agreed upon between the city and the company, and after the expiration of ten years, the period of the contract, a renewal contract for a further period of five years was arranged. This renewal contract expired in the early part of 1893. Dissatisfaction was expressed by the city with the character of the service performed by the company under the contract, in consequence of which the city announced its intention to own and operate its own water and light plant, and made an offer of $180,000 for the company's property. This offer being declined, the city made application to the legislature for a special act to authorize them to construct the necessary works for the supply of water and light. This application the legislature refused, but as a compromise, authorized the expropriation of the existing works at a price to be fixed by arbitration.

Mr. Robt. Surtees, City Engineer of Ottawa, was chosen as arbitrator on behalf of the city, Mr. Walter Shanly, C. E., of Montreal, for the company; Mr. F. T. Holt, C. E., of St. Stephen, N. B., being appointed by the Lieutenant-Governor-in-Council, as third arbitrator. The legal counsel for the city were: B. M. Britton, Kingston, Ont., Hon. H. R. Emerson, Commissioner of Public Works, H. A. Powell, M.P.P. and Mr. B. Chandler, of New Brunswick. The company were represented by Hon. A. G. Blair, Attorney-General of the province, A. A. Stockton, M.P.P., C. W. Weldon, Q.C., R. A. Borden. The engineering expert for the city was Mr. Willis Chipman, of Toronto, who was assisted by Mr. John McCready, City Engineer, and Mr. J. J. Taylor, of Moncton. For the company M. M. Tidd, C. E., of Boston, Mass., their permanent engineer, John Edington, and Mr. Croasdale, of Moncton.

The arbitration opened the latter part of August. The taking of evidence occupied three weeks. The case hinged largely upon the interpretation of a single word. The Act under which the arbitration was held, declared that "The arbitrators shall proceed to determine the compensation to be paid." The important word was "compensation." The company claimed that the compensation should be based on the net earning power of the plant, capitalized at 4 per cent., with an allowance for prospective profits for the next ten years. The average net earnings of the company for the last six years were shown to have been $24,000 per year, and calculated on this basis, the valuation placed upon the property by the company was $800,000. The company's construction account showed amount expended to have been $281,000. The total cash paid for stock was shown to have been $116,000; stock paid out of earnings was $100,000; making total stock issue $216,000, to which must be added $60,000 bonds.

The city contended that they should not pay more for the works than would be required to construct new works, less depreciation. Mr. Chipman estimated the cost of new works at: $137,500 for water works and $74,000 for lighting a total of $211,500. This estimate did not include some lands of the company, on certain streams not in use, which would bring the total up to $225,000. The depreciation was estimated at $17,500, which deducted, left the total estimate $208,000.

The award of the arbitrators, which is signed by Messrs. Surtees and Holt only, gives the company $265,000 for the water works, and $78,000 for the lighting system a total of $343,000.

The water committee of the City Council, in their report on the case, bestow credit on the legal counsel, and on Mr. Chipman, the engineering expert, for the ability with which they handled the city's case.

ELECTRIC PERCUSSION AND ROTARY DRILLS.

The accompanying illustration shows in operation at the Windsor Gypsum Quarries, Windsor, Nova Scotia, portable electric percussion and rotary drills which have lately been introduced and are being manufactured by the Canadian General Electric Co.

The percussion drill in general external appearance conforms very closely to the regular type of steam and air drill; in fact, the tripod and shelf are of the standard steam drill form. Electrically, it is arranged in the form of a solid piston reciprocating in a magnetic field and controlled thereby. The piston is provided with a standard air drill rotating rifle-bar and the usual form of springs to protect the front head of the drill from blows. The drill has a piston diameter of 3¼", a length of stroke from 6½" to 8½", length of feed 24", number of blows per minute, 360 to 380.

The first of these drills was installed on the Canadian "Soo" Canal last winter, when the contractors, Messrs. Hugh Ryan & Co., were greatly pleased with its performance. On these works the performance was equal to that of a 3" steam drill, and the facility with which the drill could be moved, owing to the complete flexibility of the connections, was especially remarked. As far as economy goes, it far surpassed any other drills on the works. The cost of operating, including power for operating the generator and labor of the attendant at the power house, was somewhat under the average operating expenses of the steam drills. Bearing in mind that the attendance at the power house is the same whether one drill or fifty are in operation, and that the increase of power is by no means in proportion to the number of drills, it will be readily seen that a very great saving will be effected over steam drills where the number in operation is the same.

ELECTRIC PERCUSSION AND ROTARY DRILLS, IN OPERATION AT THE WINDSOR GYPSUM CO.'S QUARRIES, WINDSOR, N. S.

In the Windsor Gypsum Quarries, Windsor, N. S., where one of these drills is in operation, every satisfaction is being given by it. The best day's work of one drill on record is ten 10 ft holes in 9 hours and 20 minutes. This was in glow lime stone.

The rotary drill is designed especially for use in coal mining but has also been used with great success in the Gypsum Quarries of the Windsor Gypsum Co., where the clayey nature of the material tends to clog the drill and imposes the severest test on the capability of the machine. The drill is similar to the well-known Howell's drill with an electric motor geared to it in such a way as to form a light and efficient tool. The control of the motor is effected by a small plug switch. No rheostat being used, power may be taken from the same wire supplying current for lighting, pumping or haulage.

Feed screws of different pitch are furnished for varying the speed of boring and a friction clutch protects the motor should any particularly hard obstacles be struck suddenly.

The columns are made in different lengths and each is adjustable for about two feet variation. The construction of the drill and its method of mounting enable the operator to drill close to the roof, floors or walls as well as in any direction.

The drill weighs with post complete only about 160 lbs., the drill itself weighing 100 lbs. In bituminous coal this drill shows a speed of drilling of 7 to 10 feet per minute.

COLLAPSE OF BUILDINGS.

The records of failures in the Middle Ages rather indulge in religious than in practical explanations of the causes, and so, says the Builders' Reporter, we do not gain much practical knowledge from these examples, such as the fall of the towers of Winchester Cathedral in the twelfth century; of Glouchester Cathedral, in 1160; of Worcester Cathedral, in 1175; of Evesham, in 1215; of Dunstable Priory, in 1221; the smaller towers of Worcester Cathedral, in 1222; the tower of Lincoln, in 1244; of Ely Cathedral, in 1322; of Norwich Cathedral, in 1361; and the west front of Hereford Cathedral, in 1786; the central tower of Hereford would have fallen had not its impending ruin been observed and remedied. The old tower of Thurston Church, Suffolk, fell in 1860. Then we have the Chichester tower in 1861. The above small list of towers awakens the thought that special care is needed for all structures that are carried upon piers instead of upon continuous walls. But the description that has been given of the cause of failure in the Chichester tower would have been very applicable to many of the other cases. The lesson derived from the Chichester fall seems to be that rubble masonry should never be used in piers carrying towers or other heavy work; it is a masonry suitable where bulk and weight are main objects, but it is inadmissable where unyielding vigour of pier is to be attained; it also suggests that in any such case a soft kind of stone is scarcely safe even if it be of a sound nature; and the stone forming the facing at Chichester, though in some respects a good stone, was not suitable where a crushing force was the chief force in action. It was from near Binstead, in the Isle of Wight, and it is the only tertiary building stone in England; but if we want a thoroughly good freestone we must get it out of the secondary beds. The stone in the piers of the French Panthéon was of a rather weak quality, but that with which the inner and intermediate domes were formed was tertiary, from the quarries of Conflans, about eighteen miles from Paris, and for which latter purpose it is particularly suitable.

PERSONAL.

Mr. E. L. Horwood, architect, Ottawa, through our advertisement columns, invites manufacturers to send him copies of their catalogues.

Mr. E. B. Merrill, who was for many years instructor in electricity at the Toronto Technical School, has been elected principal of that flourishing institution.

Mr. William Robinson, who for 21 years occupied the position of City Engineer of London, Ont., died in that city on the 10th of October. Mr. Robinson at one time practiced as an architect and land surveyor in Toronto.

In considering simply the proper and best use of color for house interiors it is not necessary to include the question of ornament or elaboration either of walls or ceiling. These may follow, but tint must go before, and if thoroughly studied and well chosen, can very well dispense with ornament.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

THE MASTER PLUMBERS' ASSOCIATION.

The recently formed Montreal Master Plumbers' Association will apply to the legislature for an act of incorporation. As the result of correspondence which has been going on for some time between the Association and some of the leading plumbers of Quebec, it is probable that a plumbers' association will be organized at an early date in that city. The Council of the Arts and Manufactures Association has invited the Association here to assume superintendence of the plumbing class in connection with that institution. The meetings of the Association, which thus far have been held regularly twice a month, are well attended. Careful consideration has been given to the city plumbing by-law. The endeavor will be made to bring about a conference at an early date of representatives of the Association and of the City Council, to discuss needed amendments to the ordinance.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

At a recent meeting of the Council of the Province of Quebec Association of Architects it was decided to hold monthly meetings and dinners of the members of the Association on the second Tuesday of each month during the winter, in the rooms of the Association, New York Life Building. It was also decided to hold a general special meeting of the members of the Association on Thursday, December the 6th, at 4 o'clock p.m., to discuss the amendments to the by-laws which will be proposed according to the notices of motion given at the last annual meeting, as follows:—Mr. A. C. Hutchison will move to make the following change in section XI of the by-laws: to strike out the following words in the 3rd, 4th and 5th lines of the section—"to collect all funds and hand them to the Treasurer, taking his receipt for the same;" and in line 8 of the same section to omit the words—"receipt for them to the Secretary," and to add to section XI the words—"The Treasurer shall also furnish to the Secretary at the close of each year a list of the members whose subscriptions have been paid.

Mr. W. E. Doran will move to amend section V of the by-laws by changing the words in sub-section III thereof, after "separately," to read as follows—"The retiring President shall be ex-officio the premier member of the Council, the other five members to be balloted for on one paper."

Mr. Victor Roy will move that "The Lieutenant Governor of the Province, the Prime Minister, and the Minister of Public Works of the Province, the Mayors of Montreal and Quebec, the Honorable Sir Donald Smith and G. A. Drummond be elected as honorary members of our Association."

Mr. A. T. Taylor will move "That the Council shall appoint a Board of Examiners composed of six members, instead of four, as in the past."

Members of the Association who may desire to introduce any sub-amendments in connection with these amendments, are requested to communicate them in writing to the Secretary on or before the 17th inst.

Mr. A. F. Dunlop, who was elected a member of the Council of the Province of Quebec Association of Architects at the recent annual meeting, has since resigned the position.

THE BUILDING BY LAWS.

There are probably on this continent very few cities of the size of Montreal where the aesthetic in architecture is so much ignored. Some of our city fathers even are not more enlightened on the subject than their electors are. An example of the extent of their knowledge in that line was the passing of a by-law a few years ago, when the street railway craze began, to the effect that all buildings erected in future on the new street line should be faced with stone and be not less than three clear stories in height. As the result buildings strictly in accordance with this by-law, but of cheap construction and mostly of poor design, sprung up on these promising thoroughfares, of which Notre Dame street is a recent example. Brick and terra cotta of any kind were absolutely prohibited for the facing of front walls. These materials in the eyes of some of our aldermen are merely baked mud unfit for decorative purposes, but such highly ornamental and substantial material as galvanized iron was allowed to be used in profusion for decoration and the construction of cornices and towers. Recently the Merchants' Bank of Halifax, which is erecting a very creditable and ornamental building at the corner of Seigneurs and Notre Dame streets, asked permission of the City Council to use buff pressed brick on the Notre Dame street fronts After considerable opposition on the part of some of the aldermen the by-law was amended, and anyone may now use pressed brick for facing front walls. When that by-law was passed, instead of prohibiting the use of brick, which they thought was too common a material to be used on those streets, the aldermen might better have directed their attention to forbidding the employment of galvanized iron for cornices, etc., as a substitute for terra cotta and stone, and to the regulation of the height of each story, so as to ensure uniform height in the buildings, thereby preventing such erections as that on the corner of Notre Dame and McGill streets, one of the best business locations in the city, where the building conforms in every way to the by-laws, with a stone front, and three stories in height, but where the height of each story is not more than seven feet six inches. Would it not be wise for the civic authorities when a building permit is applied for not only to enquire about the constructive merit of the structure but also as to its artistic merit, with the object of putting a stop to the erection of buildings from so-called "builders' designs," and the showy and ill-constructed buildings put up wholesale by speculators, which at present do so much to disfigure our streets?

COUNCIL OF ARTS AND MANUFACTURES OF THE PROVINCE OF QUEBEC.

The schools of the Council of Arts and Manufactures of the Province of Quebec are institutions which interest in the highest degree architectural students, and apprentices devoted to the building arts in general, as they afford to pupils great facilities for developing their talents and taste in branches of study which are seldom met with in the daily routine of the office of the architect or in the workshops. These schools are established in all the cities of importance throughout the province, as in Quebec, Levis, Three Rivers, Sorel, Huntingdon, Granby, Sherbrooke, St. Hyacinthe, St. Jerome, and Montreal, which is their headquarters. The first schools, that is those of Montreal and Quebec, were founded in 1873 by the Provincial Government, which elected a board of management actually composed of Messrs. E. E. Paché, J. F. Peachy, G. E. Tanguay and Rev. J. C. K. Laflamme, of Quebec, T. Normand, M.P.P., of Three Rivers, D. Lainé, of Levis, A. G. Lomas, of Sherbrooke, Paul Payan, of St. Hyacinthe, L. I. Boivin, G. Boivin, A. Boyd, Victor Roy, J. McFarlane, J. D. Rolland, F. J. Hart, J. C. Wilson, and W. McMaster, of Montreal, and S. C. Stevenson, B.A., as Secretary.

As a representative of the CANADIAN ARCHITECT AND BUILDER, I had the opportunity of visiting, a few days ago, the Montreal school, and cannot too highly recommend its system of instruction to those who wish to acquire some knowledge of modelling, freehand drawing and building construction, and am glad to be in a position to give herein a short description of the school. The school occupies three buildings, completely independent from one another. Two are antique but massive and well built buildings facing the Champs de Mars on St. Gabriel street, and forming the two angles of Fortification Lane, which begins at this point. The school is maintained at the expense of the Provincial Government, and is open free of charge to all male pupils above the age of fifteen years. It opens on the 5th of November in each year, to close on 5th April. Applications for admission are received by the Professors at the class rooms and are presented by the candidates in person, accompanied by a letter of recommendation from their employers. As the number of applications for admission in some of the classes are sometimes in excess of the number that can be immediately admitted, it becomes necessary for the later applicants to wait until vacancies occur; they are then admitted in the order of their applications. The only exception to this rule is made when the number waiting is more than enough to fill the probable vacancies for the season—then preference is given to those whose occupations require a knowledge of the study sought.

Pupils who may obtain admission to a class for which they are not properly qualified, are referred by their Professor to such class as may be deemed proper. They are then entered as applicants for this class, if they so desire, but are subject to the same conditions as new applicants of the same date. Each pupil on being admitted to a certain class is required to make a deposit of one dollar, which is returned if he has not been absent more than four times during the session. But in any case, when a pupil has sufficient reason for absenting himself, he should always report to his Professor in order to retain his position in the school. At the close of the session pupils must take charge of their drawing boards, instruments, etc., and all drawings or other works executed in the school are retained during the session; at the close the Council may retain such works as it considers desirable, the remainder being returned to the pupils.

The building situated on the left hand side of Fortification Lane is three stories high and contains in the basement, which is reached by a side entrance, the class in lithography, with an attendance of 18 pupils, having at their head Mr. J. A. P. Labelle as professor. The instruction commences with the preparation of the lithographic stone for work, and proceeds by regular steps till the pupil is able to finish a drawing on the stone, ready for the press. Instruction is given in engraving on stone, crayon and pen and ink work. The stone and other materials required in the class room are provided free of cost to the pupil. This class meets every Monday and Friday between 7.30 and 9.30 p.m.

The ground floor is occupied by the administrative offices of the school, and the first floor by some government offices. The second floor is occupied by the architectural class and also by the pattern making class. The class of architectural drawing possess a fine room measuring about 15 x 50 feet, well equipped with drawing tables and other requisites, and has actually 23 pupils, following their courses under the guidance of Messrs. Henry J. Peters and P. N. Peard, both architects actually engaged in the practice of their profession. In this class, although mostly intended for carpenters, builders, cabinet makers, etc., the instruction is, however, adapted as far as possible to the requirements of the pupils. Exercises are given in geometry and projection, and pupils are instructed in the details of framing, plans and elevations of buildings, and the preparation of working drawings. Several architectural students I have noticed are following this course. This class meets on Mondays and Fridays from 7.30 to 9.30 p.m.

Next to this class is the pattern making class for boot and shoe makers, which probably does not interest us very much. This class also meets every Monday and Friday, with Mr. Jos. Godin as professor. It is established for the purpose of giving practical instruction for the study and practice of artistic pattern cutting for boots and shoes of all kinds.

In the building situated at the right hand side of Fortification Lane, which is about of the same style as the one first mentioned, is on the ground floor the modelling and wood carving class, two very important factors in architectural decoration. The room occupied by this class, although small in size and of very plain appearance, has an artistic look about it with it's plaster models of Renaissance compositions hung on the wall, and statues and busts of historical personages reposing on pedestals. This class is intended to give instruction to all who use the chisel, but more particularly to marble and stone cutters, wood carvers, etc. The pipe clay which is used in modelling can be softened as often as required, thus enabling the pupil to work with ease and rapidity, obtain quick results, and become familar with form; he first gives to the mass of clay the rough outline of the object he desires to reproduce, and then finishes it by the aid of the tools. The clay required is provided free of charge. Pupils who join this class have to be well up in freehand drawing, but in the case of stone cutters this condition is not rigidly exacted. I believe that this is the class that could do the most towards developing the artistic taste of the students, especially the students of architecture, affording as it does the opportunity to study with advantage the human figure, which is so essential a part of the education of every artist. This class, notwithstanding its importance, possesses only 18 students, five of whom are devoting themselves to wood carving. It is open every Tuesday and Friday from 7.30 to 9.30 p.m. under the supervision of Mr. J. O. Gratton, sculptor.

Now pass on to the Stair Building and Building Construction Class, a department of interest to builders and architectural students who wish to gain knowledge of a practical character. The class is composed of 26 pupils, headed by Prof. L. H. Bloum, who teaches them all matters connected with construction of buildings, and who gets them to make plans for stairs and other work, and execute the same in the class rooms adjoining the Modelling Class. Special attention is given to the important branch of stair building. Tools and materials are provided by the school free of charge.

On the first floor of this building, over the Modelling and Stair Building Classes, is the Freehand Drawing Class—one of the most important at the school—both as regards the work it accomplishes and the number of students who attend it's courses. This department is under the charge of Professor E. Dyonnet, A.R.C.A., and is divided into two classes—the elementary and the advanced class. The elementary class is for those who have but a vague idea of drawing, and is intended as preparatory to the advanced class. The pupils begin by drawing differently shaped geometrical blocks, commencing with the most simple, and progressing to more complicated shapes. This method of drawing from solids from the very first has been generally adopted in all the best drawing schools of Europe. It shows the pupil in a more intelligible way than any other method, the first difficulties of outline, perspective, light and shade and tone, and as the pupil's intelligence is appealed to, there is comparatively little difficulty in showing him how these difficulties are to be overcome. After one season spent in the elementary class, the pupil who has made sufficient progress is promoted to the advanced class. He soon finds out that the principles he has learned in the first year are continually applied in the second. His eye and hand now gain sufficient accuracy and precision to enable him to draw parts of the figure from plaster casts. The simplest pieces are given at first, but as difficulties are overcome, more complicated ones are tried, until the full length antique figure is reached, after which he will soon be prepared to draw directly from the living model. This department is composed of about 30 pupils, who meet on Monday and Thursday for the Elementary Class, and Tuesday and Friday for the Advanced Class.

On Tuesday and Thursday pupils composing the Mechanical Drawing Class have their courses in the rooms occupied on Mondays and Fridays by the Architectural Drawing Class. The class is conducted by Messrs. J. T. Gardham and J. Clement. It is chiefly intended for those who follow mechanical pursuits, and to apprentices and others connected with machine building it proves to be of great value. It is aimed to make the instruction of a thoroughly practical character. Blue prints and figured sketches of familiar details of machine design are supplied, from which the pupils are required to make general drawings, etc., and to follow as far as possible the usual office practice.

This completes the number of classes contained in the two buildings forming the angles of St. Gabriel Street and Fortification Lane. On the other side of St. Gabriel Street, opposite the school, and adjoining the Champs de Mars, is old St. Gabriel Church, an historical relic of the last century. It was built in 1792, and is the first Protestant church built in Montreal. It is now the property of the Provincial Government, and is occupied to-day by the Plumbing Class of this school. It has been used during the past few years by the Decorative Painting Class, which was abandoned this year. There are two professors—Messrs. W. Britton and J. A. Peard. The class is under the immediate charge of a Committee of the Master Plumbers' Association recently formed, and which I hear will apply at the next session of the Legislature for an act of incorporation. The class has an actual attendance of about 45 pupils, and meets every Monday, and Friday from 7.30 to 9.30 p.m. The class has been arranged for apprentices, journeymen and foremen engaged in any branch of plumbing. The class room is equipped for about fifty pupils, each member having a gas furnace for melting solder and a drawer for holding tools. Instruction is given on such subjects as lead bossing, pipe bending, soldering and wiping joints, lead burning, water closets and their fittings, water waste preventors, baths, lavatories and sinks, taps, soil pipes, connection of drain to sewer, ventilation of soil pipes and drains, sizes of pipes, etc.; water supply, house cisterns, their construction, position and management; the use of tools, etc., etc. All materials are supplied free of charge.

It is in old St. Gabriel church that every year is held an exhibition of the most creditable examples of the work accomplished by the pupils of the different classes of the school during the session. As the pupils are at present just commencing the session, it is difficult to judge of their merit by their work, as they have hardly had time to do any yet, but I propose at the next annual exhibition of the school, which in all probability will be held as usual in April, to give a description of the principal works executed by the pupils during the present session.

BUILDING ACCIDENT.

The roof of a six storey building in course of erection at the corner of Craig Street and Place d'Armes Hill, for the Montreal Street Railway Company, fell in a few days ago. All but three of the twenty-one workmen employed on the roof at the time received sufficient warning of the approaching accident to enable them to safely reach the walls before the crash came. The others were carried down with the roof. Two of them are reported to have died from their injuries. Messrs. J. W. & E. C. Hopkins are the architects of the building. Ald. Dubuc is the contractor for the stone work, Ald. Brunet for the brickwork, Ald. Robert for the woodwork, and the Dominion Bridge Co. for the structural iron. All sorts of causes are being assigned for the accident, but I prefer not to mention any of them prior to the investigation, which I understand will shortly be held.

RECENT CANADIAN PATENTS.

Patent No. 47,669, has been granted to Jules Colas, Montreal, for a draining well.

Louis Rosenfield, New York, has been given a patent No. 47,064, for a hoisting apparatus.

A patent No. 47,044, for a door knob, has been granted to Albert E. White, Dutton, Ont.

Messrs. Darling Bros., Montreal, have been granted a patent, No. 46,961, for a combined bracket and shelf.

A patent No. 47,070 for an elevator brake, has been secured by Ernst C. Heydenreich, Mount Clemens, Mich.

John Heard, Strathroy, Ont., has been given a patent on moulds for forming concrete into pipes for drains, &c.

Patent No. 46,669 has been granted to Geo. Belanger and others of Quebec, for a cement formed of quartz and other substances.

Samuel John Laughlin and James Hough, of Guelph, Ont., have received a patent No. 47,003, for a sketching and designing table.

A patent on apparatus for repairing asphalt pavements, was granted on Sept., 20th, to the Western Paving and Supply Co., Chicago.

Jas. Peckover, Harrisburg, and John E. Johnson, Philadelphia, Pa., have obtained a patent dated 24th Sept., 1894, on a stone sawing machine.

Theophile E. Ayotte and Arthur A. Charbonneau, Montreal, were given a patent, Sept. 26th, on a process for making brick and artificial stone.

Hugh C. Baird and Oliver Baird, of Parkhill, Ont., assignees of James and Eli Elliott, of Wingham, Ont., have obtained a patent No. 47,054, on a brick and tile machine.

Charles H. Dalrymple, Detroit, Mich., and Chas. E. Hassey, Hamilton, Ont., have been granted a patent, No. 47,031, on a roofing composition, consisting of sheets of wood fibre, rendered impervious to moisture, and having abutting up-turned edges, the battens provided with a groove in their outer edge which receives the up-turned edges of these, sheets to close the joints.

PUBLICATIONS.

The Review of Reviews for November, has some pertinent notes on European politics and editorial tributes to the memory of Dr. Oliver Wendell Holmes and Professor David Swing, of Chicago.

"The Art Schools of America," "The Great British Northwest Territory," "The Chiefs of the American Press," and the "Public Library Movement," are amongst the Cosmopolitan's table of contents for November.

A correspondent of the Illustrated Carpenter and Builder expresses the opinion that the best form of roof for a cottage, if expense is not a consideration, is to cover the rafters with 7/8in. dry boarding, and over this nail a layer of inodorous felt; then comes a row of vertical battens fixed to top of rafters, then the ordinary slate battens. The old slates may be reused, if sound and fit for reuse, and, in fact, may be preferable to new ones in some cases.

CORRESPONDENCE.

Letters are invited for this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not resume responsibility for the opinions of correspondents.]

ARCHITECTURAL COMPETITIONS.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—Apropos of your remarks on Competitions last month, the question has often been asked "Whether better results attend the giving of a commission to one architect or a Competition in which a large number of the profession are invited to send in designs." The answer is altogether conditional. Competition properly conducted for public buildings will probably call forth the more thoughtful and skilful design. Much depends, however, on the terms of invitation and the discretion of the committee of selection and their assessors.

The competitive system is becoming discredited amongst architects of known experience and ability in Canada, because of the unbusinesslike way in which competitions are conducted and the flagrant injustice of the awards—a condition which obtained in England at no very distant date, until the architects combined in their endeavor to obtain fairness and justice. There were many years of isolated outbursts of indignant remonstrance from disappointed competitors against committees and boards for unfair decisions before the obvious remedy was seen, or at any rate applied. The conduct of Competitions will be what those who enter into them are collectively content to allow them to be, and it is evident that only by combining together in one solid phalanx against the loose system at present in vogue, can the standard be raised. If promotors of Competitions were made to see that professional men of ability would not respond unless an assessor of unquestioned standing were appointed, whose advice on the merits of the design would be accepted, and certain broad rules for the conduct of Competitions be adopted, a healthier system would soon be established.

I am aware that the Ontario Association of Architects have formulated some excellent rules which, with little amendment, would serve the purpose suggested, but they remain practically a dead letter, because their authors do not insist on their adoption, and it is left to anybody or nobody to take the initiative of enforcing them. The conditions for the conduct of a Competition should be framed with the single purpose of obtaining a perfectly fair competition, and having been issued, should be rigidly enforced. They should very definitely state the amount to be expended, and that all designs which cannot be carried out for that amount will be disqualified, that the chosen design will not be accepted unless bona-fide tenders can be obtained within 5 in excess of the figure stated. There should be no irksome restrictions in the conditions or arbitrary dictation of plan. I remember hearing Mr. Waterhouse, R. A., at the R. I. B. A., say: "I would have every competitor put as nearly as possible in the position of an architect acting for a private client, who, though he may have suggested his requirements, would probably listen to his professional adviser, if he gave good reasons for not literally adhering to them in all cases." If Competition designing is to be made successful, it must be spontaneous and free. Instructions which are ambiguous and which a competitor feels he cannot alter or modify without being disqualified, are prejudicial to the end in view of Competition, that of obtaining the most skilful design at a given cost. In conclusion let me say, that as far as Toronto is concerned, nothing can be accomplished until the architects act more in concert with each other. To this end they should meet together oftener and probably carry out the scheme of a common meeting and reading room as outlined by "A City Member" in the October issue of the CANADIAN ARCHITECT AND BUILDER.

Yours truly,

J. WILSON SIDDALL.

ONTARIO ASSOCIATION OF ARCHITECTS.

At the supplemental examinations held in October the following students came up and passed:—

S. F. Smith, 2nd Intermediate; C. P. Band and G. E. Stephenson, 1st Intermediate.

E. Langley, who intended to come up for the 1st Intermediate in March, but was prevented by illness, was allowed to take at the supplemental examination a full examination on the 1st Intermediate subjects, and passed.

Mr. C. H. C. Wright, Lecturer in Architecture at the School of Practical Science, will give a lecture on Graphic Statics to the Association on the evening of November 16th. The lecture will be given at the Canadian Institute, 58 Richmond street east, and will begin at 8 o'clock. This lecture, being on a technical subject, has not been announced as a public lecture, but we are authorized to state that any person interested in the subject will be welcome.

Judging by the new lines of furniture displayed by the leading dealers and manufacturers, a reaction is setting in towards natural finish in oak. Very little antique oak is shown, and the peculiar and fanciful colorings so popular a year ago, are nowhere to be seen. If the wood is toned at all, the tendency is toward shades of yellow or to a slightly reddish cast.

ILLUSTRATIONS.

THE TOWER OF PALAZZO VECCHIO, FLORENCE, ITALY.—DRAWN BY MR. E. J. BIRD.

This tower, so admirable for its solid construction, united to graceful proportions, is ninety-four metres high.

The Palazzo itself was raised by the genius of the architect, Arnolfo di Cambio, in 1298, A.D., and has been enlarged at different times by Michelozzi (1434) and Varsari (1550). This palace was the seat of the Signoria of Florence, then the principal offices of the Granducal Government, and at present belongs to the municipality, the offices of which are here.

WROUGHT IRON FENCE AND GATES TO RESIDENCE OF MR. A. A. ALLAN, TORONTO—GORDON & HELLIWELL, ARCHITECTS EXECUTED BY SHIPWAY MFG. CO., TORONTO.

HOUSE FOR MR. DUBUC, MONTREAL.—A. RAZA, ARCHITECT, MONTREAL.

DESIGN FOR INSURANCE BUILDING, GALT, ONT.,—J. A. ELLIS, ARCHITECT, TORONTO JUNCTION.

OLD MEN'S REFUGE, VANCOUVER, B. C.—R. MACKAY FRIPP, F.R.I.B.A., ARCHITECT, VANCOUVER.

IMPACT TESTS OF CAST-IRON PIPES UNDER HYDROSTATIC PRESSURE.

REFERRING to a frequent specification requirement for striking a cast-iron pipe with a hammer while it is subjected to heavy water pressure, S. Groves writes in a recent number of The Foundry that he conducted some experiments to determine the effect of those tests when in 1889 he was engaged with a large English pipe foundry.

"Two socket and spigot pipes 4 inches in diameter by 9 feet long by three-eighths inch thick—one cast vertically, the other cast at an angle—were subjected in the hydraulic proving press to a hydrostatic pressure of 260 pounds per square inch, and while under this condition a wrought-iron ball weighing 1½ lbs. was let fall upon a chalk line mark on the body of the pipe, at given points and from varying heights, as indicated by Figs. 1 and 2. The pipes are then taken out of the press and broken logitudinally into two parts. On the inside of each pipe, at the points where the ball had struck dead upon the center line, was a star-shaped fracture, Fig. 4. The fractured half of each pipe was then broken into two parts, and each piece upon which a blow had been struck was carefully broken through the star-shaped fracture. In each section was an oxydized fracture penetrating through the inside skin of the pipe into the body metal,

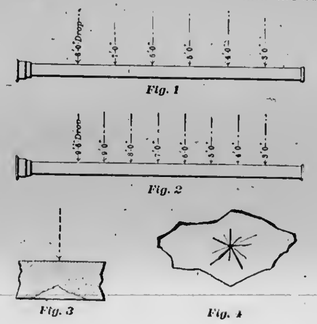


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 3, and in no case was the depth less than three thirty-seconds inch, the greatest being five thirty-seconds inch.

"The following is a table showing the depth of the respective fractures:

PIPE CAST VERTICALLY.

Drop.	Depth of Fracture.
3 feet.	Slight.
4 "	3-32 inch.
5 "	Slight.
6 "	Slight.
7 "	⅛ inch.
8 "	5-32 inch.

PIPE CAST AT AN ANGLE.

Drop.	Depth of Fracture.
3 feet.	Slight.
4 "	Slight.
5 "	⅛ inch.
6 "	Slight.
8 "	5-32 inch.
8 "	3-32 inch.
9 "	Slight.
9 " 6 inches.	3-32 inch.

"The cases marked 'slight,' were due to the deflection of the ball, in consequence of not falling dead upon the centre line. In every instance where the ball struck true a serious fracture resulted.

"Instead, therefore, of the hammer-sounding test being a safeguard, it is actually a danger; worse than a variation in body thickness of one-sixteenth of an inch, for which many a pipe has been sent to the scrap heap.

STUDENTS' DEPARTMENT.

DISCOVERIES IN ARCHITECTURE.*

DISCOVERIES of things absolutely and always unknown are always rare; and in some branches of study—architecture among others—are in the nature of things impossible. But in the sense of finding out or uncovering something previously unknown to the discoverer discovery occurs frequently, and it is by far the most healthy, the most interesting, and the most successful form of study. I propose then, in this lecture, to begin with the simple, but most valuable, discoveries which you as students must make for yourselves if you are really to master the art of Architecture; and then to proceed to notice some of the discoveries which have taken place in recent years which are more brilliant in their character and relate to architectural matters that have long lain hid. I propose to distinguish these, and call them respectively personal and public discoveries; for there is this distinction certainly between them, that the discoveries which a student makes are mostly of importance to him personally, but are not such as need be made public. Those which an explorer may make are perhaps quite as important to the general public as to the discoverer, and are usually published to the world.

The information you obtain in the offices where you work, or from attending classes like those about to begin in this college, is hardly discovery; it is instruction, and the worst of it is that, as it is not difficult to get, it is very apt not to stick in the memory. The information discovered by making researches on your own account is mostly obtained with difficulty and trouble, but it is seldom, if ever, forgotten. You may make discoveries in a library. For example, let us say that you are advised to read a handbook, say "Fergusson's History," and you do so, finding it perhaps a rather laborious task, as the reading of any condensed book always must be. You notice, however, that the numerous wood cuts all have reference to the names of writers from whose publications they are copied, and having access to books, say to the Institute library, or that at South Kensington, or some other collection of books, you begin to consult some of the original authorities, and among them you discover some book of which the illustrations or the letter-press, or both, bear on what you have been reading about, and are full and clear and interesting. The book you have discovered only occupies a corner of the vast field that Fergusson travels over; but then the writer really has the leisure to take possession of that corner, and to throw a clear light upon it. The mere fact that you have to some extent unearthed the book for yourself helps to give a zest to the reading of it, or the examination of its illustrations. It is a discovery. Nor is it in a public library only that such discoveries can be made. In any collection of books or photographs or prints to which you have access, and on the shelves of second-hand booksellers and the tables of bookstalls, you can have the same good fortune. I, for example, myself possess not a few valuable books on subjects connected with architecture which first came to my knowledge through finding them on book stalls. This reference to discovering books ought not to be made without alluding to the help to be got from one very valuable book of reference, which just now possesses a melancholy interest for some of us. I allude to the "Dictionary of Architecture," of the Architectural Publication Society, a work bristling with sign-posts—if I may use such a phrase—calculated to direct the student (in his search for knowledge) to the best sources of information. In almost all the articles the most copious lists of references occur, and it is of the greatest use to a real student to have sources of information so liberally spread before his view. This work (begun by a circle of architects, some of whom only have survived to see its completion) would have been left unfinished but for the indomitable energy and public spirit of Mr. Cates, and the learning and patience of the late Mr. Wyatt Papworth, and it is impossible just now to mention the "Dictionary" without alluding briefly to the great loss which architecture has within the last few weeks sustained in the recent death of the last-named architect (Mr. Papworth). He was full of accurate and well-digested information on every subject connected with our profession. He was an indefatigable, systematic and accurate worker, singularly quiet and simple in his manner and bearing, and was universally esteemed. In many ways his vast store of technical information has been made useful to the members of his profession. To you, gentlemen, his work, as editing Gwilt's "Dictionary," the value of which he practically doubled by the additions he made to it, is pretty sure to be familiar; but there are many others, and many important memorials of him in the literature of our profession, and his death leaves a blank which it will not be easy to fill up. To return, however, to students' discoveries—of which, by the bye, the late Mr. Papworth made many and valuable ones—architecture can be better learned from buildings than from books, and it is in visits to buildings, ancient and modern, that you will make the discoveries that will be of most use to you. The most simple building, if it is good, has some secrets, if you can but make them out. Why is it pleasing? Why are there certain irregularities? How is it constructed? What has been its history as a structure? These, and such-like questions, should present themselves to the mind, and if we can but discover the answer to one such question, the visit to the building in respect of which it is asked will have been fruitful. Among the most interesting features of ancient buildings are the traces of their history which they bear indicating the successive enlargements, alterations, rebuildings and so forth, which they have undergone, and the discoveries of this sort which a keen student, examining an old manor house or a church, a cathedral or a castle, may make for himself, are extremely interesting and extremely instructive. One of the most complete accounts of such a series of discoveries, illustrating the past history of a great building by its actual visible marks, exists in the account of Canterbury Cathedral, from the pen of the late Prof. Willis. No man during the present time of careful research has been more keen or more successful in his examination of ancient buildings than he, and this record is a good example of the manner in which it is possible to make them tell the story of their varied changes, alterations, rebuildings and extensions. Even without a tenth part of the minuteness and elaboration of Willis's investigation, if you simply establish the broad divisions of Saxon, Norman, Early English and so forth, in a building with a chequered history, and recognize the most obvious features of each period, you will have discovered the leading facts in the history of the building. In this sort of research it is peculiarly true that "to him that hath shall be given." To a person even of artistic taste and power of observation, entirely devoid of architectural knowledge, a building is almost a sealed book; but when you have got even a little knowledge from other sources a building begins to be legible. As an example, I would suggest to any student who has read something of the changes in tracery, in vaulting, and in mouldings which occur in English architecture, that when he has obtained some knowledge of these things from books he should go to Westminster Abbey cloister, getting first from Scott's book the dates at which it was done, and identify the different features of each period, and the changes both in feature and general proportions. He will find that he has discovered a good deal of what is really meant by the terms Early English, Decorated and Perpendicular. It is possible to make discoveries on drawings of buildings as well as on the buildings themselves. An example of what I mean: If you take the drawings of one of Sir Christopher Wren's churches, and examine them carefully, you may perhaps discover some of the principles upon which he designed them. He was a very orderly and mathematical worker. He had strongly impressed upon his mind the conviction that the establishment of geometrical relations between the main dimensions of his building was a means of securing that their proportions should be pleasing, and if, with this clue in your mind, and a pair of dividers in your hand, you examine a series of engravings giving the plans, sections, and elevations of his churches, and St. Paul's Cathedral, you will, I think, find it possible, and extremely instructive, to discover some of his methods of working. The plan and sections of St. Stephen's Church, Walbrook, generally recognized as the best among Wren's many successful interiors, will be very good to begin with. A famous place to investigate is a good museum. I doubt whether any one of you has seen, let alone studied in, all the museums of London which furnish information about architecture, though I hope most of you have studied, or will study in some.

That an architect should overhaul the church in any village of town where he may be, if it be of good design or possessed of features of interest, is, I hope, so much a matter of course, that I do not stop to point out how much can be discovered and appropriated in journeys and country rambles; but I am disposed to dwell upon the modern work which awaits the traveller in various parts of England. The country is now thickly sprinkled with fine mansions and smaller country houses, nearly all of them good, and many of them extraordinarily good.

*Abstracts from an inaugural lecture delivered at University College, London, on Thursday evening, October 11, 1894, by Prof T. Roger Smith, F.R.I.B.A.

"CANADIAN ARCHITECT AND BUILDER" STUDENTS' COMPETITION.

THE publisher of the CANADIAN ARCHITECT AND BUILDER invites designs from students for a Muskoka Summer Cottage to cost not more than $1,000. The accommodation required is a generous living room, with pantry and kitchen; five bed rooms, and provision for fuel.

The cottage is to be erected on a wooded island or point, the principal view being southward. The actual site is rocky and broken, with no extent of level surface, the space to be occupied by the cottage varying in level some 8 or 10 feet.

Competitors are required to submit floor plans and two elevations, unless accompanied by a perspective, in which case one elevation will be sufficient.

Each design (including elevations, plans, etc.,) must be made on a single sheet of heavy white drawing paper or bristol board, 14×20 inches in size, and must be drawn sufficiently coarse to have the proper appearance when reduced by the photo-engraver to one half the above size. The drawing must be made in FIRM, STRONG LINES, with PEN and BLACK ink. No color or brush work will be allowed. Each drawing must be marked only with the *nom de plume* of its author. The author's full name and address, enclosed in sealed envelope, with *nom de plume* on the outside, must accompany each drawing submitted. This envelope will not be opened till after the competition shall have been decided. There is also required a brief description of the design, mentioning the materials proposed to be employed in the construction of the building.

Drawings for this competition must reach the office of the CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto, not later than the 20th of December, 1894.

The first premium is the sum of $10; the second, $5; the third, one year's subscription to the CANADIAN ARCHITECT AND BUILDER. The decision as to the merits of the designs submitted will be made by three members of the Ontario Association of Architects. This decision will be final. The publisher of the ARCHITECT AND BUILDER reserves the right to publish such of the designs submitted as may be deemed suitable, and to withhold the award should none of the designs be found to satisfactorily meet the requirements.

All drawings will be returned to their authors within a reasonable time after the competition is decided.

Architects are debarred from this competition.

WHEN the national pike bridge, west of Richmond, Ind., was in process of construction, says the Indianapolis Sentinel, the workmen at the west side of White Water river dug down to find a solid foundation. They struck a great and seemingly bottomless bed of quicksand. Vainly they labored to find a safe resting-place for the foundation. Finally the civil engineer and the contractor struck on a novel expedient to overcome the difficulty. They sent men all through the country to buy wool. This wool they packed into the quicksand till the sand would take no more. At last, on this wooly foundation, the rocks were laid and to-day the western abutment of the old national bridge rests on a bed of compressed wool.

DECORATION AND FURNITURE

THE EXTERNAL COLOUR-DECORATION OF BUILDINGS.*

By T. G. Cesare Formilli.

Amongst the many considerations suggested by the works of the old masters in Art, there is one concerning the external decoration of houses which leads to the enquiries: Why is it that to-day, when the words "old masters" are on the lips of all, when we consult and study them, that we do not take examples from the various methods that they had of externally decorating their edifices with such beautiful effect? and why do we not also unite coloring with architecture? Colour does not disturb form in any way; in fact, when colour is well-conceived, it greatly helps to bring out the full beauty of form. The Assyrian Art, the Egyptian, Greek, Roman, Arabian, Gothic, and finally, the Art of the fifteenth century, entered into the decoration of innumerable edifices of great importance, some with monochrome colours and some in polychrome; whilst we, with few exceptions, when we want to do something above the ordinary level, generally resort simply to the usual terra-cotta or stone of uniform colour and to very little else.

We must, however, here note that, in spite of the general similarity of the external decoration of the present age, we see in them from time to time a tendency to more closely study the old masters, and we notice a certain revival of old ideas of great artistic value relating to external decorations in colour.

There is much that could be said about the art of uniting colour with architecture in the Greek and Roman periods, but the time is too limited on this occasion to attempt to cover so extensive a field. I will, therefore, limit myself to a few remarks about the methods adopted by the fifteenth-century artists for adding beauty and variety to their edifices. I ought also to say that amongst the many and varied styles of external decoration of the different artistic periods in different countries, that used by the fifteenth-century masters, which lends itself so particularly to our requirements, greatly surpassed every other style of decoration which had, up to that period, been used. What have we, it may be asked, more beautiful in external decoration than the immortal majolica of the Della Robbia, and the graffitos, chiaroscuros and frescoes of Polidoro da Caravaggio, Pellegrino da Bologna, Maturino, Fiorentino, Guillo Romano, and Raffaelle? These artists, who possessed such refined taste, covered many and many external walls of houses and palaces, which, for the proportion of the windows, the elegance of the columns, and that of the cornices, have excited immense admiration, and yet those beautiful and various decorations, framed, as it may be said, by the surrounding elements of architecture, have hardly been considered worthy of study, except in very rare cases.

Rome, Florence, Venice, and many other principal and secondary cities of Italy can give immmerable examples of the beautiful art of external decoration, which, in virtue of the material used and the mode in which the work was done, have endured through many centuries, as well as the architectural stonework which encloses them.

However, we must note that in these golden times the term "decorator" conveyed something more elevated and noble than it is frequently understood to mean to-day. In fact, in the past, a Michelangelo, a Raffaelle, a Cellini, were embraced in the title of decorator. Whereas in these days it is rarely that we see a work of industrial art executed by an artist of high reputation; there seems to be a prejudice against such work. Why then, do we not entirely abolish this prejudice? Why do not artists who have great names, and those who have not, return to those good and wise traditions of the old times? What variety, what elegance of effect might be added to the many houses that are now being constructed with so much good architectural taste if there were introduced in some or all of the blank spaces decorations of majolica, graffito, chiaroscuro or fresco as in the fifteenth century.

Let us, however, now pass on to the principal methods of external decoration most used in that period, beginning with that of majolica.

Besides being extremely beautiful, the majolica decoration has the advantage of preserving the walls by preventing the penetration of moisture into the interior, and thereby protecting in the same way both the owner's property and the occupier's health. As is generally known, external decoration in majolica is often seen in the Southern climates, whereas, in England, if it is used at all, it is chiefly for interiors. If we ought to believe in the old Latin saying, utile dulce, majolica would hardly be selected for the internal decoration of dwelling-houses in cold climates, for although in a certain sense it must be considered useful, it certainly would tend to discomfort indoors under ordinary circumstances during cold weather.

Externally, however, as already said, it protects the walls from rain, fog, and from dirt; presenting at the same time to the eye a magnificent and varied effect. We may imagine the effect of the front of a house well designed by the architect for the application of majolica, having beautiful friezes, medallions, panels, &c., in this material, and of the truly artistic creation in the sober sense in which the old masters intended. A big frieze, as made by Luca, Giovanni, or Andrea Della Robbia, with spaces between the windows, fitted with beautiful symbolical figures, representing, for example, scenes from family life, or fitted with scenes of child life, as Andrea fitted the famous medallions which decorate the space above the arches of the Hospital of the Innocents, in Florence.

What beautiful and sublime external decoration is made by the five figures of Giovanni Della Robbia, in Pistoria, namely, Faith, Hope, Charity, Prudence and Justice; also by the immortal frieze, called "The Seven Works of Mercy," of which beautiful copies can be seen at South Kensington Museum, and which are good in any case as an inspiration in that class of external decoration. Not less important or beautiful are the medallions of the arms of the King of Anjou, and the months of the year, both by Luca, and also found among the many treasures of the same Museum.

It would be too long to enumerate the many examples of decoration in majolica by the Della Robbia's family, who began with Michael, born about 1320, followed by Luca about 1399, by Andrea in 1435, and by Girolamo in 1488. Afterwards one branch of this family became almost French, and finished with Guido Della Robbia, who did not reach the age of touching the clay, but died in 1625 at the age of only five years.

Another system of external decoration not less beautiful and well adapted to resist atmospheric changes is without doubt that of graffito, which was adopted with immense technical and artistic knowledge in the renaissance of the Italian Art.

Such decoration, whether it be for its weathering powers in severe climates or for the magnificent artistic and at the same time subdued effect which it produces to the eye, certainly merits being considered as beautiful as decoration in majolica.

On the Continent, and especially in Germany and Italy, the art of Graffito is extensively used, but here in England many must regret that graffito decoration has been almost entirely neglected. It is difficult to account for this unless it is due to the erroneous impressions that the English climate would injuriously affect the work, or that it may be too expensive for general application.

Regarding the cost, I need only say that it would compare favorably with any decoration, even if it were of the simplest description, in stone or terra-cotta.

As to the durability of graffito, it is, if properly executed, quite capable of resisting heat, frost and rain, because it presents a very hard surface, and is much less porous than ordinary stones or bricks, whilst it lends itself to being easily washed, which is an advantage in foggy and smoky atmospheres. Of the very few examples of graffito existing in London, that which is at South Kensington, although not executed according to the method of real graffito, affords nevertheless good evidence that decorations of this character do not suffer materially from long exposure to atmospheric changes. If they are a little darker in tone than when they were executed, they still are perfectly distinct, and, without doubt, of a finer tone and more harmonious than when done by the artist. Here I ought to add that the work just mentioned is cut much deeper than graffito as intended by the old masters in this art—masters to whom we feel deeply grateful for having added this treasure to their already invaluable bequests.

Vasari wrote of the graffito of his day, and gave considerable information about it. He referred to it in words which may be translated as follows: "Artists have another sort of art, which is called graffito, and serves for ornamenting the fronts of houses and palaces, which may be quickly decorated by such a system, and more surely resists the rain. Its durability is entirely due to the etching on the wall instead of being simply drawn in chiaroscuro or in colours." He then describes the process of preparing and tinting the cement or plaster which is to be laid on the part of the building to be decorated, and which forms the background of the work, and explains how this is afterwards covered with a wash of lime of travertino, through which the lines are etched with an iron point. He further describes how backgrounds are obtained by the entire removal of the surface wash, and shows how strong projecting shadows for grotesque figures or designs of foliage may be produced by adding stronger shades of the same color to the background.

Referring again to the graffitos at South Kensington, they may be described as low relief in graffito rather than graffito proper, because the cut into the plaster or cement bed is excessively deep. The depth of the cut made with the iron or steel point by the artist in that particular work is a disadvantage, necessitated by plastering on the final coat instead of merely washing it on. So deep a cut gives a hard appearance to the design, and impedes the water from running off the walls, whilst tending to accumulate dirt. The true Italian graffito is without this inconvenient feature, because the depth of the cut is scarcely perceptible. The cut or score made by the instrument does not generally exceed the thickness of a sheet of drawing paper, or in other words, very little more than the thickness of the surface layer with which the bed-work is covered. Extremely beautiful effects can be produced under these conditions, perhaps more beautiful than can be obtained with a soft-pencil on a rough paper. The weight of the leaning point of iron is itself sufficient to remove the light surface, and to make the dark background appear without fatigue to the hand.

In some backgrounds colors in monochrome are sometimes added, and these are treated just as you treat fresco, which is very easy after experience has taught the difference between the tint in its wet and dry state. Some of the finest and richest effects are reached by the addition of gilding to some part of the graffito, as ribbons, fruits, arms, &c. The gold, however, must be added when the graffito is perfectly dry.

Naturally there is much in graffito decoration that experience teaches, but it is not very difficult to execute, and it seems to be deserving of more attention in these days of progress, in virtue of its durability as well as of the excellent effects it lends itself to producing. There seems to be a good field open for teaching graffito decoration in the art schools, which have been so largely established in this country.

There are still other modes of decorating the exterior of edifices which were adopted by the fifteenth-century artist—namely, that of chiaroscuro in fresco, and fresco in colors. The first has, at a distance, all the appearance of graffito, and, although the design is not cut, it has similar color and effect.

Much was done in this style by Maturino Fiorentino and Polidoro da Caravaggio, both of whom arrived to the highest point in this art of decoration with their immortal work of chiaroscuro in Fresco in Via della Maschera d' Oro in Rome. Many other examples could also be mentioned, but as this work is the most important among the others, it will suffice as an illustration of this beautiful art. The frieze representing historical scenes is the most important decoration, and in a certain sense it recalls to mind the sequence of pictures which compose the triumph of Cesare, by Mantegna, at Hampton Court. Speaking of fresco, what is meant is the real Italian fresco, and not tempera or incausto, which is occasionally confused with it. As an external decoration it may be considered to be truly ideal, and it is to be regretted that in England it appears to be absolutely out of fashion.

Outside fresco, when it is done with good and pure earth colors, upon suitable lime mixed with much sand and puzzolana of that sort which the Romans used on the Colosseum, becomes very solid, hard, lasting and washable, just like compact and durable stone.

It is really to be regretted that to-day the exterior of buildings is so much limited in the matter of decoration to frames, columns, or, in a few words, to architectural mouldings, whereas the old masters of nearly all ages introduced into their edifices all that contributed beauty. Why, it may be asked, render so poor the mother of all Arts—the one which more directly speaks to our souls, which is so impressive, which cheers and covers us?

* A paper read at a meeting of the "Art-workers' Guild," London, on October 5.

A STATEMENT IN FAVOR OF HOLLOW BRICK WALLS.

By E. Boyden, Architect, Worcester, Mass.

In order to give a thorough knowledge of what is required, I quote the report made by the government officer of the Ordnance Department U. S. A., at Watertown Arsenal, of a test made of seven bricks from Providence, R.I., for the Norcross Brothers, of Worcester, Mass., Sept. 14, 1892.

Test Numbers.		Dimensions in Inches.			Sectional Area	First Crack. Lbs.	Ultimate Str. Total lbs.	Ultimate Str. Lbs. Per Sq. Inch.
8698	No. 1. Long Island Brick Co.	2.45	3.80	8.18	28.32	58,000	128,100	4,492
8699	No. 2. Danvers	2.00	3.72	7.94	29.54	91,800	194,700	6,591
8700	No. 3. N. E. Steam B. Co. Rough Pav.	2.21	3.80	7.78	29.56	132,000	372,300	12,612
8702	No. 4. N. E. Steam B. Co. Smooth Pav.	2.20	3.51	7.78	27.31	177,000	383,900	14,057
8703	No. 5. N. E. Steam B. Co. Sewer Brick.	2.25	3.93	8.00	34.20	114,000	282,600	3,263
8704	No. 6. N. E. Steam B. Co. Light Hard.	2.44	4.16	8.33	34.65	67,000	159,300	4,592
8705	No. 7. Nyatt Brick Co.	2.28	3.58	7.29	28.35	98,000	209,900	7,404

I consider the above tables of great value to the building community. We are indebted to the enterprising firm of Norcross Brothers, who caused the above tests to be made, for much valuable information. By their great desire to know the strength of materials, and by the many precautions they take, they have gained an enviable reputation as being most thorough builders.

From exhaustive tests made during the building of the Allegheny County court house and tower, the tower being three hundred and twenty-five feet high, something over one hundred feet higher than Bunker Hill Monument, it was ascertained that the strength of brick built in walls or piers is very nearly one third of the crushing strength when crushed between smooth surfaces or imbedded in plaster; so that, in work where it is necessary to be near the margin of safety, it may be assumed that well-laid brickwork will carry in a wall one third the crushing strength of a single brick. In some parts of the above mentioned tower the brickwork carries twenty-four tons per square foot.

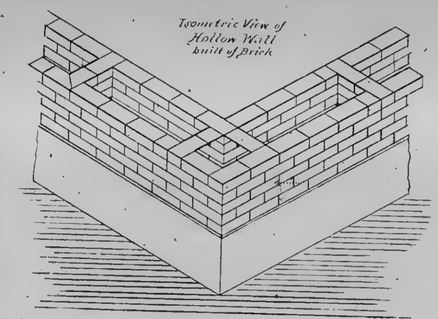
We also have other authority, taken from a book published by Frank E. Kidder, C. E., in 1892. On page 171 we find the following table:

	Strength of Masonry. per square inch.	
Brick (common) Eastern,		10,000
" (best pressed),	" " "	12,000
" (Trautwine),	" " "	770 to 4,600
Brickwork (ordinary),	" " "	300 to 540
" (good, in cement),	" " "	450 1,000
" (first-class, in cement),	" " "	930

Take, for instance, from the above table, "Brickwork (good, in cement)," using the lowest figures, 450 pounds per square inch. Assuming the weight of brickwork to be 112 pounds per cubic foot, it would require a brick column one foot square and 580 feet high to crush the brick at the bottom.

Taking one brick 3¾ by 8 inches which gives us a surface of 30 square inches, and multiplying this by 450, we have the sustaining strength, 13,500 pounds.

Now if we should lay one brick upon another to a height of 100 feet, we would have 500 brick with a weight of 2,000 pounds, thus leaving us 11,500 pounds to carry the load.



In a 16-inch hollow wall 10 feet long laid with the solid bonded wyths of brick, 30 inches from centre we have 1,080 square inches of surfaces. Multiplying this by the lowest number of the seven Rhode Island bricks tested, 4,492, we have 4,851,368 pounds, or 2,425½ tons, as our sustaining strength.

A hollow wall 10 feet long and 50 feet high contains 8,500 brick, with a weight of 34,000 pounds or 17 tons. Five hundred feet of flooring and roof at 25 pounds per square foot equals 6¼ tons; weight snow at 15 pounds per square foot equals ¼ ton; required by Boston ordinance for loading of floor, at 75 pounds per square foot, equals 15 tons; total, 39 tons. On deducting the 39 tons from the 2,425½ tons, we have 2,386 tons of additional strength. This is certainly enough to make it secure beyond all doubt.

If, instead of using the 16-inch hollow wall, we had used a 12-inch solid wall of the same height and length, it would have required 2,570 more brick, giving us 5½ tons additional weight on our foundations.

In using a hollow wall we gain many advantages, aside from the less weight and number of brick.

First. The hollow wall stands on a sixteen-inch base, while the solid wall has a twelve-inch base, making the former much the stiffer wall.

Second. We have a much dryer building, and one that is cooler in summer and warmer in winter; and frost will not appear on the inside of the wall, as is frequently seen on solid walls.

Third. The vacuum in the wall may be used to ventilate the cellar, and also to receive a pipe to conduct off the water.

This was done in the residence of the late George Crompton, of Worcester, Mass., and has never needed repairs.

Fourth. A hollow wall will stand fire much better than a solid wall.

This is shown in the Ashburnham Academy, where the entire woodwork was burned away, leaving almost the entire hollow wall standing erect.

In my practice as an architect I have built a great many buildings in which I have used the hollow wall. Some of these were very large and tall buildings, as the Congress Hall of Saratoga, N. Y., which is in part seven stories high. I have used this wall in many dwellings, schoolhouses, stables and mills, all of which are standing as firm as the day when they were built.

All the above calculations are based upon good materials and good, thorough work. When these are obtained I claim that the hollow wall is much the best, and that buildings constructed with them are the most desirable to live in. I hope that the city authorities will soon change the ordinances so that we will not be compelled to put in more material than is necessary, to the injury of the building. I would rather pay for the extra brick and then leave them out, than to put them in; for the thicker the wall the longer it will retain the dampness.

A reliable architect made a statement before a city committee that he had seen a candle blown out through a solid brick wall

twelve inches thick. In fact this was done before the Institute of Architects at Albany.

The apparatus used consisted of two tunnels placed one on each side of the wall. The connections were made thoroughly tight so that no air could escape. The candle was placed close to one, and some one blew in at the other. The candle was extinguished through twelve inches of solid brick. This experiment confirms the fact that dampness will penetrate a solid brick wall.

I have often asked the residents in houses built with the hollow wall if it is ever damp enough on the inside to cause mildew or mould, or the swelling of the woodwork. This question has invariably been answered in the negative, thus proving the superiority of the hollow over the solid wall.

An example of this is seen in J. G. Clark's house in the city of Worcester, which had been closed and without fires for over a year. At the end of that time there was not the slightest appearance of dampness on the interior.—The Brick builder.

NOTICE TO SUBSCRIBERS.

Mr. D. Jones Landor has no authority to collect money or otherwise to transact business for this Journal.

C. H. MORTIMER.

E. L. HORWOOD

ARCHITECT

51 SPARKS ST. - OTTAWA.

Manufacturers please send Catalogues.

WM. J. HYNES,
Contractor and Plasterer.
Relief Decorations in Plaster, staff or Papier-Mache.
97 Winchester Street.
Shop, Esplanade, foot of Jarvis Street.
Telephone 3414.

ARCHITECTS and ENGINEERS
APPLY TO
THE NEW COLOR PROCESS CO.
214 ST. JAMES ST., MONTREAL,
for Instantaneous Reproductions in Colors of Drawings and Plans

WILL SAVE YOU.....
MONEY Copies on Manilla Paper 4c. per sq. foot.
LABOR No recoloring by hand.
TIME We print without the aid of the sun.
ERRORS We give exact facsimiles.
TRACING CLOTH
We print direct from originals on paper.
DISSATISFACTION
We guarantee uniformly perfect work.
Originals sent from a distance returned with copies same day as received.

Hayes' Patent Steel Lath . .

HAS NO EQUAL IN ANY PARTICULAR

. . . Used in more important buildings . . .

. . . THAN . . .

all other styles of metal lathing combined.

SOLE MANUFACTURERS

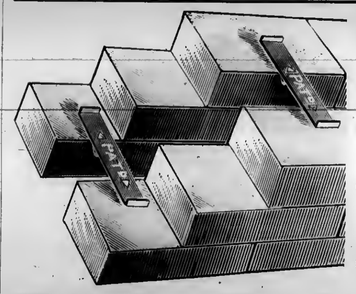
THE METALLIC ROOFING CO.

OF CANADA, LIMITED.

BRANCH OFFICE: 706 Craig Street MONTREAL

HEAD OFFICE: 82 to 90 Yonge Street TORONTO

Send for Samples and Prices



The Wall Tie

WEESE'S PATENT
WALL BRACE OR TIE
USED FOR BUILDING
Warm, Dry, Fireproof Buildings
ESPECIALLY ADAPTED FOR
Churches, Public Buildings, Hotels, Dwellings, etc.

. . MANUFACTURED BY . .
THE MAC MACHINE CO.
BELLEVILLE - - CANADA
. . Write for particulars . .

ARCHITECTS : CONTRACTORS : ENGINEERS : ETC.

Just Issued—A Second Edition of the

Canadian Contractors' Hand-Book

150 PAGES OF THE MOST VALUABLE INFORMATION—Substantially bound in Cloth.

The Canadian Contractors' Hand-Book will be sent to any address in Canada or the United States on receipt of price, $1.50; to subscribers of the CANADIAN ARCHITECT AND BUILDER, $1.00.

Branch Office:
New York Life Insurance Building, Montreal.

C. H. MORTIMER, *Publisher,*
Confederation Life Building, Toronto

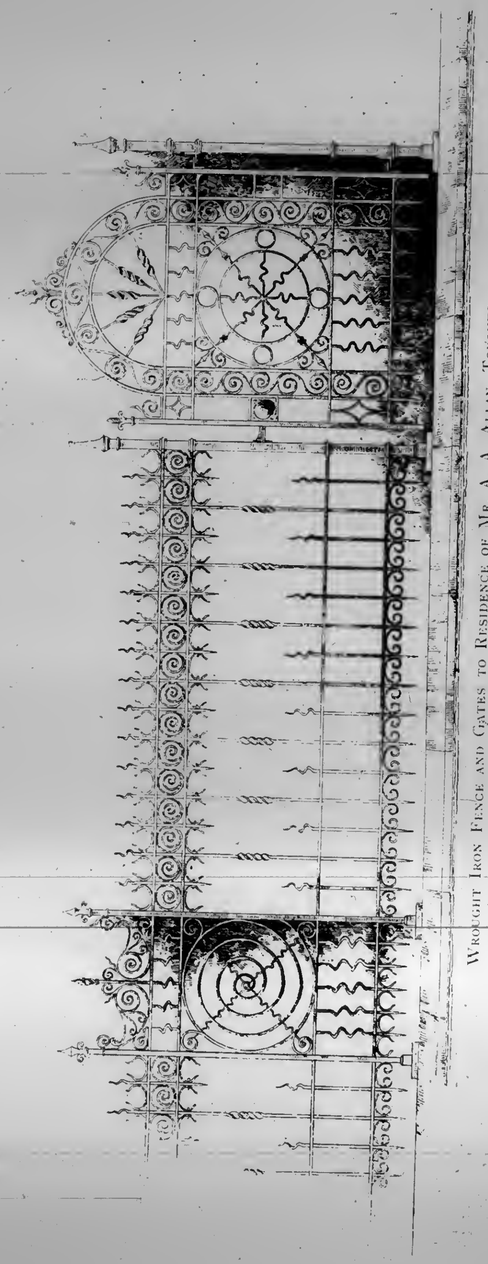
Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

CANADIAN ARCHITECT AND

DOMINION PROVINCIAL BUILDINGS
TORONTO
PARLIAMENT BUILDINGS
QUEEN'S PARK
ARCHITECTS

Old Men's Refuge, Vancouver, B. C.
R Mackay Fripp, F R I B A, Architect, Vancouver.

House for Mr. Dubuc, Montreal.
A Raza, Architect, Montreal.



WROUGHT IRON FENCE AND GATES TO RESIDENCE OF MR. A. A. ALLAN, TORONTO.
GORDON & HELLIWELL, ARCHITECTS, TORONTO.

CANADIAN ARCHITECT AND BUILDER.

VOL. VII.—NO. 12. DECEMBER, 1894 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2259.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 10th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	EDMUND BURKE, Toronto.
1ST VICE-PRESIDENT	J. E. BELCHER, Peterboro'.
2ND VICE-PRESIDENT	W. A. EDWARDS, Hamilton.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI	Ottawa.
FRANK DARLING	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

A. F. DUNLOP	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
L. Z. GAUTHIER	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. MCLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.
WM. PARK, 1st Vice-President.
GEO. OAKLEY, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JOHN ALDRIDGE.
JAS. CRANG.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
JAS. THOMSON
H. MARTIN.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD'S reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

THE tendency of modern architectural practice, as of many other pursuits, is towards centralization in the hands of the best organizers—men who have, with other necessary qualifications, the ability to secure business and to dispatch it with such facility as to leave them free to devote a large share of their time to securing business. Ability of his kind consists of a combination of talent and training for what may be called the business side of the profession. With some there is little development of this faculty. While with some the possibilities in this direction are extremely limited, with others they are neglected. Every architect's assistant who does not wish always to remain such, should be awake to the necessity of studying how to do business. The peculiarities of every transaction he has a chance to observe, should be carefully noted and analyzed. The study of human nature and the adaptation of onesself to his surroundings, so as to be in touch therewith, is most important for the purpose mentioned. Next to this, nothing is more helpful than a good knowledge of the best methods in general office work. A habit of independent thought and a reasonable degree of self confidence should be cultivated. Students and young architects should not be satisfied with learning how to design and build in an artistic and practical manner. To be successful they must learn to handle the necessary business transactions with promptness and good judgment.

THE 16th and 17th of January is the date fixed for the annual convention of the Ontario Association of Architects. This convention, the arrangements for which are already far advanced, gives promise of being one of the most interesting and important in the history of the Association. The advisability of again bringing forward at the approaching session of the Provincial Legislature the proposed Bill to amend the Act of Incorporation of the Association, will be fully considered at this meeting. The opinion largely prevails that no more favorable opportunity of pressing the measure is likely to be afforded during the term of the present House. It is proposed to exhibit at this convention by stereoptican drawings or photographic views of buildings designed by members of the Association with the purpose of eliciting an exchange of friendly criticism. An invitation has been extended to the members to contribute drawings and photographs of their work for this purpose. The result of this new departure will be eagerly awaited, and we cherish the expectation that it will prove to be a most valuable feature of this and future meetings. Papers are promised from Prof. Coleman, of the School of Practical Science, on Building Stones; from Mr. C. H. C. Wright, Lecturer in Architecture, School of Practical Science, on Cements, based on original tests; from Mr. John Langton, Electrical Engineer, on Electricity Applied to Buildings; from Mr. Hamilton McCarthy, Sculptor, on Sculpture, its Relation and Application to Architecture; an illustrated paper on Architectural Rendering, by a student of the School of Practical Science, and four short papers on subjects not yet specified, from members of the Association. From the foregoing it will be seen that a programme of unusual interest is being provided. In order that the convention may be an unqualified success, it is required that the members of the Association should support it by their presence.

MR. Richard A. Waite, of Buffalo, is reported to have said to a Montreal reporter that he had been requested to examine the Montreal Street Railway Company's new building and give expert testimony concerning the cause of its failure, but had declined on account of professional reasons. Mr. Waite and the profession are both to be congratulated on this refusal to reap a personal advantage by transgressing the ethics of the profession. What a pity that Mr. Waite was not as well grounded in professional ethics prior to the erection of the Ontario Legislative Buildings!

IN a reference last month to the importance to the contractor of a knowledge of concrete construction, the promise was given that some formulas for work of this character would be published in the present number. This promise is to a large extent fulfilled in the excellent paper on "Concrete Construction—its Practical Application," by Ernest L. Ransome, printed elsewhere in this issue. In this paper the treatment given the subject is more comprehensive and thorough than in any single treatise which has yet come under our attention. Notwithstanding there are some phases of the subject which are not touched upon, and which will be considered on a future occasion.

THE plastic character of terra cotta naturally makes it a favorite building material. A recent writer has pointed out that out of this fact threatens to spring its indiscriminate use. Before the stamp of the artist can be exhibited on stone or marble, skill and labor, in no small degree, is required, but "terra cotta leaps forward to the modeler and, meeting him almost half way, realizes at once the grandest and broadest conception with an ease equalled in no other material." The danger will be to overload with ornament, and the prediction is that if this tendency is permitted to grow that the good service that terra cotta may do in building construction will be seriously marred and a distaste may be created against it that will destroy its usefulness.

ARCHITECTS, and especially members of the Architectural Associations, who may be desirous of promoting a high standard of professional ethics and of seeing the profession held in public esteem, should endeavor to make it perfectly clear that unprofessional conduct, wherever found, will be discountenanced. The Associations should not hesitate, if necessary, to discipline their members. If commissions are accepted from supply men or contractors, if work is undertaken at cut rates, or if unfair means be used to secure it in competition or otherwise—if in short disreputable practices of any sort are resorted to, it should be made plain that the person practising them has no standing among his brother architects. If wrong methods are allowed to pass unnoticed by reputable members of the profession, the public cannot be expected to know who are the reliable architects or that there is any difference as between one architect and another until they learn the fact by some disagreeable and perhaps expensive personal experience. The same is true of contractors. They should make a clear distinction among themselves, as regards those who are entitled to be known and dealt with as competent and reliable contractors. Instance, the question of responsibility. The contractor who pays one hundred cents on the dollar and is responsible in case of liability through accident to an employee, often has to compete in tendering with men who have no financial responsibility whatever. If the Employer's Liabilities Act is a just measure, why should not contractors be licensed? Responsible contractors should likewise use every legitimate means to make supply firms feel the necessity of strict terms and restriction of credit within safer lines. In tendering it should be made a condition that no tender should be considered binding until the contractor making it has had opportunity of knowing whose are to be the other accepted tenders, as he knows to begin with who is to be the architect. By this means it could be made much more difficult for men who inflict a loss on almost everybody with whom they come into business relations to secure contracts.

IN another part of the present number is printed the plan of a proposed organization to be known as the "Chicago Municipal Improvement League." The purpose of this organization is to secure for the city of Chicago "such an arrangement, design and adornment of its public buildings and grounds, streets and boulevards and other public works as shall most contribute to the convenience and enjoyment of the public, shall stimulate an appreciation of art, and give to the city a fit expression of its greatness." These objects are identical with those mentioned by Mr. A. T. Taylor, F. R. I. B. A., of Montreal, in the paper which he recently presented to the Province of Quebec Association of Architects, wherein he advocated the appointment of a committee of artists, architects, etc., to supervise the erection of public monuments, the laying out of public squares, etc. Referring to the Chicago League, to which we directed his attention, Mr. Taylor, writes as follows: "My idea was a little more modest than the Chicago organization, at least to begin with, but which would ultimately expand to embrace the wider objects. If we could get this Advisory Art Committee appointed to which all city art matters would be referred by the city authorities in all the large towns and cities of the Dominion, it would be a great step in advance. I am in hopes of getting our Association here to petition the Council in favor of such a scheme for our city. ..... The Dominion is, I think, quite ripe now for an increased attention to the art side of its national life and progress, and looked at even from its lowest point of view—that of the dollars and cents aspect—it would pay, for whatever adds to the beauty and attractiveness of our cities and towns would tend to draw both people and money; but I prefer to put it on the higher ground of culture, art training and actual enjoyment of the people themselves." We are pleased to observe that since the above was written the Province of Quebec Association of Architects has adopted a resolution embodying Mr. Taylor's views. The Ontario Association of Architects might profitably we think give some consideration to this subject at its approaching annual convention, and it is to be hoped that the initiative taken by Montreal will be followed by Toronto and other principal cities and towns throughout the Dominion.

ONTARIO ASSOCIATION OF ARCHITECTS.

A GENERAL meeting of the Ontario Association of Architects was held in the Lecture Room of the Canadian Institute on Friday evening, Nov. 16th.

The programme consisted of a Lecture on Statics by Mr. C. H. C. Wright, B. A. Sc., of the School of Practical Science.

With the aid of some simple apparatus and a series of prepared diagrams a demonstration was given of all the fundamental principles involved in "Graphic Statics" and their direct application to framed structures such as architects constantly meet with in practice.

It was also shown, that by the use of drawing instruments alone, and an average knowledge of mathematics, that the stresses in even complex structures due to exterior loading, could be readily determined when once the leading principles were fully understood.

In the discussion that followed, some of the architects present illustrated how nearly theory and practice agree in this respect, by examples from their own work.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

UNDER the title "A Gift to Quebec Architects," the Quebec Telegraph of recent date contained the following:

"Public attention is directed to the magnificent tableau or exhibition at Lavigne's music store, in Fabrique street. It is by Notman, of Montreal, and some three to four feet in length. It contains the portraits of some forty-seven of the architectural fraternity of the sister city and below each portrait is the name of the architect. The Quebec section of the Association of Architects of the Province of Quebec had last year or at a previous general meeting of the Association presented their confreres of Montreal with a similar tableau, photographed by Beaudry, of Quebec, but naturally of less dimensions, as it only contained the portraits of some twenty Quebec architects. The tableau at Lavigne's is as the French have it "*le retour du gateau*" and was presented by the Montreal section to the architects of Quebec, at the opening of the last general meeting of the Association at Montreal on the 5th of October last, when Mr. Baillairgé, of this city, was elected president of the Association for the ensuing year of 1894-95."

The works of the Owen Sound Portland Cement Co., at Shallow Lake, Ont., are again in operation, and are turning out 125 barrels of cement per day.

THE BYSTANDER.

GIVEN the opportunity recently of spending a pleasant hour with Mr. C. H. C. Wright, Lecturer in Architecture at the School of Practical Science, Toronto, the value of a technical course in education was impressively forced upon the Bystander. The high character of the school system of Ontario has long since passed into a proverb. Perhaps, sometimes, because of this excellence, the tendency is to overrate the system, or rather to forget that with its excellent features also come a few defects. Citizens who, like the writer, have little ones at school, are not without opportunity of seeing where these defects exist. However, it is not the intention of the Bystander to write an educational article. One of the encouraging features of the educational system of the present day, confined not alone to Ontario, but embraced by other provinces of the Dominion, is the growing attention given to the practical side of life. In a country where few are born with a silver spoon in their mouth, and work is the lot of the many, there is need that what the boys and girls learn at school should be of service to them in the everyday callings of life, and not something to be learned only to be forgotten. The School of Practical Science, so well domiciled and equipped between its walls of red brick in the Queen's Park, is doing its full share along these lines, as are also the Schools of Manual Training and Technology that have their place in other towns and cities in Ontario, Quebec, and elsewhere.

× × × ×

The conversation with Mr. Wright took a "shop" turn, and in a direction in which, no doubt, many readers of the ARCHITECT AND BUILDER are interested. The Bystander had recently read with some care, and not without astonishment, an article written by Mr. Cecil B. Smith, one of the teachers in the technical building of McGill College, Montreal, on the question of Portland cements. The increasing uses of Portland cement makes this a subject of importance to architects and contractors. Mr. A. Blue, director of mines for the Ontario government, is authority for the statement that as between the years 1880-81 and 1892-3 the imports into Canada of Portland and Roman cements have shown an increase of nearly 600%, and as between 1880 and 1890 the number of establishments manufacturing cement in Canada have grown from 9 to 19, and on the basis of values the manufactured cement in Canada increased from $91,658 in 1880 to $251,175 in 1890. As Mr. Wright remarks, Portland cement is being used for many purposes to-day that would not have been dreamt of so much as a decade ago. Everyone is aware by ordinary observation of the extent to which cements are now used in road building. The intelligent agitation of late years, the country over, for good roads, must receive credit for a large proportion of this increase, though in this respect newer countries are only following the example shown in the construction of Roman roads in Europe 2000 years ago, where it was made an essential of road building that the foundations should be laid good and strong. Not only in roads, but for other purposes, where strong and durable foundations are required, concrete to-day holds a first place. Mr. Wright says that piers of bridges are now being constructed of concrete and are found to possess many advantages over masonry. The price, of course, is one consideration, but with this goes equal strength, and satisfaction to contractors in the work of construction. Taking a forward look from this standpoint it can be readily understood that the future must show a large development in the manufacture of cement, and this is good reason why care and attention should be given to a study of the question Mr. Smith's criticism is to be welcomed on this account, notwithstanding that it is at fault in important particulars.

× × × ×

Mr. Smith takes the ingenious position of regretting that the Canadian government has recently contracted for 11,000 bbls. of Portland cement of foreign manufacture, intimating in the next sentence, however, that he does not well understand how, under existing conditions, the government could have pursued any other course. He is quite correct in stating that the Canadian output of Portland cement has been a long way short of meeting the demand in Canada, but this does not justify a protection government in deciding squarely against the home manufacturer. In the government specifications English cement is specially called for, a barrier at once to the Canadian manufacturer bringing his cement into competition with that of the foreign manufacturer in the construction of public works. The Bystander has been pleased to learn, however, that the government is likely, at an early date, to abandon this invidious distinction between the home and foreign article, and that before long in their specifications it will be an open matter, whether the one or the other cement shall be used. This fact of itself will have an influence in meeting the conditions that are bemoaned by Mr. Smith. Of course, it is true that the manufacturers of cement in Canada are yet unable to nearly meet the demand that exists for cements in this country, but time and fair play will remedy the difficulty. This is to be remembered, that the manufacture of Portland cement in the Dominion is of recent origin. The Rathbun Co., the Owen Sound Portland Cement Co., and the English Portland Cement Co., of Milbank, have spared no expense and care to perfect their equipment in order that, first of all they should satisfy themselves that they could manufacture a cement that would compare favorably with the imported article. This, as will be shown, the Bystander believes, further on, despite Mr. Smith's criticism to the contrary, has been accomplished, and the track is clear for a large development in the manufacture of Portland cements in Canada. Further, let it be remembered that Canadian manufacturers have not alone been compelled to meet a very great increase in demand within their own country, but also to keep pace with this demand during the initial days of manufacture.

× × × ×

The gravamen of complaint from McGill College is that there is a manifest lack of uniformity in grinding and burning in Canadian cements, and Mr. Smith submits certain tests he has made in verification of this statement. He adds as a comment to a test of three samples of a No. 1 brand that had been selected: "That such a tremendous variation should exist is enough to cripple the industry until this is remedied." These, he says, are samples obtained, not from the manufacturer, but from dealers, taken from the article as placed on the market, which he argues is the only satisfactory test that can be applied. A snap verdict, where care has been taken to place the best specimens in the hands of the tester, cannot be accepted as a fair test of the general character of cements. "Let us grant," said Mr. Wright, "in discussing the point, that this is the proper method of arriving at the real character of the cement regularly in use by contractors. But what is the usual practice and experience? Mr. Smith writes as though this 'tremendous variation' was applicable only to Canadian cements, and the inference is that imported cements are not faulty in this respect. Ask some of the contractors and engineers, who have occasion to use the imported Portland cement, what is their experience. It is notoriously true that this variation exists in all cements, there being different conditions that seem to tend to this want of uniformity." It is only two years ago that a single shipment of some 4000 or 5000 bbls. of English cement was sent to this country, which, though bearing the brand of a reputable maker, was found to be of a very indifferent character. What was the history of this particular shipment? English manufacturers had been in the habit of making up large quantities of cement for shipment to South America, where the tests were not so severe. A financial crisis occurred in that country and manufacturers were left with heavy stocks of this grade of cement on hand. They had to dispose of these somehow, and part came to Canada. "Just take another illustration," continued Mr. Wright. "Let me draw your attention to the conditions set forth by an American concern in its specifications where Portland cement is called for." The Bystander was here shown the printed specifications in which it was directly stipulated that the cement to be used should be either White's English Portland cement or a French manufacture, but it was just as clearly stated in the conditions that these cements were not necessarily to be accepted without first undergoing certain tests. Evidently these people had learned that the particular label of a foreign manufacturer did not always insure a cement that was uniform in character. Only within the past month efforts have been made by English manufacturers of Portland cement to adopt means to prevent the placing on the market of certain qualities found to be exceedingly faulty in character.

× × × ×

So far as Mr. Smith is desirous of having produced in Canada a cement of "uniform fineness and strength, which will answer severe specifications," he will have the support of all who wish

well to the manufacturing interests of the Dominion. "For my part," said Mr. Wright, "I am of one mind with my Montreal congener in this matter." But where does the fault in grinding rest to-day? Chiefly with the consumers, who are satisfied with a low grade of grinding, and in no inconsiderable degree the engineers of the country are blameworthy. The truth would seem to be, from the fact, perhaps, that Portland cement has only come into extensive use within a few years, that Canadian engineers have not any more than commenced to give this matter the study and care that it merits. Consumers are satisfied, in many cases, with a cement that will stand no higher than a 20 % test of a No. 50 sieve. Nothing more than this is frequently called for in specifications from contractors and others. When the consumer is satisfied, the engineer is not likely to insist on a higher standard. Here it is that Mr. Smith and Mr. Wright believe that reform is necessary. And in this regard Canadian cement really takes a higher place than the imported article, perhaps sometimes to the prejudice of Canadian trade. Canadian manufacturers are ambitious to produce a good article, and will not, as is the case with some imported cements that come to this country, be satisfied with anything less than a high class test. A large proportion of English cements will not average a 10 % test, where, from data of tests shown, the Bystander by Mr. Wright, he is able to say that Canadian cements seldom fall below a 5 % test, whilst he has seen those that have run as high as one per cent. and others 2½% and 3%. In a paper on concrete construction, read at the annual convention of the American Institute of Architects, and published in this month's ARCHITECT AND BUILDER, a similar view of the grinding of cements is held. The manufacturers of Canadian cements are evidently holding up the true ideal and it remains for the engineers, rather than the manufacturers, to see that the severer test is insisted upon in all cases.

× × × ×

Many people are influenced by their environments and the Bystander has thought that, perhaps, the natural habit of the good people of Montreal of taking an English view of matters has colored Mr Smith's diagnosis of Canadian cements and caused him to write in a severer tone than would otherwise have been the case. Then from a Montreal point of view there is the local influence that comes from the desire to maintain at its best the shipping interests of the metropolis, and it is well known that these obtain no inconsiderable share of trade through the importation of foreign cements. Let Canadians occupy the home field as manufacturers of cement, and this line of traffic will suffer. However this may be, it may be expected, as the subject is more fully entered into that Mr. Smith will see that there is little, if any, material difference between English and Canadian cements, while the advantage is really on the side of the former. Rapid strides have been made within the past ten years in this branch of manufacture in the Dominion and continued progress during the decade ahead is to be expected. Readers will be pleased to know that at the forthcoming annual meeting of the Ontario Association of Architects Mr. Wright will read a paper on cements and submit several tests.

BUILDING IN THE NORTHWEST.

In a lecture delivered recently at the Y. M. C. A., Winnipeg, entitled "Architecture, or the Art and Science of Building." Mr. Geo. Browne, architect, of that city, thus refers to the improvement which is taking place in architecture and building methods in the Northwest:

"When I came to Manitoba in the spring of 1879, there were no buildings of any importance, and the wigwam of the Indian, and the log house of the pioneer were seen on every side, while the frame buildings were not numerous off Main street, and when I returned to the city in December, 1881, to reside, architecture was still in a primitive state. Architects and builders seemed to have little or no knowledge of the proper methods to pursue in order to erect buildings suitable for their purpose, the climate and the place. Since then, however, considerable knowledge has been gained, and progress made, both as to the proper methods of construction and design. Time and experience have taught the necessity of avoiding many things which in the early days were considered quite correct; or, to use the old phrase of the boom days, "good enough."

The now historical boom period did more than anything else to retard the erection here of improved and substantial buildings. Money flowed so freely that men lost their heads, and in the excitement of the hour gave no attention to their comfort or to the proper improvement of their habitations, imagining that their residence here would be brief, and as soon as they digested the numerous flies then buzzing around anxious to walk into their parlor, they would reverse the advice of Horace Greeley and go east. But when the boom burst they awoke to the fact that the flies had gone east instead of themselves, and left nothing but mortages to be paid off, and old, ricketty buildings to fix or pull down. The impression became general that a reform would have to be made in the methods of building then followed, and the result has been that the objectionable plan of setting large timbers on the ground for a foundation to receive the superstructure has been abandoned for the common sense stone foundation. At one time it was considered necessary for the safety of the building to build the foundations on piles, or two or three thicknesses of 2-inch plank laid cross ways or diagonally and spiked together, but both have been found unnecessary and expensive, and only on rare occasions are resorted to, concrete and broad footing stones having been found quite sufficient to carry our heaviest buildings on the blue clay, provided the latter is properly drained. Footings of broad stones without concrete are sufficient enough to carry an ordinary building. Stone foundations should be coated well on the outside below the ground line with hot tar and pitch or Portland cement to keep the damp out of the wall and cellar, and where expense is not an object, the foundation wall should be lined on the inside with 4-inch brick with 2-inch air space.

I am frequently asked which I consider to be the warmest, a house of solid brick, a frame house or a brick-veneer house. I believe that the three kinds are equally warm if properly built and attention is paid to details, which seem but trifles to the average workman, but which play a very important part in adding to the comfort of the inmates. One is to build in properly the door and window frames so that when the wood of which they are constructed shrinks, they will be air-tight. Another one is, in the case of a veneer house, to fill in the space between the boarding and brickwork, solid with mortar, and in all houses to have two air spaces in the exterior walls, formed by putting on the inside of the walls 1 by 2 inch strapping, lathing and plastering one coat, commonly called back-plastering, which should go, in every case, from the ground floor joints up the walls and rafters and between the joints, practically making an air-tight jacket of plaster for the building.

If the house is to be heated with hot air, the cellar should not be less than 7 feet 6 inches in the clear, to allow the pipes to have a good incline. The furnace should be placed so that the pipes will be of equal length and as short as possible. Long pipes interfere with the proper working of the apparatus and are of little or no benefit to the rooms to which they lead. Return pipes are necessary to draw off the cold air from the rooms and create a vacuum for the hot air to fill.

People complain of the shrinkage that takes place in the woodwork of their houses, and attribute its cause to its not having been properly seasoned before being fixed in position, and while in some cases this may be the correct reason, in others it is owing to the wood absorbing the moisture from the plaster, for the wood finish is, as a rule, rushed on before the latter is dry, and by that time the chilly weather has set in, the furnaces started and a hot blast thrown on the wood work and severely testing it.

The unusual dryness of our climate is also responsible to a certain extent. I have known wood works, after having been in for two years in the east, to fall to pieces after being here only a short time.

Owing to this defect, which we cannot easily overcome, I never paint my interior work more than two coats the first year, leaving the third coat to be applied the following year, after the work has been rubbed down and the cracks and open points puttied up.

The architecture of our city is now in a transition state; the wood, brick-veneer and galvanized iron age is passing away, and is being succeeded by the stone, brick and copper age, our capitalists recognizing that it is poor economy not to build for the future as well as the present. As an illustration I will point to the building in course of erection for Wesley College, which shows a greater advance in architecture than any building yet erected in Manitoba. The college board are to be congratulated that their building can be viewed from every side with pleasure, and that they have avoided the common error of making the building Queen Ann in front and Mary Ann behind.

I sincerely trust that many months may not elapse before I shall have the pleasure of congratulating you on the completion of your new and permanent home. I think that citizens of Winnipeg, and also their country cousins, should do their utmost to reward your efforts with a building worthy of the noble cause in which you are co-workers.

What is termed a "ventilating window" is now being adopted in some of the barracks and other public buildings in France. It consists in employing two panes of glass for one, with a space between them, and their length so curtailed, one on the lower side, the other on the upper, that the air comes from the outside, passes between the panes, and enters the room. Such a window is, of course, only required in one part of a room, preferably near the ceiling.

STUDENTS' DEPARTMENT.

AN ENQUIRY.

TORONTO, Dec. 1st, 1894.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—I am troubled in my mind about a house which is just about completed on Lowther ave., this city. The design, particularly the front elevation, is different from anything I have seen in a similar situation. I should therefore like to know something of the reasons for its peculiarity. Toward the street the windows are few and small, giving it an appearance far from cheerful. They are larger in the rear. I have read of houses of which it was necessary to understand the plan in order to appreciate the design. Perhaps this is an instance of that kind. I have seen it partially promised, or at least proposed, that the O. A. A. would hold open meetings with illustrations and friendly criticism and discussion of some works. I would be delighted to see and hear the subject referred to treated in this way. Is there any probability of such an opportunity being afforded during the present winter?

Yours faithfully,

INQUISITIVE STUDENT.

A WATER-COLOR CLASS FOR STUDENTS.

TORONTO, Dec. 11th, 1894.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—The endeavor has recently been made to establish a water-color class for architectural students in this city, under the exellent instruction of the well-known artist, Mr. C. M. Manley. Notwithstanding the extremely moderate figure at which Mr. Manley consented to give his services, great difficulty was experienced in getting the half dozen members necessary to form the nucleus of the class.

In the spring of 1893 a water-color class numbering some eight or ten members, was formed, and made good progress, but most of the members upon whose energy its success depended are now in the United States. Sketch clubs have likewise been founded, with what success we all know. I think it is the deprivation of a few winter Saturday afternoons, including the foregoing of hockey-clubs and various other social attractions that keeps the majority of students from joining. As architectural students, choosing a profession in which not only the trades, but also the arts are involved, why should we hesitate for a moment in grasping every opportunity presented to us for self-improvement?

Sincerely yours,

STUDENT.

ARCHITECTURAL STUDENTS.

Book work and practical work are two of the relative factors in the student's life; but for some reason or other, says the Building News, they are generally divorced. Many a student thinks he can learn everything from books. The recent remarks of a medical authority to students in that profession are applicable to the architectural student. The elementary textbook ought to be used as the skeleton of his knowledge; the student ought to endow it with the tissues and life from his own personal observation, by practical school courses and visits to buildings. A mere dry study of textbooks is of little value, except to furnish the mind with names and definitions, and yet the ordinary student regards the textbook in the light of something to be read through, and committed to memory as quickly as possible. No wonder the pupil undervalues the textbook, and looks upon it much in the same manner as the schoolboy does his Murray or his Eaton Latin Grammar. They are looked upon as "dry as dust" manuals, and the more elementary they are the more difficult they are to grasp and comprehend. Instead of being used as a "skeleton of knowledge," which they simply are, to be clothed by his own experience, the student cannot see any use or value in them, as they do not supply his needs. But the student of a practical order of mind, who has served his time in an office, can utilize the elementary textbook; he reads into it his own experience, and he begins to read it with some interest. A good advice given by an eminent physician to his class is to write his own textbook by grafting his practical work on to an elementary manual, and to revise his knowledge before entering for an examination by the light of a first class textbook. Every student can do this; if he has any love for his work at all, he will take an interest in filling up the outlines and dates of a manual on styles with his own notes and sketches, and his scientific textbooks with remarks of his own derived from practical knowledge, or from other authors. The Institute rightly insists on the necessity of making reading thorough by supplementing it by the taking of notes and sketches, and by information under various heads from different authorities. The continuous use of a note-book is enjoined on the student, in which he should write down, in his own words, the principal part of the books under study, and also supplement these notes by sketches from all available sources (notes on one page, sketches on the opposite page). The accurate sketching of old work in plan, elevation, construction, and detail from memory is equally valuable, thus bringing eye, brain and hand into exercise. In this way the student can be made to enter into the spirit of the art. The note and sketch book are the only true tests of the student's knowledge; they serve to indicate the extent of the knowledge he has made his own from lectures and reading and observation, and serve to mark him off from those who pursue the course-and-cram system, and desire to become architect in name only. We are inclined to think, despite the advice of teachers at official head-quarters, that the "course-and-cram" system is now most in favor amongst young men who desire to assume the *role* of architect or engineer. Like the clincial work of the medical student in the hospital wards, the practical work on building must go hand in hand with books and lectures.

Perhaps there is another distinction between the two aspirants we have been considering, and one that lies deeper than methods of study. The novice who is in such a hurry to take the name of architect is often a more receptive man than he who is in earnest to prove his qualifications and credentials. He learns by rote quickly, has a capital memory, and, with the help of a little "coaching," is sure to pass any examination. It has been pointed out by all authorities on teaching that the receptive man quickly learns and benefits by teaching, which only arouses opposition in the critical man, and this explains the reason why so many of those who have passed examinations with credit frequently fail to exhibit any talent in actual practice. In every profession there are examples of this fact; but in architecture we find designers of very feeble buildings able to go through their examination with conspicuous credit. Between the critical faculty necessary to select good forms and to arrange plans upon logical data, and the mere receptive ability to collect facts and work out formulæ, a great gulf is fixed. The one order is preceptive—it can discriminate between good and bad, can think out a problem of design, while the other can only gather and grope its way between conflicting opinions. The first can invent, the other only collect and classify; hence we find that copies and poor compilation of existing buildings are the rule rather that the exception.

CHARACTERISTIC FEATURES OF HOT-WATER HEATING.

FIRST. The ability to produce a gentle warmth with a low fire. The temperature of the water may be raised to 100 degrees for the chilly damp days of September and May, 140 degrees for the cold air of October and April, and 180 and 200 degrees for the cold winter months, the amount of heat being regulated from day to day as the season demands.

Second. Should the fire be unintentionally neglected, the water will continue to circulate and give off its heat as long as any fire remains in the boiler, or warm water in the pipes.

Third. Hot water may be regulated to meet any ordinary changes of temperature, and therefore there is no excuse for overheating on mild days. This point, however, may be urged for steam where the boiler is provided with modern automatic regulating appliances.

Fourth. The valve or radiator may be partly closed, which will retard the circulation and cool the radiator down to any desired temperature.

Fifth. The circulation of hot water is invariably noiseless, the pressure is uniform, the heat is clean, mild and delightful, and with intelligent management great uniformity of temperature may be obtained throughout the house.—Plumbers' Trade Journal.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The Building Inspector has condemned the new St. Johns church in course of erection at the corner of St. Catchrine and Cadieux streets. The exterior wall, built of stone and faced with brick, age said to have been found to be so defective in workmanship, that for the safety of pedestrians, the architect, Mr. Geo. Mann, has been compelled by the Inspector to have them torn down. This is proving a difficult task for the workmen, as an effort is to be made to preserve the roof, which was already in position when the order to reconstruct the walls was issued.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

At a general special meeting of the members of the Association held on Thursday, the 6th inst., to consider the proposed amendments to the by-laws, the following members amongst others were present:—Messrs. A. C. Hutchison, A. T. Taylor, J. Nelson, A. Raza, H. C. Nelson, J. Perrault, J. Venne, M. Perrault, J. Wright, J. Z. Resther, A. H. Lapierre, Geo. W. Wood and J. R. Gardiner. It was proposed, first: by Mr. A. C. Hutchison, seconded by Mr. J. Wright, that the following words in the third, fourth and fifth lines of section XI of the By-Laws, viz: "collect all funds and hand them to the Treasurer, taking his receipt for the same," be struck off and in line 8th of the same section to omit the words "receipt for them to the Secretary;" to add to section XI the words "the Treasurer shall also furnish to the Secretary at the close of each year, a list of the members whose subscriptions have been paid." To strike out the words "to" at the beginning of the 8th line and to substitute "to collect and." Carried.

Second—Proposed by Mr. W. E. Doran, seconded by Mr. Jas. Nelson, that section V of the By-laws be amended by inserting after the word "separately" of the fifth line of said section "the retiring president shall be the premier member of the Council", then after the word "the" actually following "separately," to add the words "other five" to read as follows: "The other five members of Council may be balloted for on one paper." Carried.

Third—Proposed by Mr. A. T. Taylor, seconded by Mr. J. Z. Resther, to change section VIII of the By-laws to make it read as follows: "The Council shall appoint each year a board of six examiners who shall," etc. Carried.

Lastly—It was proposed by Mr. J. Z. Resther, seconded by Mr. A. T. Taylor that the following be elected as honorary members of the Association: The Lieutenant Governor of the province, the Prime Minister and the Minister of Public Works of the province, the Mayors of Montreal and Quebec, the Honorable Sir Donald Smith, the Honorable J. A. Drummond and Mr. R. B. Angus. Carried.

It was resolved that the President of the Association be instructed to issue a circular to the members giving them notice of the above adopted amendments.

It was also proposed by Mr. A. T. Taylor, seconded by Mr. A. Raza, that the Association propose to the City Council to have a special committee formed for the embellishment of the city. Carried.

The first of the monthly dinners, for the winter, of the Association was held on Tuesday, the 11th inst., at the City Club. After the dinner the members met in their rooms, New York Life Building, when the following paper, prepared by the President, Mr. Charles Baillairgé, F. R. S. C., was read:

A QUICK AND EASY WAY OF GETTING AT THE WEIGHT OF IRON SCANTLINGS, GIRDERS, COLUMNS, ETC.

Bear in mind that a cubic foot of iron weighs 480 lbs, therefore an inch thick and foot square is 40 lbs., or one twelfth of the cube foot. Therefore also half an inch 20 lbs., ¼in. = 10 lbs., ⅛in. = 5 lbs., 1-16in. = 2½ lbs., 1-32in. 1¼ lbs. You need not try to remember these; as by a quick mental process you can start with the foot or inch and in less time than it requires to write this, halve the inch, then halve the half inch, then the quarter and so on.

Now if your scantling be 3in.x1in. and as 1in. a foot square is 40 lbs., the 3in. bar will be 1-4 of 40 lbs. or 10 lbs. If your bar is 4in. wide or ¼ of a foot, you will have ¼ of 40 lbs. or 13⅓ lbs. For 1-2in. bar or 1-4in. or ⅛in., etc., the same process holds good. For instance, a bar 1-4in. thick and 2in. wide will be the 6th part of a square foot or the 6th part of 5 lbs., or 5-6 of a pound, since 5 lbs. x 6-30 sixths and 30 sixths divided by 6 gives 5 or 5-6 lbs., as just stated. Three inches by 1-4in. will be 1-4 of 5 lbs. or 1-4 lbs. and so on.

Now, take a bar 1 in. square, and since a foot inch is 40 lbs., the 1in. bar will be 1-12 of 40 lbs. or 3⅓ lbs., to the lineal foot. If the bar be 1 in. x 1 1-2 in., and as 1 1-2 is ⅛ of a foot, the bar will weigh 1-8 of 40 lbs., or 5 lbs., since 8 into 40 gives 5 times. And if the bar be 1-2 in. x 1 1-2 in., it will be ⅛ of 20 lbs. or 2 1-2 lbs. If the bar be 3 in. by 1-4 in. it will be 1-4 of 10 lbs. or 2 1-2 lbs., and if 1-8 in. x 3 in., 1 1-4 lbs. or the quarter of 5 lbs.

Say now your bar is ⅞ in. square, and as an attempt to divide 12 inches or a foot by ⅞ in. would lead to a more difficult or lengthy process, do it this way:—spread it over mentally into eighths of an inch. Thus seven times seven eighths = 49 eighths or 6⅛ inches in width of ⅛in. thick iron. Now take for 6 in. (half a foot) the half of 5 lbs., or 2 1-2 lbs., but there is still ⅛in. x 1½ in. unaccounted for, which being only 1-48 of the 2 1-2 lbs, may either be disregarded as a very small fraction of about 2 per cent., or if we wish to be more exact, and as it is mentally difficult, or even with pen or pencil to get at the 48th part of 2 1-2 lbs., reduce your 2 1-2 lbs. to ounces, giving 40 oz., and now you see that to the 2 1-2 lbs. arrived at as above, you have to add 0.83 of an ounce, or say 4-5 of an ounce, or even a whole ounce as, except for hundreds or thousands of lineal feet, the neglected fraction of an ounce would hardly cover the trouble of exact computation.

Apply now the process to iron 1 1-4 in. square; reduce the bar in imagination to 1-4 in. iron, when it will be 5-4 in. x 5 times, or 25 quarters of an inch in width, or 6 1-4 inches, or half a foot plus 1-24 of half a foot, and as 1-4 in. iron weighs 10 lbs. to the foot, the 6 in. in width will give 5 lbs., and as 5 lbs. = 80 oz., and as the 24th part of 80 oz. is 3⅓, (since 3 times 24 = 72 and 80 or ⅓ oz. over), therefore to the aforesaid 5 lbs. add 3⅓ oz., and the exact weight of the 1 1-4 in. square bar per lineal foot is 5 lbs. 3⅓ oz.

Again if the square bar be 1 1-8 in. or 9-8 in. and as 9 times 9-8 = 81 eighths or 10 1-8 in., and as 10 in. is the 5-6 of 12, therefore the bar will weigh per lin. ft. the 5-6 or 5 lbs. or of 80 oz., or 66 2-3 oz., but there still remains 1-8 in. to be accounted for, which just gives 5-6 oz. more, forming together 67 1-2 oz. or 4 lbs. 3 1-2 oz., say 4 1-4 lbs. nearly.

This last example may be more easily and quickly computed by taking the bar as so much of a foot of iron 1⅛ in. thick, or 45 lbs. to the foot, when we get for 1 in. 0.81 one-twelfth of 45 lbs., or 3¾ lbs., and for the ⅛ over add 1-8 of 3¾ lbs. or 1-8 of 60 oz. = 7 1-2 oz., together as before 4 lbs. 3 1-2 oz. or 4 1-4 lbs., nearly 3¾ lbs.

For computing the weight of sound bar iron or of solid posts or columns of circular section, the simplest way is to compute as square and then reduce. Well, geometry teaches that the area of a circle is .7854 of its circumf. scribing square, or that the area of any square is to be reduced to that of its inscribed circle by a multiplication of said area by the decimal fraction .7854, which is the area of a square of which the diameter is equal to one (1) or unity. These figures .7854 will be better understood as a percentage. Thus, the area of the circle is very slightly in excess of 78 1-2 per cent. of its corresponding square. Now, since decimal 76 is equivalent to three-quarters (3-4), we therefore have to take, to begin with, 3-4 of the weight of our square bar, which is best and quickest done by taking half of it and then half of that or a quarter of the whole. Now, there still remain to be added 3 1-2 per cent. to get at the full weight required. This 3 1-2 per cent., or more correctly $3\frac{54}{0}$ per cent., being multiplied by 7, we get (354 × 7) 2478, or very nearly 25; therefore the remaining figures 354 of the .7854 are almost exactly equal to 1-7 (one-seventh) of .25; therefore, by dividing the weight set opposite to the 25 per cent. or one-quarter of the weight of the square bar or scantling, we get the fraction to be added to the 75 per cent. already obtained to arrive at the comparative weight of the round scantling. Thus then we make unto ourselves the rule: to compute weight of round iron, calculate it as square, and then take one-half, plus one-quarter, plus one-seventh of one-quarter (1-2 + 1-4 + 1-7 of 1-4) of weight of square bar; this process being far shorter or more concise than that of multiplying by .7854, which would further require a reduction of the ounces or fractional portions of the weight to a decimal to allow of such multiplication.

EXAMPLE.

Suppose the weight of one lineal foot of a bar of square iron to be 5 1-2 lbs. Thereby the rule, the corresponding weight of the round bar, or weight of a round bar of same size, will be the half of 5 1-2 plus the 1-7 of this last or 1-8 × 1-16 or 3-16 lbs., together 4 5-10 lbs., lbs., or 2¾ lbs., plus the half of this, or quarter of the whole, = 1 3-8 lbs. or 4 lbs. 5 oz.

Otherwise, reducing the 1-2 lbs. to a decimal,

we get	5. 5	lbs.	or reducing again the
1-2 of which	2. 75	"	fraction of a lb. to decimals
1-2 of this	1. 375	"	5. 5 lbs., and multiplying
1-7 of this	0. 1964	"	by 7854
	4. 3214		39270
			39270
			431970
		or	432 very nearly,

which shows that the fraction 1-7 for the remaining decimal 354 of the .7854 differs from it by little more than one-thousand $\frac{1}{1000}$ of a pound.

Now, for cast-iron, it is true the weight of a cubic foot is only 450 lbs. instead of 480 lbs. for wrought iron; but as it is always safe in estimating in advance to be on the safe side, to make up for any omitted trifling items, I generally use same figures as for wrought iron; also because when contracted for by weight, the tendency is to give the casting as great a weight as possible, and even when the thickness asked for is not exceeded there is generally a slight allowance to be made for so much of the sand or core adhering forcibly to the casting and hard of removal.

Therefore for any straight work or rectangular, as for a girder, column or stanchion of square, rectangular, crucial or cruciform or box-like cross section; estimating the elemental components and putting them together will give the weight of a lineal ft., which into the length or height of the column or girder will give its total weight.

With regard to circular work, as of a cast iron column, the inner diameter added to the thickness gives the mean diameter and this taken 3 and 1-7 times gives the mean circumference or girth, which into the weight of a lineal ft. of the column under consideration, and this last into the length in feet, will be the total weight of the column.

For example, say we have to compute the weight of a column of which the outer diameter is to be 8 in., and the metal 7.8 in. thick, therefore, the inner diameter or base will be 6 1-4 inches and the mean diameter 6 1-4 in. plus ⅞ in., or 7 1-8 in. (or which is the same thing, the mean diameter is similarly arrived at, as the outer-diameter 8 inches, less the thickness of 7-8 in. = 7 1-8).

Now, diameter 7 1-8 in. x 3 1-7 gives 21 in. 3-8 x 1-7 of 7 1-8 in. or say 1 in.; therefore mean circumference = 22 3-8 in., say 22 1-2 inches, or 1⅞ ft. superficial. Now iron ⅞ in. thick = ⅞ of 40 lbs. = 35 lbs. (or iron 1-8 in. thick = 5 lbs. and 7 times 5 lbs. = 35) and 35 lbs. into 1⅞ times gives 65 ⅝ lbs. for foot lineal.

If it be required to weigh any irregular form such as a statue or piece of carving or scroll work, of which the cubical contents are unknown, the latter may easily be had by immersion of the object in sand or water in a cylindrical or rectangular box or tub of quick and easy computation, and a mere comparison of the height when just covered by the sand or water with the height of depth of the auxiliary material after removal of the object. Thus if the box be a foot square in cross section and the filling stand 3 feet high or deep with the object in it, and 2 ft. 9 inches after the object is removed, the cubical contents arrived at are a foot square and 3 inches in height or 1-4 of a cubic ft., or 120 lbs. If the object be hollow, it must of course be inverted in the bath, so the sand or water may fill the hollow space.

Or the weight of an object to be cast of any metal may be made known in advance by weighing the model of it inwood or any other material and by simple rule of three, comparing their specific gravities. And in like manner when the weight is known of any object, its cubic contents may be arrived at by a mere inversion of the terms of their proportion.

Thus of a shapeless piece of stone or wood or metal, the ratio of its cubical contents to those of a cubic foot of the material, from a table of specific gravities, will be the same as that of the weight of a cubic foot of the material to that of the piece to be computed.

In the foregoing mode of obtaining the cubical contents of an irregular figure by immersion in a vessel, if the vessel instead of being cylindrical or rectangular, has tapering or splayed side, or be the frustrum of a cone or pyramid, the contents must of course be computed by the prismoidal formula, which consists in adding to the sum of the areas of the upper and lower bases of the tub or vat four times the middle area (of which the factors are arithmetic means between those of the end areas) and multiplying the result by one sixth part of the depth or height.

MASTER PLUMBERS' ASSOCIATION.

At the annual meeting of the above Association held last week, the following officers were elected: President, J. Lamarche; vice-presidents, J. Date, A. Champagne and H. Paddon; secretary, W. Briggs; English corresponding secretary, W. Hughes; French corresponding secretary, J. Thibeau; financial secretary, J. C. Jacotel; treasurer, W. A. Stevenson; sanitary committee, J. W. Hughes, John Date, James Mattinson, A. Sigouin and J. C. Jacotel; arbitration committee, P. Carroll, A. Demers, G. Yon, G. Rosser and H. Baillie; auditing committee, J. Watson, A. Rousseau and Theo. Jacotel; legislation committee, F. Brunet, D. Gordon, J. Burns, T. Leclaire and W. Britton; apprenticeship committee, A. Demers, E. C. Mount, F. Jacotel, J. Bonhomme and J. Sadler.

THE NEW BUILDING BY-LAW.

The members of the Committee of the Province of Quebec Association of Architects to whom was referred the revision of the proposed city building by-law are finding their task an arduous one. They have held meetings regularly since last June, and now meet Tuesday and Friday in each week. Even though these meetings should be continued during the holidays, it is not probable that the work of the committee can be completed before the end of January. The members of the committee are: Messrs. A. C. Hutchison, A. T. Taylor, J. Nelson, A. Raza, W. E. Doran, Jos. Perrault, Jos. Venne, Victor Roy and J. Z. Resther.

MONTREAL STREET RAILWAY BUILDING COLLAPSE.

A lengthy investigation has taken place before a coroner's jury into the causes resulting in the accident to the Montreal Street Railway Company's new building, to which brief reference was made last month. A number of experts were called as witnesses, but as there was much diversity of opinion amongst them, we shall print only the conclusions of Mr. W. McLea Wallbank, B.A.Sc., M. C. Soc. C. E., and Mr. Lacroix, the City Building Inspector, who made an examination of the building by direction of the Attorney-General for the Province of Quebec, and whose opinions, as embodied in the following report, we should regard as being impartial.

R. D. McGIBBON, Esq., Q. C.,
Pro Attorney-General for Province of Quebec.

DEAR SIR,

Acting under your instructions I, in company with Mr. Lacroix, City Building Inspector, have carefully examined the Street Railway Company's new building on the corner of Craig St. and Place des Arms Hill, in order to ascertain the cause of the recent collapse.

The result of my examinations, calculations and tests goes to prove that the collapse in question has been caused by the failure of the 12in. brick wall supporting the two columns in the north-east portion of the building.

In order to ascertain the crushing strength of the bricks used we had the same tested at McGill College laboratory in our presence by Professor Bovey and Mr. C. B. Smith, the results of which have proved very conclusively that the strength of the brick depends almost wholly upon the manner in which the workmanship is performed in building same, viz, in using proper care to see that the bricks are properly wetted and thoroughly bedded in mortar.

We tested these bricks when bedded with cotton waste and cardboard and found that they failed as follows:—The first brick "A," bedded as above, failed at 395 lbs. to the square inch. This sample was bedded in Portland Cement also. "B" commenced cracking at 5 lbs., and failed at 428 lbs. "C" and "D" broke across the centre at 132 and 161 respectively. "E," cracked at 57 lbs. and failed at 393 lbs. "F" was bedded in Portland Cement on one side and loose sand on the top—commenced cracking at from 25 to 36 lbs., increased rapidly at 214 lbs., and failed at 625 lbs.

The above tests were with wet brick.

Dry Bricks: bedded with cotton waste and cardboard No. 1 failed at 139 lbs. No. 2 failed at 89 lbs. No. 3 failed at 143 lbs. per sq. inch.

PROPER BEDDING.

Not being satisfied that the bricks if properly bedded would fail with the small loads above quoted, we procured additional samples of brick from the building and had the same very carefully and evenly bedded in plaster of Paris, with the following results:

M, first crack at 1583 lbs., failed 2212 lbs.
N, first crack at 764 lbs., failed 885 lbs.
O, first crack at 417 lbs., failed 937 lbs.
P, first crack at 1385 lbs., failed 1559 lbs.
Q, first crack at 679 lbs., failed 1365 lbs.

R. This sample bedded on cardboard only, cracked at 85 lbs., fractured badly at 723 and failed at 946 lbs.

MORTAR.

A sample of the mortar is at present in the hands of Dr. Harrington, of McGill University, who will report on same about Thursday or Friday. I have also some samples of the mortar in my possession which I took from the building myself. I have made an estimate of the weight supported or concentrated on the 12in. wall at the foot of the column second from Craig Street and first from Place d'Armes Hill as follows: Area carried by top of column, 193.2. The weight of roof covering on roof composed of 1123 joists at 2 ft. centres an inch board over same would be neglecting bridging on blocks equivalent to 9 lbs. per sq. foot.

IRON.

One 15in. eye beam, 56 lbs., 21 ft. long					1176 lbs.
One 12in. "	32	"	9	"	288 "
Six 7in. "	14.7	"	10	"	882 "
One " "	17	"	3	"	51 "
					2271

This weight distributed over 193.2 of floor gives 11.75 lbs. per square foot.

TERRA COTTA.

I weighed a block of terra cotta which I found in the building and appeared to be a fair sample with cement on it and which I have still in my possession, and found same to weigh 20 lbs. The size of the block with cement was 4½x13. One of these blocks would give an area of 58 sq. inches, making the load about 50 lbs. to the sq. foot.

RECAPITULATION.

Wooden roof	9 lbs.
Iron	11.75 lbs.
Terra Cotta	50 lbs.
Total	70.75 lbs per sq.ft.

This load multiplied by 193.2 gives 13,669 lbs. approximately as the weight of the roof resting on top column.

Assuming that the fifth floor was similarly constructed, deducting the joists and roofing boards, the weight per sq. ft. of this floor would be 70.75, minus 9, equivalent to 61.75 lbs. per sq. ft.

193.2 multiplied by 61.75 gives 11930 lbs. as the load on the column supporting this floor in addition to the roof load.

Assuming that the fourth floor was similarly constructed to the fifth floor, there would be an additional 11930 lbs. for the wall supporting this column, to which should be added the weight of the columns themselves, which witnesses have stated to be 2400 lbs.

The total load therefore carried by the 12in. wall immediately under the column in question would be as follows:—

Weight of roof	13669	lbs.
5th floor	11930	"
4th floor	11930	"
Weight of columns	2400	"
Total	39929	" or 20 tons.

Size of bearing plate 12x18, equals 216 sq. inches.

Load per sq. inch was therefore 185 lbs.

The McGill University will send you a complete report of tests referred to and the bricks are still preserved and packed in a box at the College awaiting your instructions.

Yours faithfully,

(Signed) W. McLEA WALBANK,
Architect and Civil Engineer.
(Signed) P. LACROIX,
Building Inspector.

After having heard the testimony of the numerous witnesses, and listened to the coroner's charge thereupon, the jury returned the following verdict:—

"We, the undersigned jurymen, after having heard the proof, declare that Regis Panze, Adolph Leblanc and Joseph Marquis died in Montreal the 9th day of November, 1894, having been killed by the falling of a part of the building under construction for the Montreal Street Railway Company. We believe that the falling in was due to the fact that Ed. C. Hopkins, architect; Avila Gravel, engineer of the Dominion Bridge Company, and Joseph McLaughlin, foreman of the Dominion Bridge Company, failed to take reasonable precaution in the construction of the work, and that they cannot be excused for having neglected to fulfil this duty.

"We likewise believe it to be our duty to recommend to the municipal authorities that an amendment to the building laws be brought about, with a view to avoid such a catastrophe in the future."

Messrs. E. C. Hopkins, Avila Gravel and Joseph McLaughlin were thereupon arrested, but were subsequently released on giving bonds to appear when required to do so before the civil courts.

A SUCCESSFUL YOUNG CANADIAN.

QUEBEC, Dec. 1st, 1894.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—We translate from the French the following, which purports to be from "Le Canadian," of St. Paul, Minnesota, and which, while reflecting honorably on Canada and Quebec in particular, is also to the credit of the Quebec section of the Province of Quebec Association of Architects, under whose auspices the young man was admitted to the practice of the profession. The article reads as follows:

"Minnesota, one of the wealthiest States of the Great Republic, has decided on erecting a capitol to cost as much as a million and a half of dollars. 56 sets of plans have been sent in. Those designed by René Lemay are among the worthiest and most perfect, if we can credit what the St. Paul Despatch says on the subject. We have the plans before our eyes while writing this, and in truth the design is superb. We regret not being able to reproduce the longitudinal and cross sections which go to complete the design, which is by R. P. Lemay, assistant of M. M. Kretz & Co., Architects.

Mr. Lemay is the son of Pamphile Lemay, the well known Canadian poet. After long and serious studies under apprenticeship with Mr. J. F. Peachy, of Quebec, architect and member of the P. of Q. Association of Architects, he was by the Quebec Board of Examiners admitted to practice, when with his diploma he entered the office of M. M. Kretz & Co., who were not slow in discovering the talent of their young assistant, and who confided to him the execution of a plan which was to compete with those of the best architects of the United States. His efforts were crowned with success, and everything leads to the belief that the Commission will adopt the plans and specifications of our young Canadian friend."—COM.

COLLINGWOOD MEAT CURING ESTABLISHMENT.

It may not be generally known that one of the largest meat curing and packing industries in the Dominion is located in the town of Collingwood, but such is the case, and in this paper I will endeavor to convey to your readers, as briefly as possible, some idea of the building, its fittings, and the purposes for which it is intended.

The building, or rather buildings, stand near the shore of Georgian Bay, a little west of Collingwood harbor, the foundations going down to the limestone rock, which at this point, is only a few feet from the surface. The main building is 200 feet long by 80 feet wide, two stories high, of 12 feet each, with spacious attic, and a cellar seven feet clear, under the whole building. On the north side the building being longitudinally nearly east and west there is an addition 12×48 feet, three stories high, divided with brick walls into three smoke chambers, and a two ton hoist. The smoke chambers contain gridiron shelving, whereon to place bacon, ham or beef, that is to be subjected to the smoking process. Smoldering fires will be kept below, on a level with the cellar floor and the smoke will ascend to the top of chambers and escape through louvres in the roof. On the north-east angle, slightly detached, stand the engine house, boiler room, cold generating rooms and chimney shaft. These buildings cover a space about 32 feet by 50 feet with walls as high as the main building.

The chimney shaft is 88 feet high, including footings, and is seven feet square at the base, tapering to 3 feet 6 inches at the top, with a two foot by two foot flue at both top and bottom.

The whole of the outer walls, and two dividing partition walls, are of hard burned pale red bricks, and are two feet in thickness, with a hollow space of four inches between the inner and outer walls; the two thicknesses being tied together every fifth course with connecting links. The hollow space is well parged on both walls and every joint in the brickwork is well flushed up with properly prepared mortar.

As the roof is a particularly heavy one there are strengthening buttresses under the seats of principal rafters; the buttresses being solid brickwork from foundation up. The cellar story is of random coursed quarried stone, and is three feet thick, with air space in centre, which is well parged with cement mortar.

The footings are formed of immense blocks of granite four feet wide and one foot thick and of various lengths, laid down in the best Portland cement. Piers for the support of floors, machinery, tanks and roof, are scattered over the cellar and are formed of white oak resting on massive stone plinths. The cellar floor is a marvel of perfection, and is as smooth as a skating rink; it is composed of a layer of five inches of broken stones, a layer of three inches of slag, which is intended to act as a non-conductor, well tamped down, then a layer of grout or concrete, and finished off with a thick layer of Dykerhoff portland cement used in proportion of two of sand and one of cement—the whole being trowelled off until it is as smooth as glass.

The main floor is divided into twelve compartments, five of which are for storage, two for cooling, one for shipping, one for cutting up, another for killing and dressing, with a small room attached, 14×28, for preparing tripe. Another room is devoted to the manufacture and packing of lard. On this floor is a large room where the blood, offal and viscera are transformed into transputable fertilizers, and for this purpose an ingenious set of apparatus is set up and worked by steam. A mammoth press for expressing lard from the fatty substances is also in this room. The facilities in the killing room are such that 1000 hogs can be disposed of in twelve hours under pressure. Overhead tracks, of which there are some 3500 feet, convey the carcass to any required spot in the building where it is dealt with by the cleaner, cutter, &c. It is then placed in the cooling or chilling room until it is wanted for curing or for shipment.

The second floor contains six cold storage rooms, 15×65 feet each, all having five tiers of overhead tracks and capable of holding over 175 hogs each. All these cold storage rooms are kept at a temperature a little above freezing point by the ammonia system of cooling. Twenty-eight thousand feet of two-inch pipe is used in these cold storage rooms, and the whole system is worked by a 100 H. P. Wheelock engine, which, together with the cooling machine, is capable of making 35 tons of ice daily. The whole cooling system in the building is the work of the Wolfe Ice Machine Mfg. Co. Chicago, so also is the engine of 50 H. P. used for supplementary purposes, lighting, pumping, chopping meat, running presses, hoists, etc. The building is lighted throughout with an incandescent system put in by the Canadian General Electric Co. Shafting, pulleys, lard tanks and minor machines were furnished by the Goldie & McCulloch Co., of Galt, Ont., and the pumps, which are of the Blake pattern, are from the shops of the Northey Mfg. Co., Toronto. On the second floor is the singeing machine, where hogs intended for export have all the bristles singed off them in less than half a minute. On this floor is also a scalding vat, wherein the dead hogs are dumped, the water being made and kept hot by superheated steam. There is a large cutting and salting room, 50×50 feet, also on this floor and a sausage room 26×40 where sausages of every style are manufactured ready for export.

The full capacity of the building for killing, cooling and preparing for export is about 5,000 hogs and 3,500 hogs per week, and to manipulate this vast amount of material throughout its whole preparation will require an army of employees in and about the works, besides a large staff of buyers and agents. A thorough system of water-service, for fire and general purposes is provided on the spot, the water being taken from the lake.

In an article of this kind it is impossible to describe more than a few of the salient points connected with this enterprise, but I am persuaded the foregoing will give a fair average idea of the works.

The owners are Messrs. Thos. and J. Long, Frank and H. Telfer C. Stephens & Co., and G. Brown & Bro., to the latter of whom I am indebted for some of the figures given.

The Wilson Bros., of this town, designed and superintended the work, and the stone, brick and cement work, was executed under the supervision of Mr. Robert Burdett. At this writing the whole work is about completed, and killing will be commenced in a few days. A number of outside improvements are still going on, and will continue for some time yet. There has already been expended on these works about $80,000.

FRED. T. HODGSON
Collingwood, Ont.

LEGAL DECISIONS.

THE CITIZENS MILLING CO. VS. DEFOE.—A case of some interest to architects and builders, was decided by Mr. Justice Robertson and a jury about three weeks ago against the defendant. The merits of the case were about as follows: The defendant purchased a property on Adelaide street west which had been used as a billiard table manufactory. The building was of the ordinary type of such structures, built about twelve years ago. Dimensions about 114 feet long by 30 feet wide and four storeys high, including basement; good ordinary walls, centre beam running lengthways from end to end, 10"×12" in basement and ground floor, 12"×8" for the remainder, 12" round cedar posts in basement, six in number, dividing beam into seven bays of about sixteen feet each. The pillars on ground floor were some of iron and some of wood; iron circular 6" diameter, wooden ones 12" circular. All the columns were capped with solid pine corbels 10"×6", 4 feet long. The character of the remainder does not come into account. When the premises came into Mr. Defoe's hands in about 1891 he arranged it for a storage warehouse, putting in a power elevator, etc. The basement was used for heavy bulky articles, the ground floor for furniture, etc. The first and second floors were used by the Milling Co., mainly for the storage of flour in bags, and piled on the first floor seven bags high leaving narrow passages between the piles. Early in February of 1892 a portion of the floor carrying the heaviest load collapsed, the main beam broke and the greater portion of the contents of the various stories were precipitated into the cellar. On examination it was found that the main beam of the first floor where the greatest load was concentrated had become rotted, and the rot was traced to the action of steam from a steaming box which had been in use for years in the billiard factory previously there, but which presented no external indication of the weakness before the break. The jury decided that the safe load was exceeded and the verdict was against the defendant.

ILLUSTRATIONS.

PROPOSED RESIDENCE FOR MR. HUGH GRAHAM, CORNER OF SHERBROOKE AND STANLEY STREETS, MONTREAL, QUE.—A. F. DUNLOP AND J. C. A. HERIOT, ARCHITECTS, MONTREAL.

PROPOSED HOUSE TO BE ERECTED AT KAMLOOPS, B. C., FOR MR. J. OGDEN GRAHAME.

FREE LIBRARY BUILDING, LONDON, ONT.—HERBERT MATTHEWS, ARCHITECT.

The free library building at London, Ont., is now being built under the supervision of Mr. Herbert Matthews. The materials used are as follows: Credit Valley stone facing for basement; Milton red pressed brick for superstructure; Ohsweken sand-stone—cut stone; Berea stone steps, &c.; windows glazed with French plate glass; roof covered with red slate. The interior will be fitted up in the most modern fashion, and it is expected that the library and museum, in connection with it, in their general arrangements and appointments will be a success.

PERSONAL.

Mr. J. W. Taylor, manager of the Toronto Radiator Mfg. Co., is passing through a severe illness.

We are pleased to learn that Mr. Eustace G. Bird, of Barrie, formerly of Toronto, has received the degree of A. R. I. B. A., having passed the examinations last March of the Royal Institute in London, and being elected an Associate last month.

A partnership has been formed, between Mr. Eden Smith, of Toronto, and Mr. Eustace G. Bird, of Barrie, as architects, with offices at Toronto and Barrie. Mr. Bird, has lately returned from England, where he was with the well known architect, Mr. Colcutt, of London. Mr. Smith is well and favorably known.

Messrs. Gurd and Burke, architect, Toronto, has admitted to partnership Mr. J. C. B. Horwood. Mr. Horwood served the earlier years of his studentship in the office of Messrs. Langley & Burke, Toronto. He has since had the opportunity of gaining valuable experience in the offices of leading architects in New York city, and has recently spent some time in England and on the continent. Mr. Horwood will be a decided acquisition to the ranks of the profession in Toronto, and the partnership into which he has entered with Mr. Burke should prove to be mutually advantageous.

THE PRACTICE AND PROVINCE OF THE ARCHITECT.*

I VENTURE to draw your attention briefly to a few considerations affecting the practice and province of the architect. Foremost amongst the essential elements of architectural practice I would place what I may describe as an artistic sense—the faculty of recognizing and enjoying the beautiful in all things. And, more than this, an open vision to see, and wisdom to understand, the great underlying principles out of which all true beauty, whether in nature or art, grows. The direction of the student's work will depend much upon his tastes; but a study of the best examples in Classic, Gothic, and Renaissance architecture is certainly desirable. The aim of such studies should be fundamental, not with the object of slavishly copying, but of learning the principles upon which the builders wrought; and thus it will often be found that some of the principles are the same in widely differing styles. We are often twitted in this country with having no national style, but—as the Americans say of our weather—possessing "samples only." I take it we must admit the criticism. But may not this fact be due in some measure to the oftimes wrong direction of our studies? It is scarcely a generation back since it was a common practice to regard ancient Classic examples as objects to be copied bodily—at least, as to elevation. The interior purpose of the new building might even be wholly different from those of the original, but convenience of plan had to succumb to an imposing façade. The Gothic revival only in a measure mended matters, for a time, for a somewhat slavish copying of detail, apart from a proper understanding of principles, became the fashion. This period, through which we have now happily passed, has doubtless had its uses, nor can we yet afford to set aside a careful study of Ancient and Mediæval art. It were indeed far better to copy bodily a good design than to invent a bad new one. But the evil is that buildings, like plants, are often indigenous to the soil, and ill-adapted for transplanting to another clime. Though the maxim is not a new one, we have perhaps not yet come fully to understand how a national style can scarcely exist, at least can only be good, as it grows out of, and fitly expresses national habits and characteristics. But when we speak of the "practice" of the architect, the word itself suggests that something more than the possession and efficient training of the artistic sense goes to the making of an architect. He must also undoubtedly possess not a little practical knowledge of several sciences. To the vexed question, whether an architect should be an artist or a theoretical mechanic, I would reply: In a measure he must be both, and a man of business too. An artist may be a thoroughly unpractical man, no man of business, and yet be a good artist; an architect cannot. On the other hand, neither has the mere mechanic, or man of business, with perhaps little art sense, and no art training, any claim to call himself an architect. He may be well versed in the science of building, and able, most efficiently, to conduct the business of his client, but he cannot be a true architect unless he be a true artist. Lacking this, though his buildings be very ornamental, the ornamentation will probably be vicious, and though his work secure many admirers, it will inevitably be devoid of the elements of true beauty, and transgress at every point canons of good taste. Time will only permit of a brief mention of two features of the times which present special hindrances to architectural practice. The mania for cheapness thwarts us at every point, often curtailing expenditure below reasonable limits, and tempting to the improper use of materials made to imitate the functions of more costly substances. The multiplication of specialists' manufactures by way of fittings and decorative features, though it sometimes saves us trouble, tends to sameness of treatment and loss of originality, and often unhappily to the fostering of a vitiated taste for showiness and a wholesale destruction of true art. The qualifications for the practice of architecture are wide in their range, and certainly such as to make large demands upon the powers of most men. I think, however, you will be ready to admit that they are not unreasonable. But does not every consideration of the subject point again to the absolute need for a careful education and training for every architect?

Let us now turn from the qualifications for the practice of architecture and inquire what are its limitations. What is the province of an architect? One thing must be evident. Unless he become a specialist the variety of the buildings which an architect may be called upon to design will of itself present a wide scope for the exercise of his talents. He may be to-day designing a church, and to-morrow a dwelling house, school or factory. He need not, it is true, have a previous knowlege of all the technical requirements for which such buildings, for instance, as factories are needed; but he must be able readily to grasp these requirements, to invent methods for overcoming difficulties, to guide and advise clients who often scarcely know their own needs, and to throw all into forms of beauty framed out of suitable and enduring materials. Such duties are not light, and surely a man with any amount of practice might find in their faithful exercise ample scope for time and genius. But what are the facts of the case, gentlemen? A study of local Directories would lead us to suppose that many architects must indeed be men of Herculean powers. In fact, architecture seems to have been tacked on as a light and pleasant pastime relieving the more serious occupations of house agency or upholstery. In these days of keen competition it becomes a matter for quite serious discussion what occupations, if any, beyond his evident sphere an architect may fitly engage in. It would often doubtless be to his pecuniary advantage to undertake house and estate agency. It must, however, always be to the detriment of his art; if such a combination can be justified at all, it should at least be by way of recognized partnership, the partner who has been trained as an architect having freedom to give his undivided attention to architectural work. It has always appeared to me perfectly legitimate, and sometimes advantageous, for an architect to take out his own quantities. He must know best his own intentions, and if he has a proper knowledge of the science, should be best able to make the quantities a true expression of those intentions. An architect in large practice will, however, not often have time for this. When the work is done by a surveyor, he should be working in full concert with the architect; and whether the quantities form a part of the contract or not, it would be better if they were always recognised and paid for by the employer.

Land surveying, and the laying out and development of estates, is another large branch of work in which architects frequently engage. As regards the former it is certainly admissible for an architect to measure and level the sites for his own works, and he should at least be able to do this. In respect of the latter, it would doubtless be much to the advantage of the estates if an architect had at least some share in their planning. In this, as in other matters, very much must depend upon the time at his disposal. I cannot see that there is necessarily in the work itself anything inappropriate or injurious to the proper exercise of architectural art. Surveying for delapidations is another branch of work which, at least in the provinces, is always regarded as coming within an architect's practice. It is certainly one which his general experience specially fits him to perform judiciously. The question whether architects should advertise opens an oft-debated point. Much depends upon the manner of advertising. It cannot reasonably be denied to an architect to use some legitimate means of making himself known. But should not his works be his best advertisement, and why should he not place his name upon them in some modest spot, as an artist or sculptor does? There is something very different in this from the ordinary trade advertisement. For myself, I much doubt whether advertising in the ordinary trade sense is of any use to an architect; but whether it be so or not, it is utterly repugnant to good taste. The following is an actual specimen of this kind of advertising, which fortunately has not yet become common amongst architects:—"Designs for chapels and schools. Pretty, inexpensive; free from damp and echo. Upwards of eighty have been erected during the past eight years, and the demand is still increasing." And then follow paragraphs headed:—"Architectural Beauty, Echo, Damp, Ventilation, Extras and Disputes," &c., in all of which points the author claims exceptional success. The circular closes with an offer to forward photographs or lithographic views of chapels in various styles at a charge of 6d. each below 400 sittings, and 9d. each above. Comment is superfluous! It is not always easy to stand against the fashions of such an advertising age in which literary men and even ecclesiastics are sometimes led into the stream. But to my mind all eulogistic comments upon the creation of one's own brain are out of place, and must so tend to lower one's higher sensibilities as to become reflectively injurious to our art. It behoves us, therefore, as a Society, very strenuously to set our face against such practices. Against the acceptance by architects of commissions from manufacturers and others, it is scarcely possible to utter words too strong. Architects are doubtless often put to much trouble in selection, and the unwillingness of clients to fairly remunerate for such work is strong inducement to them to seek their commission elsewhere. But the argument is specious and insufficient to uphold what can only be characterised as deception. My aim throughout has been to demand a high standard in the exercise of our art. With class distinctions of trade and profession I have little sympathy. A calling is honourable as it is exercised honorably. Every man who does his best, whether in art or craft, is worthy of respect. But assuredly all callings do not require the same degree of ability. And without any invidious comparison it may safely be averred that the practice of architecture ranks high amongst the professions, as one making large demands upon talent, study, and close application. It is on these grounds that I would urge the limitation of architectural practice as much as possible to what is certainly the main province of the architect, namely the designing and superintending the erection of buildings.

* From the inaugural address of the President of the Society of Architects.

The manufacturing business of the Chanteloup Estate, Montreal, has been purchased by the Chanteloup Mfg. Co. Ltd. The business will be conducted under the management of Mr. Wm Robinson.

Messrs. B. L. Nowell & Co., of Montreal, have been appointed Canadian agents for the Royal Cement Plaster Co., of St. Louis. This cement plaster is mixed with good sharp sand in the proportion of 100 lbs. of the former to eight ordinary water buckets of the latter, and thoroughly tempered to a good stiff mortar.

To make canvas waterproof, it is usually first wetted, then coated with two coats of boiled oil, using very little turps and driers. When thoroughly dry two coats of paint of the desired color, or better still, three coats are put on thin.

CONCRETE CONSTRUCTION—ITS PRACTICAL APPLICATION.*

BY ERNEST L. RANSOME.

THE practical application of concrete may be conveniently divided into four divisions, viz.: 1st. False work. 2d. Materials. 3d. Tools. 4th. Labor.

The second division can be usefully divided into four sections, viz.: A. Cement. B. Aggregates. C. Iron. D. Water.

DIVISION 1.—*False Work.*—Concrete, in respect to false work, is unfortunate in comparison with other masonry because it not only needs more expensive centering whenever centering is necessary, but it also usually requires cribbing, whereas other masonry does not. This characteristic entirely prohibits its use in many cases where in all other respects it would be desirable, and it is therefore an obstacle to the more extended use of this valuable construction that should be minimized as much as possible. Of late years I have met with considerable success by adopting systems of standard centering and cribbing, which, while not of universal application, are of great use, permitting, as they have done, of the construction of floors and buildings that otherwise could not have been attained; but as this is of interest to the contractor rather than to the architect, I will not enter into a detail description thereof.

Great difficulties have often arisen from the swelling of the sheeting of the centering or cribbing, caused by the wood absorbing the moisture of the newly placed concrete. From this cause many arches have been lifted and broken, floors cracked and walls thrown out of line. By using sheeting boards of a moderate width, say six to eight inches, and beveling one edge slightly, the boards may be put close together and when expansion occurs the only effect will be to slightly crush the sharp outer edge of the bevel, without lifting or disturbing the concrete abutting or resting upon it, the widest side of such boards being of course placed facing the concrete.

This is a very inexpensive, simple and unfailing remedy that from its conception I have used in all cases, and since its use I have never had any trouble from swelling of the timber. Some such device as this is especially necessary in dry climates, also in light constructions, such as floors of but an inch or two in thickness, or hollow walls.

For standard centering or cribs, if of wood, it is advisable to make them of planed lumber. The surface of the wood should be thoroughly coated with common thick kerosene oil before it is used for the first time, and before each subsequent use it should be brushed over afresh with the oil, or else with a paste made of castile soap and water. Fish oil is objectionable, as it is apt to injure the surface of the concrete, and linseed oil is generally too gummy for this purpose.

It may be accepted as a general rule that false work of light sheeting, well braced, is more economical than heavier planks with braces farther apart. I am aware that this is not the usual practice.

The ornamental effects can be much more cheaply produced by recessed than by projected work.

Materials.—Under this head cement, by reason of its greater cost and active qualities, stands out preeminent. I will limit my remarks under this subdivision to Portland cement, with the exception of the following observation, viz:

That where rapidity of construction is not a great object, and aggregates are unusually cheap, by the use of common lime, with or without some of the cheap native cements, properly handled, work of good quality and of astonishing cheapness can be made—one part of lime to forty parts of aggregates not being considered too little in some cases.

Portland cement, a giant from its birth, is striding rapidly along in the way of improvements in quality and price, so that formulas of tests that were thought severe a few years ago would not be considered sufficiently exacting at the present time to ensure as first-class the cement that would successfully pass them.

The current technical literature teems with methods of testing, so that we can hardly go astray in the selection of a good cement. The three principal requisites for a first class cement are as follows:

1st. That it sets or hardens without undue expansion or contraction.
2d. That it be sufficiently finely ground.
3d. That its tensile strength be high.

The usual methods of ascertaining these points are:

1st. The cake test. This test is so well known that a description of it here is unnecessary. When time is an object, by the use of hot water the test may be hastened. Under expert supervision the "boiling test" is by many considered superior to the cake test, but the difficulties in the way of carrying it out and some uncertainties in the results that yet linger about this new test prevent me from advocating its substitution for the older test.

2d. The test for fineness. Ninety per cent. of the cement should pass through a hundred-mes screen having 10,000 holes to the inch. It would be better to use a yet finer screen for testing, but for the difficulty of obtaining finer screens. The practice of using coarser screens is to be condemned because they pass much that is inert. The screenings should feel soft and silky to the touch. The residue on the screen should be hard, black, angular grains. The economic importance of fine grinding has seldom been exaggerated. It is usually unduly disregarded, yet it has been established beyond reasonable doubt by repeated experiments that the sand-like grains of the cement are practically inert and useless. Still, unlike the first qualifications, this is an economic question, and the ill effects of coarse grinding, if not apparent in the first test, can be overcome by making due allowance for the coarse portion in proportioning the cement to the aggregate and then but little harm will follow the use of coarse ground cement in ordinary work.

3d. Tensile strength. This test is usually and best made by the aid of the ordinary testing machine. Several first-class cements will now develop tensile strength of 600 or 700 pounds per square inch in seven days, and while this may be too high a standard to insist upon, yet the cement that will not furnish a strength of 450 pounds in seven days ought not, in my judgment, to be graded as first-class, unless it is exceptionally fine ground.

With regard to the aggregates not so much has been published.

Sufficient interest is not usually taken in these inert materials, which, nevertheless, have a powerful influence upon the character of the concrete, so much so that a good aggregate with a poor cement will sometimes give better results than a good cement with a poor aggregate.

A first-class aggregate should be made of a hard, tough rock, free from clay or dirt and having a rough surface and sharp angles when broken; it should be so graded from the finest grains to the largest pieces admissible in the work it is for, as to give, while retaining the largest proportion of large sized pieces, the smallest proportion of voids.

If the aggregate is all of one material, the desired aggregation can be determined by weighing a given measure. That proportion which, while retaining the maximum amount of large pieces, weighs the most, is the best. If, on the other hand, the aggregate is composed of different materials, then that proportion which in a given measure and under the same limitations as just given, will permit of the introduction into the filled measure of the least quantity of water is the best.

In making such tests the larger the measure the better; a round measure is better than a square box, and it should not contain less than two cubic feet. The material also ought to be shaken down into the measure. It is desirable, when time will permit, to make these tests with a mixture of one of cement to three of sand, but ordinarily with cements of equal fineness the relative strength of different brands will remain about the same as under the test with neat cement.

For fireproof work care should also be taken to avoid such aggregates as contain feldspar, and where the possibility of the concrete being subjected to a long continued red heat is sufficiently probable as to be worthy of precautions being taken to meet its effects, limestone also should be rejected from the aggregate.

To those who have studied the matter practically, it is evident that in the large majority of cases the prejudice against the use of the dust and fine particles created in crushing brick or stone is unfounded, and the practice of prohibiting these and substituting therefor ordinary sand is strongly to be condemned. Lieut. Innes found that both limestone dust and ground, burnt clay, gave stronger results than the purest sands, and tests and works carried out under my supervision thoroughly corroborate this.

The largest stone does not necessarily make the best aggregate.—For instance, finely crushed granite is for some purposes inferior to finely crushed limestone, although as a rule the granite is the harder of the two. One reason for this is not hard to seek: Owing to the brittle quality of granite, in crushing it is not only broken into small pieces, but many of these pieces are so bruised and contused that upon a little pressure being exerted upon them, such for instance as can be applied by the finger or thumb, they will crumble. With limestone and many other softer rocks, by reason of their greater toughness and elasticity, this is not the case.

Again, some stones, as quartz and the like, have surfaces of such smoothness that the adhesion of the cement thereto is not so good as that between cement and other stone, such as basaltic lava, sandstone and the like, which, when fractured, present a rough surface. Such stones as these latter usually make first-class aggregate. Broken stone, as a general thing, is a better aggregate than gravel. Sometimes a mixture of the two is preferable to either alone. Usually the use of one or the other has to be determined by the economic side of the question and the local supply. When from such causes gravel is selected, its quality can be greatly improved, at small cost, by running it through a crusher that will break the larger pieces as they pass.

The common practice of limiting the maximum size pieces so that they will pass through a three-inch ring is, I think, open to question. In massive work, stones much larger may advantageously be used, not, however, if the late fashionable practice of "dry concrete" be adhered to.

The experiments carried out by Mr. Elliott C. Clark tend to show that the presence of a small amount of clay in the concrete is no detriment to the strength of concrete, even with clay, as much as ten per cent. of the aggregates and cement combined.

In corroboration of this I would instance the Niagara gravel, which, whilst it contains a marked quantity of clay, yet makes most excellent concrete.

Having determined the aggregate, the next important question is, what is the proper proportion of cement to use for any given work?

When first-class materials, in round figures and within the limits of proportions between the cement and the aggregates of from 1 to 4, to 1 to 15, the crushing strength of concrete, when skillfully made, at a month old may be taken as follows in tons per square foot: Multiply the *constant* number 700 by the number representing the proportion of cement used, and divide it by the relative number representing the amount of aggregate used; for instance, a concrete composed of 1 part of cement to 14 parts of aggregates should, when properly seasoned, have a crushing strength of $\frac{700 \times 1}{14} = 50$ tons; when three months old the strength will have increased some twenty-five per cent., and when twelve months old it will have increased some fifty per cent.

Under this rule a concrete composed of 1 of cement to 14 of aggregate would be about on a par with good brick work when a month old, and be about fifty per cent. stronger when twelve months old. This rule reduces the strength of the concrete too much as the proportion of aggregate is increased, but it is reasonably correct and quite safe to act upon.

SECTION C.—*Iron.*—The tensile strength of concrete is comparatively little, and by reason of the gradual though slight shrinkage that takes place in all concrete structures that age in dry situations, should not be relied upon in any important work.

For giving tensile strength to concrete, all modern workers of note now use iron in some form or other.

Angular iron bars, cold-twisted, commend themselves in many ways, and on this continent they have been more largely used than any other form in concrete iron construction.

The advantages of this cold twisting are many; they may be summed up as follows:

1st. The tensile strength of iron is largely increased, viz., from 20 to 50 per cent., dependent upon quality of iron used.

2d. Its elongation under strain is considerably lessened, a very important advantage in concrete-iron construction.

3d. It forms a *continuous* key with the concrete, both longitudinally and also athwart the bar. The effect of the twist is to *grip* the concrete in every direction, and in fireproof flooring and other work where light construction is desired, the importance of this universal key is very great, for it counteracts the tendency which the bar otherwise would have to split the concrete along the line of tension.

4th. The cost of twisting is nominal, and the royalty for its use not prohibitory.

In placing these bars care should be exercised in putting them in position where they will best exert their strength. They should be straight and laid directly in the line of strain. Any deviation from this rule should be such that the tendency to straighten, which invariably occurs upon the application of the strain, will do little or no damage, such a deviation, for instance, as laying the bar of a floor beam with a slight sag in the centre. In such a case when the strain takes place the tendency to straighten would have the effect of thrusting the centre of the bar upward against the downward thrust of the load, and it would be harmless. If, on the other hand, the bar was laid crowning in the centre, upon the floor being loaded, the tendency of the bar to straighten would be in the same direction as that of the downward thrust of the floor load, and the consequences would be detrimental, if not fatal, to the integrity of the structure.

Concrete is an excellent conservator of iron. Von Emperger states that he knows of a case where iron rods were found perfectly rust free after having been imbedded in concrete below the water level for forty years. (T. A. V. C. E., Vol. XXXI., p. 447.)

W. G. Triest, Jr., states that a wrench that had been buried in concrete twenty-two years had kept its black metallic surface. (T. A. V. C. E., Vol. XXXI., p. 467.)

Referring to some concrete foundations that I built about ten years ago, the president of Star & Co. writes, as follows, under date of December 30, 1893: "Though this foundation is on tide land and submerged in salt water more than half way up, there is no rusting or deterioration to the iron. We had occasion to cut through one of the arches and found the iron as stated." A long time ago I imbedded a dozen pieces of hoop iron in as many blocks of concrete, leaving one end of each piece of iron projecting from the surface. After years of exposure to sea air, all the exposed iron had rusted away, or so nearly as to leave but a few soft, jagged needles of rust that were readily removed by the hand. In all cases upon cutting into the blocks I found the iron almost as good as new, and from one to two inches from the surface it was invariably so.

SECTION D.—*Water.*—The water for mixing should be clear, and by preference soft. If it cannot be obtained of ordinary purity, then due allowance should be made for the impurities by an additional quantity of cement.

Sufficient water should be used to bring the mass when thoroughly mixed into a stiff, sticky, tenacious, viscous condition. An error as to the amount of water that should be used in concrete some years ago crept into the professional practice both of engineers and architects, and with surprising rapidity permeated and revolutionized it. I allude to the erroneous theory that only sufficient water should be used to slightly moisten the mass, and hardly enough to render it cohesive in its unconnected state.

An error seldom takes the hold this did upon a skilled body of men without some apparent justification. The only justification that I have been able to find after considerable research is the fact that, in making briquettes for testing purposes, the use of a minimum quantity of water gives the best results. From this one little isolated fact the generalization was made that, to produce the best results, concrete should be mixed in like manner. The fatal flaw in this deduction lies here, viz.: that a mixture of cement, or of cement and sand, with water, differs radically in conditions when to either of these gravel is added, and differs yet more when broken stone is used.

If cement, or cement and sand, is mixed with a large proportion of water, it cannot be compacted by blows or such pressure as can usually be brought to bear, for the mixture would flow from under the tamper. In the latter case, however, where gravel or broken stone is used, with a larger proportion of water, the concrete can be compacted more intimately and closely than with the minimum quantity, and under all ordinary conditions makes a much better concrete. The only exception to this is where smooth, rounded pebbles only are used with the mortar of the concrete, but this exception does not apply to ordinary gravel and never applies where broken rock is an ingredient. I allude to this at some length, because the error, although on the wane, is still widespread.

DIVISION 3.—*Tools.*—There is great advantage and economy in mill mixing. Mills can now be obtained at a reasonable figure and should always be used on large works. By their use the cement is more fully utilized, the cost of labor lessened and the work is more uniform and satisfactory in character.

An objection is often made to mill-mixed concrete, viz., that the concrete is injured by overmixing. What is "overmixing?" A very rare *distemper*, this. I have never once met with it, although I have been actively engaged in concrete construction for thirty-five years. It is never epidemic or fatal, but like vaccination, if present, it would prevent worse and more fatal ailments.

Mr. Spencer Newberry found that a mixture of one of cement to three of sand, which when worked for one minute with a trowel developed a tensile strength of 87 pounds in seven days, developed a strength of 240 pounds in same period after being worked with the trowel for five minutes; a remarkable result, surely, and well worthy of consideration.

Contrary to the almost universal opinion, Portland cement is improved by a delay between mixing and placing. I have experimented with several brands of Portland cement and find that they were invariably improved in tensile strength by a delay of from one to four hours between mixing and placing.

In placing concrete it is preferable to have it of one uniform consistency throughout the mass. In cases, however, where it is required that the face of the work should be of a finer grade, both grades should be carried on simultaneously, the face grade being placed up against the sheeting or mold a little in advance of the backing by means of a trowel or other convenient tool. In more careful work thin strips of iron about six inches wide and of any lengths convenient, may be set up on edge in the concrete parallel to and at any desirable distance from the face of the mold. The face concrete should then be inserted between the mold face and the iron while the backing is placed at the other side thereof. As each layer is put in the iron is drawn up a few inches, so that when the concrete is tamped the effect of the tamping is conveyed below the lower edge of the iron, and causes the two grades of concrete to become thoroughly united and monolithic.

The material should in ordinary cases be placed in thin layers, seldom greatly exceeding in depth the length of the largest aggregates used, and these layers should follow one after another sufficiently quickly so that one layer does not become stiff or partially set before the next is upon it.

Flat tampers should not be used for massive work except in the first and last layers of the day's work; thin or edge tampers should be employed. Wherever practicable the concrete should be compacted by rolling, in preference to tamping. It is cheaper and much more effective. I am not aware of its being done outside of my own practice, but it is certainly deserving of almost universal use. On large work steam rollers would be excellent.

It may be accepted as an axiom that concrete cannot be too thoroughly compacted, provided the action is not violent enough to bruise or crush the aggregate.

In massive or deep work, as it proceeds through the day, often the working surface becomes richer in mortar, when, and as often as this occurs, the mixture should be changed by adding thereto more of the larger aggregates free from fine dust, sand or gravel, until this fault is remedied. If on the contrary at any time the surface becomes open for lack of mortar, it should be immediately remedied by putting into the mixture a lesser quantity of the larger aggregates and not substituting anything in their place.

In a similar way the amount of water used in the mixings should be regulated, changing to more or less as the working surface appears too stiff or too watery. It should be firm under the tamper or roller and yet the mortar should be viscous and unctuous to the touch.

The quantity required to produce this condition varies greatly, dependent upon the character of the aggregates, whether but slightly or very porous, and upon the age and character of the cement and weather.

Great care should be observed in joining the work of one day to that of the next. The last layer should be thoroughly compacted and left with a slight excess of mortar. It should be finished with a level surface, which, at proper time, as soon as sufficiently stiff, should be patted or stippled with a steel float so as to produce a surface studded thickly with little conical knobs. This surface should be kept wet throughout the night, and in the morning immediately before the application of the first layer of fresh concrete it should be covered with a wash consisting of a mixture of equal measures of Portland cement and air-slacked lime, mixed with water to the consistency of thick cream. This covering should be put on in excess and brushed thoroughly back and forth upon the surface so as to insure a close contact therewith, the excess being swept along just ahead of the fresh concrete until all the surface has been covered, when it should be removed.

When in place the concrete should be kept moist for as long a period of time as possible. When one bears in mind that the chemical action which causes the cement to harden can only take place in the presence of moisture, the importance of keeping the work wet is at once apparent.

In all concrete construction excepting subway and other works where the concrete remains permanently moist, provision should be made for the slow but certain shrinkage that takes place in the concrete as it becomes thoroughly dehydrated. The vertical shrinkage will take care of itself, as the weight of the building is in harmony with its movement. The horizontal shrinkage, however, is resisted by the inertia of the structure and the friction of its foundation. There are several ways to direct such shrinkage; that which I have found most feasible is to partially divide the wall at certain intervals, preferably over the windows where there are several in line, and to insert across the division a weathering strip of copper or lead.

Where the appearance of a straight division line on the face of the building would be objectionable, for instance a wall blocked off into ashlar face, I build this division straight and cause it to coincide with the line of the V recesses of the ashlar, marking in every other course, and I block out in the intermediate courses recesses opposite to the division line, and subsequently fill these recesses with concrete ashlars made and seasoned beforehand. By adopting the pattern of alternate long and short ashlars in every other course with long ashlars only in the immediate course meeting at the centre line of the short ashlars above and below them, there separate concrete ashlars may be made small, and the additional cost of their manufacture will be but trifling.

Apart from the question of appearance, some such division of the surface of a concrete wall is advisable for a two-fold reason: some defining line is needed at the juncture of each day's work at least, and by dividing up the surface by deep recesses into small sections, surface cracking is largely avoided.

In reference to this shrinkage of concrete, lest I should have unnecessarily alarmed you, I will state that in a building, the walls of which were 170 feet long and divided thus, it was nearly two years before any apparent shrinkage took place, and now it can hardly be observed by a minute examination of the division joints. No outsider, even though a careful observer, would be likely to perceive any effects of this slight shrinkage when thus controlled.

In situations where it is not possible to make shrinkage joints by a liberal use of twisted iron, shrinkage cracks can often be prevented.

THE RESISTANCE OF PORTLAND CEMENT CONCRETE TO THE DESTROYING ACTION OF FIRE.

By a misunderstanding, due to a windy interference (Mr. Stone tells me one of my letters was blown out of his office window), I find I am expected to speak on the protection concrete affords iron in case of fire.

There seems to be not so much data on this subject as one would desire. What little there is, however, seems to be in favor of concrete as a fire resistant.

It is generally understood that the artificial stone made with Portland cement concrete withstood the Chicago fire well. Some years ago the blacksmith's shop at the Benicia Arsenal, California, was burned out, leaving the outer walls standing. This was a brick building with granite door sills, free stone belt courses, with window caps and cornice of Portland cement concrete. I examined the ruins carefully. The granite was spoiled badly and broken into several pieces; the freestone was badly broken and injured; the brickwork was burnt out in the joints in many places, rendering the walls unsuitable, many of the bricks also being spoiled, whilst the concrete window heads, which had probably to bear the brunt of the fire on the outside, were but little injured; the surfaces had softened a little and were badly discolored, but they remained whole and strong.

Concrete bricks made of well burnt clinker and lime by a process which converts the lime into a silicate of lime, thereby making it resemble a Portland cement in character, withstand the action of a hot fire and the subsequent sudden cooling by water better than any burnt brick, either common pressed or firebrick, that I could obtain in San Francisco, and I presume the same relative result would be obtained from most of the bricks of the several States.

I have repeatedly made the tests so severe that every burnt brick in the dozen or so tested at a time broke into two or more pieces, whilst under the same test the concrete bricks, beyond discoloring slightly, showed no change.

THE THERMIC EXPANSION OF PORTLAND CEMENT.

Bonnican Bonnicean is quoted as giving the expansion of Portland cement at 0.00000143 for 1 celsius, and iron is given at 0.00000125, which is practically the same.

Hyatt corroborates this in some careful experiments he made with loaded floors submitted to fire, in which the concrete-iron construction bore a red heat for several hours without injury.

Throughout Europe I believe hollow tile construction is almost unknown. Concrete floors are commonly used in fireproof buildings. The result of tests undertaken in Germany under Government supervision to ascertain the relative value of the ordinary building material, including brick work, places concrete at the head of the list as the best fine resistant.

If due regard is paid to the aggregate used, so that feldspar is avoided, and limestone also, where the structure is liable to prolonged hot fire, I think it will be found that Portland cement concrete is an excellent fire resistant.

PUBLICATIONS.

A new and artistic catalogue has just been issued by I. P. Frink, manufacturer of reflectors, New York, a copy of which will be sent on application to any of our readers.

"Industrial Agreements and Conciliation" are the tropics treated by the Hon. C. C. Kingston, Premier of South Australia, in the December of the Review of Reviews; the magazine is publishing a series of articles by leading Australian statesmen on questions of immediate interest to American readers.

The Pease Furnace Co., Toronto, have recently published an interesting catalogue, in which is fully described their heating system and the method of securing best results therefrom. Illustrations of public and private buildings heated by their system, and testimonials from persons having it in use, are likewise given.

Of the second edition of the Canadian Contractor's Hand-Book, Mr. Chas. Baillairgé, Architect and City Engineer, Quebec, expresses the following opinion: "A valuable work of most useful and suggestive memoranda and tables, and worthy of an analytical index—the Table of Contents "as given affording a very incomplete idea of the information conveyed."

* A paper read at the Twenty-eight Annual Convention of the American Institute of Architects, held at New York October, 15, 16 and 17, 1894.

PROPOSED ORGANIZATION OF LEAGUE FOR THE ADORNMENT OF THE CITY OF CHICAGO.

CONSTITUTION.

ARTICLE I.—The name of this organization shall be the "Chicago Municipal Improvement League."

ARTICLE II.—The purpose of this League shall be to secure for our city such an arrangement, design and adornment of our public buildings and grounds, streets, boulevards and other public works as shall most contribute to the convenience and enjoyment of the public; stimulate an appreciation of art and give to the city a fixed expression of its greatness.

ARTICLE III.—This League shall be a union of committees, of three each, elected or appointed by such organizations interested in the above objects, as shall respond to the invitation of this League. The following organizations are represented in the formation of this League and are hereby invited to continue their co-operation by making their committees standing committees for this purpose, viz: The Illinois Chapter of the American Institute of Architects, Western Society of Engineers, Chicago Society of Artists, Chicago Real Estate Board, Chicago Builders' and Traders' Exchange and the Civic Federation of Chicago. Other organizations may be invited to co-operate with this League by a two-thirds vote of the whole number of members.

ARTICLE IV.—Each committee of three, appointed by a co-operating organization, shall be a standing committee of this League on the subjects that come within the scope of the organization which it represents. Each committee will serve as a means of communication between this League and the organization which it represents. No action of this League is to be binding in any way upon the co-operating organizations, but is to be advisory only.

Each committee shall have a chairman elected by itself or the organization appointing it.

ARTICLE V.—The chairmen of the several standing committees shall constitute the Board of Directors.

ARTICLE VI.—The following officers shall be elected by the Board of Directors from their own number. A president, a vice-president, a secretary and a treasurer.

ARTICLE VII.—All officers shall be elected immediately after the annual meeting by a majority ballot vote of the directors present. Officers shall be elected for a term of one year and until their successors have qualified.

ARTICLE VIII.—It shall be the duty of the Board of Directors to have general charge of the work of the League; referring special investigations to the appropriate standing committees. All expenditures of money shall be under the control of the Board of Directors who shall devise and carry out means for raising the necessary funds.

ARTICLE IX.—The annual meeting shall be held on the second Tuesday of November, at which time the several committees shall announce their selection of members for the Board of Directors.

Other meetings may be held on the call of the President or the Board of Directors. The President shall call a meeting on the request of any five members. Co-operating organizations are requested to appoint their committees during the month of October, so that the change of membership may take place at the annual meeting, at which time reports shall be presented by all these committees. These reports shall be sent to all co-operating organizations.

ARTICLE X.—A majority of the League or any committee shall constitute a quorum.

ARTICLE XI.—This constitution may be amended at an annual meeting without previous notice, or at a special meeting upon notice of proposed amendments at least one week in advance, by a vote of two-thirds of the total number of members.

ARTICLE XII.—The officers elected at the organization of the League shall hold office until November, 1895.

A rule to determine the ready quantity of paint required to cover any structure, says the Plumber and Decorator, is as follows: Divide the number of square feet of surface by 200, the quotients will be the number of gallons of liquid paint required for two coats. Or, divide the area in square feet by 18, and the result is the number of pounds of pure white lead required to give three coats, where this pigment is permissible.

WARNING

OUR subscribers and advertisers are hereby notified that persons authorized to collect accounts for this Journal are furnished with a special receipt form, headed "Official Receipt," and this is the only form of receipt which will in future be recognized in the case of accounts paid to collectors.

C. H. MORTIMER,
Publisher Canadian Architect and Builder.

E. L. HORWOOD
ARCHITECT
51 SPARKS ST. OTTAWA.
☞ Manufacturers please send Catalogues.

WM. J. HYNES,
Contractor and Plasterer.
Relief Decorations in Plaster, Staff or Papier-Mache.
97 Winchester Street.
Shop, Esplanade, foot of Jarvis Street.
Telephone 3414.

ARCHITECTS and ENGINEERS
APPLY TO
THE NEW COLOR PROCESS CO.
214 ST. JAMES ST., MONTREAL,
for Instantaneous Reproductions in Colors of Drawings and Plans
WILL SAVE YOU.....
MONEY Copies on Manilla Paper 4c. per sq. foot.
LABOR No recoloring by hand.
TIME We print without the aid of the sun.
ERRORS We give exact fac-similes.
TRACING CLOTH
We print direct from originals on paper.
DISSATISFACTION
We guarantee uniformly perfect work.
Originals sent from a distance returned with copies same day as received.

Hayes' Patent Steel Lath..

HAS NO EQUAL IN ANY PARTICULAR

...Used in more important buildings...
...THAN...
all other styles of metal lathing combined.

SOLE MANUFACTURERS
THE METALLIC ROOFING CO.
OF CANADA, LIMITED.

BRANCH OFFICE: 706 Craig Street MONTREAL
HEAD OFFICE: 82 to 90 Yonge Street TORONTO

Send for Samples and Prices

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

(4)
Gyro- 913

CANADIAN

ARCHITECT AND BUILDER

VOL. VIII.

93941
30/9/08

1895:
C. H. MORTIMER, Publisher
TORONTO—CANADA

INDEX

	Page
Architectural Reminiscences	7
Accident at Montreal Street Railway Co.'s Building	18
Architectural Guild of Toronto	28
Acoustics, Points on	43
Æsthetic Unity of the Fine Arts	46
Australian Examination Paper	57
Application of Color to Architecture	58
Architectural Competitions	63
Asphalt for Street Paving	83
Adjoining Owners, Rights of	84
Albert Hall, London, Fire Escape from	84
Age of Brick, the	87
Approximate Estimates	90
Acoustical Defect, Discovery of	103
Area Without Fire Walls	104, 114
An Arch Collapses	109
American Institute of Architects	113
Architect's Vigorous Indictment	115
Architect's Education, Requirements of	136
Architects and Builders in Convention	138
Art Students League Exhibition	140
Bystander	4, 85
Bow Windows	7
Building in Canada in 1894	8
Bearing Power of Foundations	14
British Columbia Affairs	30
Building Season of 1895	37
Building Construction in its Relation to Fire Protection	38
Bribes to Architects	55
Buffalo Real Estate Boom	74
Bricks and Brickwork	82
Brick-dust Mortar	91
Black Birch for Inside Finish	97
Bricks and Brickwork, Test of	113
Bearing and Resisting Strength of Structures	122
Bonded Courses	128
Building Materials Severely Tested	136
Bell, The Largest in America	139
Chicago Canal, Effect of on the St. Lawrence	5
Concerning Chimneys	5
Coloring Metallic Surfaces	7
Combination Heating	13
Concrete	17
Canadian vs. Imported Cements	18
Colors from the East	1-xii
Concrete Bridge over the Danube	1-xiii
Check Valve, Successful Working of	38
Customs Duty on Architectural Plans	39
Chapter from My Note Book	44
Chimney 100 Feet High Straightened	3-vii
Coating for Hot Water Pipes	3-viii
Code of Ethics	62
Cairo, Museum at	63
Competition Evil, the	69
Chimneys, Damage to by Lightning	5-viii
Carleton Place Town Hall Competition	76
Crushed Glass as Builders' Sand	84
Chimneys and Flues, Proper Shape of	87
Coloring Architectural Terra Cotta	87
Cement, Abuse of	90
Chips	7-viii, 12-vii
Chimneys, Defective Construction of	94
Collingwood Hospital	100
Canadians, Two Distinguished	103
Convent of the Sisters of St. Croix	108
Concrete Floors for Stables	108
Crystal Palace, the Old.—A Reminiscence	109
Concrete Floors	110
Chicago, Building Permits in	113
Cement, Manufacture of in Canada	114
C. A. & B. Competition	14, 120, 136, 148
Coal Oil Lamp at Toronto Custom House	127
Cement at Vancouver	127
Clay Materials, Specimens Wanted	128
Concrete as a Fire Resistant	129
Canadian Heating Methods in Europe	11-vii
Contracts, Useful Facts about	11-viii
Cement, Testing of	151
Departmental Store Buildings	48
Domes	72
Dominion Government vs. St. Louis	84
Douglas Fir Boycotted	93
Drilling Glass	120
Decorators, Ancient	121
English Methods	37, 42
Electricity for Architects	32
Effect of American Drainage Works on Canadian Interests	48
Electric Lighting for Large Buildings	55
Electric Radiators	74
Escape in Case of Fire	77
Essentials of Good Portland Cement	86
Electric Elevators Popularized	113
Eighth Year	139
Electric Heating at Carmelite Monastery	140
Fireproofing Toronto's City Hall	2
Fireproof Flooring	15
Frosting Glass	18
Fireproofing of Wood	73
Fireproofing Material, Tests of	78
Furnaces, Prices to be Advanced	94
Fire Escapes, Builders of Responsible	114
Fireproof Building, What is a	129
Finger Plates, Origin of	136
Frenchman's Opinion of American Houses	140
Foresters' Temple	145
Fire Proof Materials	146
Glass Era, A	57
Greenhouses	4-vii
Granite Stopping	5-xii
Galvanized Water Pipes, Danger of	74
Glass Coloring in Germany	89
Gravel Roofing, Something About	9-viii
Guild of Sculpture	128
Globe Building, the New	143
Good Advertising Methods	151
Heating Trade, Better Prospect for	1
Hot Water Heating	6
Hamilton Correspondence	68, 77
Hunt, Richard M., Death of	93
High Buildings Unsanitary	114
How to Construct and Equip Mills, etc., as Fire Hazards	114
Hutcheson, A. C., R.C.A.	117
High Buildings in San Francisco	127
Halifax Sanitary Regulations	137
Hudson River Bridge	140
Hamilton Boy's Success	143
Hamilton Art School	147
International Exhibition at Montreal	63
Inexperienced Contractors, Troubles of	92
Improvements in House Drainage	104
Ivy Plant not Injurious	115
Ivy on Parliament Buildings	127
Ireland Building Collapse	139
Jennings, Wm. L., C.E.	3
Jamieson Building Round Corner	139
Keating, E. H.	86
Keep out of Ruts	114
Lincoln Cathedral	4
London Competition, the	41
Legal	69, 6-viii
Licensing of Architects	73
Low Contract Prices	45
Lifting a Roof	107
Lime Combine	105
Legal View of an Architect's Responsibility	121
Lien Law	140
Lien Law, Defects of the Ontario	144
Loudon Correspondence	147
Methods of Measuring	2-viii
Montreal Correspondence	39, 56, 70, 80, 88, 98, 117, 131, 145
Manufactures and Materials	61, 69, 111, 152
Master Plumbers Association	73, 83
Mortars, Some Experiments With	92
Mortar, How to Prepare	92
Manual Training in Toronto Public Schools	94
McGill University Library	96
Mortar	97
Moving a Stone Dwelling	102
Monument to Champlain	113
Mathematics and Construction in the Ecole des Beaux Arts	148
Newfoundland Collapse, Toronto Losses in	1
No Teutonic Art	36
Norman Adaptation	15
Neelon Appeal Dismissed	74
Native Materials should be Used in Canadian Buildings	94
New Court House Roof	95
Nail Combination	113
New York Building Operations	140
New Orleans Court House	140
Ontario Association of Architects	2, 19, 21
Old Toronto Builders	6
Ontario Assn. of Architects Exhibition	19, 52
Ontario Legislative Buildings	37
Ontario Land Surveyors	39
Ontario Architects Bill	52
Old Men's Refuge at Kamloops	61
Organization Among Builders and Contractors, Absence of	114
Odd Suit, Strickland & Symons vs. Laidlaw	141
Pointers on Trade Journals	16
Prevention of Fire	17
Publications	17, 43, 5-9, 7-vii, 108, 10-viii, 131
Patents, Recent Canadian	18, 59, 81, 101, 109, 152
Personal	1-vii, 2-vii, 41, 53, 65, 81, 88, 99, 104, 116, 144
Pompeiian Houses	1-viii
Painting Hard Pine	1-xii
Portland Cement	28
Porta Dell Pallio	40
Pulling Down Walls, etc.	52
Popular Impressions vs. Fact	54
Pompeiian Bathroom, A	58
Planning of Small Houses	62
Ponderous Machines	4-ix
Pavements, Street, Brick for	67
Public Parks, Our	67
Public Monuments, Sites for	74
Proposed Palace Hotel for Toronto	76
Public Libraries and Novels	84
Plaster Casts	91
Plumbers Supplies, Unsatisfactory Method of Dealing in	94
Photography in Natural Colors	99
Preservation of Wood from Decay	100
Possibility of Simple and Safe House Plumbing	104, 134
Preserving Wood by Lime	107
Protest, A	145
Parliamentary Library at Ottawa, More Room Wanted	114
Prestige	125
Public Works, Money may be Squandered on	127
Patents, New	138
Paving Material, A New	138
Preservative for Brick and Free Stone	11-ix
Paper Plaster	141
Paving Materials, About	142
Points on Plastering	150
Quebec, Province, Association of Architects	13, 20, 72, 108, 118
Question and Answer	65
Qualities of Building Stone	111
Queen Victoria School, Toronto	115
Quebec Castle, the	150
Rapid Construction, Methods of	60
Royal Canadian Academy Exhibition	64
Russia Seeking Information	93
Roofing Tiles	95
Registration of Architects, Advisability of	106
Refund of Duty on Iron Materials	128
Riwaulx Abbey	58
Rights of Contractors	140
Ruinous Competition	141
Some Lessons of the Toronto Fire	2
Simpson, R., Store	12, 94, 115
Safe Building Requirements	15
Shingles, Red Cedar	1-vii
Scratches in Plate Glass	2-viii
Staff	41
Society of Architects, London, Membership in	52
Sawing Stone by Wind Power	53
Survey of the Building Season	75
Sub-estimating and sub-contracting, Code of Practice for	89
Students Examinations	91
Structural Iron, Use of, Increasing	103
Sudden Death of a Well Known Architect	108
Swedish Order to a Toronto Architect	114
Sarnia Collegiate Institute	125
Side Talks with the Builder	125
St. John Exhibition	125
Surveying by Photography	10-vii
Stones Part of the Land	127
St. Louis City Hall	128
Sawdust for Buildings	128
Should Master Plumbers Handle Tools	128
Specifications of Government Buildings	128
Strength of Bridge and Trestle Timbers	132
St. Alban's Cathedral	140
Should Architects be Licensed	141
Safety of Hot Water Heating Systems	146
Sketch Club, Toronto	145
Transmission of Heat	3
Trimming Joists	5
Toronto Builders Exchange	34, 41
Tender vs. Municipal Control for Public Works	37
Toronto Radiator Co.	39
Toronto Master Plumbers Association	48
Toronto Plumbing By-law, Amendment	51, 93
Toronto Building By-Law, Amendment of	52
Tunnel, Proposed Water Works	66
Trade in Wood Working Lines	94
Toronto, Building Permits in	103
Testing Structural Materials	112
Toronto Streets, Compliment to	114
Theatre, the Largest in the World	114
Toronto City Engineer's Report	116
Thomson, Peter, the Late	121
Toronto Technical School	130
Toronto's Municipal Building	135
Toronto Sketch Club	139
Training the Public Taste	141
Town Hall, Carleton Place	143
Useful Hints	1-ix, 57, 72, 80, 88, 99, 108, 120, 126, 136
Upper Canada College Buildings	139
Unsanitary Condition of Hotels	140
Volume VIII	1
Ventilation a Feature	53
Varnish, to Remove	7-xi
Victoria, B. C., New Legislative Buildings	110
Vaux, The Late Calvert	12-vii
Wood Carving in Switzerland	3
Weathering of Building Stone	35, 10-viii
Wages in British Columbia	2-vii
Waterproofing Bricks	56
Wages, Masons, in Toronto	19, 64, 74, 113
Water Hammer in Steam Pipes	75
Waterproof Brick and Stone	8-vii
Wire Nails	104
Windows, Size of	117
Widow's Tenth, the	125
Workman's Suit for Damages	138
Wide Portieres and Heating	141
Water, Curtain Protection	150

ILLUSTRATIONS.

	No.
Addition to Lakeside Home, Toronto	IX
Book Case and Writing Table	IV
Church of St. Gregory, Oshawa	II
Core St. Antoine Academy, Montreal	IV
Convent of the Sisters of St. Croix, Montreal	IX
Country Railway Station	X
Collegiate Institute, Sarnia	X
Country Church	XI
Details of Store for R. Simpson, Toronto	II
Entrance to a House	VIII
Foresters' Temple, Toronto	VI
Foreman and Workman's House, Vernon, B. C.	VII
Factory Building for Metallic Roofing Co.	XII
Grand Opera Hotel, Toronto	IX
House for A. Dickson Patterson, Toronto	IV
Heating Apparatus, Government House, Ottawa	V
Hotel Majestic, New York	VI
House for A. A. Dixon, Toronto	X
Insane Asylum, Brockville	VII
Lincoln Cathedral	I
Library, McGill University, Montreal	VIII
Muskoka Summer Cottage	I
Masonic Temple, Montreal	II
" " Vancouver	VII
Offices of Perrault, Mesnard & Venne, Montreal	VI
Porta Dell Pallio	III
Proposed Business Premises, Vancouver	XII
Quebec Association of Architects	I
Residence for Arthur Thompson, Toronto	XI
Residence at Swan Lake, B. C.	XI
Residence at Vancouver	III
Rievaulx Abbey	IV
Residence on Howard Street, Toronto	V
Roof of Convocation Hall, Toronto University	VIII
Residence for Dr. Gurd, Montreal	XII
Store for R. Simpson, Toronto	I
St. Andrews Church, Belleville	I
Sketches in Italy	II
Stokesay Castle Gatehouse	III
Store of Catto & Son, Toronto	V
Staircase Hall, A. E. Kemp's House, Toronto	IX
St. Marys School, Halifax	X
St. John's Church, Norway	XI
Town Hall, Carleton Place	XII

CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—NO. 1. JANUARY, 1895 {PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1894.

PRESIDENT	EDMUND BURKE, Toronto.
1ST VICE-PRESIDENT	J. E. BELCHER, Peterboro'.
2ND VICE-PRESIDENT	W. A. EDWARDS, Hamilton.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI	Ottawa.
FRANK DARLING	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

A. F. DUNLOP	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
L. Z. GAUTHIER	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. MCLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

WM. PEARS, President.	FRED. WAKEFIELD.
WM. PARK, 1st Vice-President.	WM. BOUTH.
GEO. OAKLEY, 2nd Vice-President.	JAS. ISAAC.
DAVID WILLIAMS, Treasurer.	H. LUCAS.
JOHN ALDRIDGE.	JAS. THOMSON
JAS. CRANG.	H. MARTIN.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD'S reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

VOLUME VIII.

To mark the commencement of a new year and the entry of the CANADIAN ARCHITECT AND BUILDER on the eighth year of publication, the present number is presented in holiday attire, and exhibiting special features in the way of illustrations and letterpress which it is hoped will be regarded with favor. An effort has been made to compile a statistical review of building operations in Canada for the year which has just closed, and to indicate as far as can be done at this early date, the outlook for the building trades for the approaching season. While this first attempt has not resulted in as comprehensive a statement of the situation as we hope to be able to present in future years, it will, we trust, bear reading with a degree of interest and profit.

The year 1894 was undoubtedly the most inactive which the building trades in Canada have experienced during the last decade. The cause is known to have existed in the severe commercial depression through which this country and continent has been passing. It is now generally admitted that bottom has been reached, and that the tendency during the present year will be upwards.

The CANADIAN ARCHITECT AND BUILDER is grateful for the support accorded to it during the period of depression which is now drawing to a close, and hopes to merit a share of the increased prosperity which we believe to be in store in the near future for all connected with the building interests. Indulging this belief we are with more assurance able to wish every reader a happy and prosperous new year.

A RECENT conversation with the manager of one of our largest manufacturing companies, served to indicate to some extent the prospects for the heating trade the approaching season. "Our repair business last season was the heaviest we have ever experienced," he said, "the attempt was made to fix up all sorts of old heating apparatus to the extent necessary to make it do duty for another winter. This leads me to anticipate a brisk demand for new heating apparatus next seasnn." There would seem to be good ground for this view of the situation, and we hope to see the anticipations of better times, not only in the heating trade, but in all other lines as well, in some measure realized before the close of the present year.

WE regret to learn that amongst those who suffered loss by the financial collapse in Newfoundland, are several Toronto contractors. After the great fire in St. Johns, several architects and twenty or more contractors went from Toronto to that city and found abundance of employment. Some of these contractors had completed their contracts and returned home before the financial crash came, but others were less fortunate, and have been caught in the storm There were only two banks in St. Johns, and when both of these collapsed, paper currency and securities were valueless. Gold became the only medium of exchange, and some of our Toronto friends who were well enough provided with paper money and securities, had not enough of the precious metal to pay their way back to their homes.

In view of the recent fire it is to be hoped that the city council of Toronto will see the wisdom of complying with the recommendation of the architect for an extra appropriation sufficient to cover the cost of fire-proofing the roof and corridors of the new city buildings. Mr. Lennox estimates that after deducting the saving in insurance, the cost of fireproofing the buildings to the extent mentioned would not exceed $30,000. This would mean a charge for interest of only $1,200 per year. Surely for the sake of so small an amount, the council will not refuse to protect a building, the cost of which will run into the millions. If a wooden roof is allowed to be placed on these buildings their destruction will be next to a certainty in case of fire being communicated to them from adjoining buildings.

THE indications point to the success of the annual convention of the Ontario Association of Architects to take place in Toronto on the 15th and 16th inst. Nearly one hundred drawings and photographs of buildings erected by members of the Association have been received by Mr. C. H. C. Wright, of the Department of Architecture, who has reproduced them on lantern slides in order that they may be exhibited for criticism at the convention. It is to be regretted that the designs submitted for this purpose are not representative of the work of a majority of the members of the Association. If the result of the experiment this year should be considered satisfactory, however, a more thoroughly representative collection will doubtless be obtainable for future conventions. The CANADIAN ARCHITECT AND BUILDER for February will contain a complete account of the proceedings of this meeting.

SOME LESSONS OF THE TORONTO FIRE.

IT is frequently the case that necessary public improvements come only as the result of a public disaster. The recent conflagration in Toronto is a case in point. The fact that the means for the protection of the city from fire were totally inadequate for the purpose, was well-known to the chief of the fire department and others who took the trouble to investigate the condition of affairs. The city council was urged to furnish the necessary fire equipment, but the matter was from time to time deferred, with what serious result is now seen. Since the fire, the statement has been published that Toronto is perhaps the only city of importance on the continent of America, which does not possess a number of steam fire engines. Montreal has a dozen or more. Detroit has eighteen, in addition to, besides chemical engines, while other American cities with a population only thirty per cent. that of Toronto, have from eight to twelve engines. It appears also that the water mains in the business district of Toronto are of too small diameter to furnish the necessary supply of water in case of a large fire such as the city has just experienced.

The first thing requiring to be done is to put the fire equipment of the city in a thoroughly satisfactory condition. Second in importance to this comes the necessity for a thorough revision of the city building by-law, with the object of preventing the erection of structures such as some of those which were destroyed in the recent fire, and which had so much to do with spreading the conflagration. It is not many years since the existing by-law underwent revision at the hands of the Council, but in the time which has since elapsed many changes have taken place in materials and methods of construction, so that what virtue the by-law may have possessed five or six years ago it cannot be said to possess to-day. Within the period mentioned there have been erected a number of large buildings, five, six and seven stories in height, the upper stories of which the firemen with their present appliances are powerless to reach. In the absence of a carefully prepared building ordinance, some of these high structures have been erected throughout of combustible materials. The roof of the Globe building for example is estimated to have contained not less that 20,000 feet of lumber. The interior of the Osgoodby building was wood throughout, even to the partitions and ceilings. In addition to the combustible character of these buildings, the Globe building at least, was looked upon as an unsafe structure. The upper stories, surmounting two or three stories of an old building formerly used as a warehouse, were carried on iron pillars, and the upper flours of the building were loaded with heavy machinery. It is by no means improbable that had fire not destroyed the building, it would at some future time have collapsed and caused large loss of life. This building was a type of cheap and showy architecture erected under the supervision of a firm of American architects, who, after securing all the work they could during the period of the boom, returned to their native soil across the line.

There are other buildings still existing constructed in much the same manner, which, should a fire break out in them, would burn out as quickly and spread destruction to adjoining buildings. One amendment to the building by-law should be that roofs of buildings above four stories in height must be of metal and other fire proof materials, and where galvanized iron cornices are used, they should be backed with brick and supported on iron brackets. The method of constructing such cornices with wood backing and hung on wood brackets is a dangerous one, as in case of fire the galvanized iron becomes heated to such a degree as to set fire to the wood, and thus a path is formed for the flames around the top of the building. The combustible material such as has hitherto been employed in roofs and cornices is carried by the wind to adjoining buildings, and in some instances to distant parts of the city, thereby greatly enhancing the danger of a serious conflagration.

The present by-law does not regulate as it should the thickness of walls, nor does it limit as it should the area between brick walls. As a result, many buildings, such as warehouses, have been erected with large floor areas and walls of insufficient strength. A valuable provision would be that such buildings must be divided laterally by brick fire walls. The value of such walls was clearly demonstrated in Messrs. Buntin Reid & Co.'s building, where a twenty-four inch brick wall dividing the building was the means of staying the progress of the fire, and doubtless saved the wholesale district of the city from being swept away.

Something requires to be said also with regard to the use of iron in substitution for wood as a supporting material for buildings. It is well known to those who have investigated the subject that heavy wood beams are better capable of withstanding fire than steel girders and steel or wrought iron pillars, unless the latter are thoroughly encased in fire proof material, such as porous terra cotta. To encase merely the supporting columns, leaving the girders exposed is of little advantage. This method might be of some use in case of a fire breaking out in the basement or the ground floor, as it would be the means of keeping the floor supports intact for a considerable time, thereby giving greater opportunity for the fire to be extinguished. In the case, however, of a building taking fire in the upper stories, it becomes valueless. It is to be hoped that when the building by-law comes up for consideration and amendment, the protection by fire proof material of all structural iron work will be made compulsory.

In the present loose conditions of affairs, it has been possible for an unscrupulous architect, by offering to put up a building of larger dimensions for less money than could be done by one who proposed to carry out his work in an honest manner, to secure work which under proper conditions would find its way into the hands of the better men in the profession.

We are pleased to observe that the Toronto Board of Trade have adopted a resolution calling on the City Council to amend the building by-law, and to establish a building department, at the head of which should be a person fully qualified to judge whether or not the plans for buildings proposed to be erected have been properly designed from a structural standpoint. The head of such a department should be one fully familiar with the strength of the various materials entering into the construction of buildings, as well as the proper methods of using them. There is need also for more frequent and thorough inspection of buildings in course of erection, in order that when the by-law shall have been properly amended, its provisions may not be disregarded.

Finally, there is need for legislation such as the Ontario Association of Architects is seeking to obtain, which would make it compulsory on architects to pass a qualifying examination, and show themselves to be equipped for the proper practice of their profession.

The authorities of the Louvre have been conducting a series of experiments as to the best background for sculpture, and have now decorated the galleries which contain them with a light red colour.

CHARACTER SKETCH.

WM. T. JENNINGS, C.E.

"Because I have neglected nothing."—Nicholas Poussin.

ONE of the men who has played an active part in the construction of public works in Canada, is Mr. Wm. T. Jennings, who was born in Toronto, May 19th, 1846. Mr. Jennings was educated at the Model Grammar School and Upper Canada College in his native city, and commenced his professional career as an engineer in 1869. He was then under Mr. Molesworth, and his first work was to survey the swamp lands of Grey and Bruce for drainage improvements. From 1870 till 1875 he was on the engineering staff of the Great Western Railway, which he left to enter the service of the Dominion Government. From that time forward Mr. Jennings' chief work, perhaps, has been in the line of railroad construction. Several important surveys and construction works in the Northwest, British Columbia and other parts of the Canadian Pacific Railway were made by him while in the service of the Government, the Construction Co., and the C.P.R. Co. From 1886 to 1890 he had charge of the surveys and construction for the C. P. R. in Ontario, and early in 1890 was appointed Engineer for the City of Toronto.

Whatever work Mr. Jennings has undertaken has been marked by thoroughness and complete mastery of his profession. Nowhere was this more apparent than during the two years he occupied the position of City Engineer in Toronto. The basis of the present arrangement between the city and the Street Railway Co. had its origin with Mr. Jennings, and not only the excellent character of the road, but also the revenue the city receives from it in the shape of percentages and mileage tax is largely the result of thought on the part of the late City Engineer. Toronto is proud of its splendidly paved streets, and this work was planned by Mr. Jennings during his occupancy of the office of City Engineer. It was a special study with him to give to Toronto a system of pavements that should not alone be attractive as public thoroughfares, but that would possess endurance and lasting qualities. Negotiations between the city and Bell Telephone Co., which resulted satisfactorily for Toronto, were also undertaken while Mr. Jennings was in the service of the city. He had planned a system of underground wires in connection with the electric light and telephone contracts, and had he remained in office would likely have brought these plans to completion. During these two years the esplanade matter came up for consideration and Mr. Jennings had to fight with his known determination the strong railroad corporations.

WM. T. JENNINGS, C.E.

His official connection with the city did not cover as great a length of time as citizens, desirous of the well-being of Toronto, would have liked. The fact is that Mr. Jennings was too independent and fearless an officer to suit many who at that time occupied the position of aldermen. They quickly learned that he was a man who was master of his business and could not be dictated to, or used by those who had their own little schemes to carry out. Of his own free will, and to the regret of the better elements in the Council, after occupying the position for about two years, he resigned, owing to the aldermanic body breaking faith with him by changing the by-law under which he took office. The past two years of Mr. Jennings professional career have been employed, to a large extent, in the construction of various short lines of railway throughout the province.

Personally Mr. Jennings is popular with all who have his acquaintance or friendship. He is ever ready, out of his wide knowledge of public affairs, to impart information to those honestly wanting information; at the same time he is too busy to rest comfortably under the intrusion of those who hold to a person in his position much the same relationship that the editorial bore does to the journalist in his sanctum. His career furnishes a capital illustration of the saying of Owen Feltham: "That man is but of the lower part of the world that is not brought up to business and affairs."

Mr. Jennings is a member of the Canadian Society of Civil Engineers, the Institution of Civil Engineers, the American Society of Civil Engineers and the American Association for the Advancement of Science.

THE TRANSMISSION OF HEAT.

HEATING a building properly calls into requisition not only practical every day experience in the business of pipe fitting and furnace setting, says the Pacific builder, but also a thorough understanding of the laws governing the production and the communication of heat. As heat is the force, so cold is the absence or diminution of this force. It is produced by a mode of motion through particles of matter, whether gaseous, solid, or liquid, and is communicated in three ways, viz: by radiation, conduction, and convection. The radiation of heat, of which the warmth of the earth is an illustration, is the transmission of heat from one body to another through gases, the heat always passing in straight lines and with great velocity. Conduction consists in the passage of heat from one particle of a substance to another through insensible distances. By convection we mean conduction and radiation, as when heat is carried from one point to another by moving particles in liquid and gases. It should not be forgotten that in liquids and gases there is very little, if any, conduction of heat, and that radiation does not warm the air through which it passes. But while heat is not transmitted from one particle to another in gases and liquids, but depends for dissemination chiefly upon the movements of the particles, it is readily transmitted between them and solids. This is the whole secret of many difficulties in heating, and explains the futile attempts on the part of many purely practical workmen to heat rooms without the necessary attention to circulation. When warm water, steam, or hot air is used it is absolutely necessary that a proper circulation is maintained so that every particle of air or water comes successively into contact with the heated surface of the furnace or radiator. Many persons cannot understand why their rooms, although "perfectly tight" are yet but partially heated, even with a great consumption of fuel. To understand it thoroughly it is only necessary to remember the theory of the communication of heat by convection. For just as warmth and fuel may be wasted by too much ventilation, so they may be also thrown away by a lack of it; and it is only the expert heating engineer, trained both in the practice and in the scientific theory of his business, who is fully competent to meet all requirements of modern house heating and guarantee satisfaction in every instance.

THE wood-carving industry, which was formerly very prominent and profitable in Switzerland, is beginning to arouse serious apprehensions as to its future. The business in the Oberland of the cheaper and lower grades of wood-carving continues to be remunerative, but the demand for the better class of work has fallen off very much. The sales to English customers, formerly very large, have been seriously affected by the competition of German and Austrian woodworkers. The institutions for teaching wood carvers in Germany, established some years since, are said to be well managed and attended, and their influence is fast telling on the Swiss trade. There is at present some Federal and very considerable Cantonal interest taken in the fostering of this industry; but there is a growing sentiment that it can be maintained against the rising competition only by the Confederation assuming a more direct and complete supervsion of it with more liberal subventions for training schools; that the assistance, local and general, is too scattered and imperfectly organized to accomplish satisfactory results.

LINCOLN CATHEDRAL.

By Eustace G. Bird

AFTER travelling through many Cathedral shires, spending much time in sight-seeing, sketching and measuring many old fabrics, I at last set foot upon Lincoln.

Lincoln Cathedral, it may well be said, as she calmly reposes on her "Sovereign Hill" and looking abroad over the wide plains below, has no rival among English Minsters. As seen from a distance, overshadowing scores of red-tiled roofs, standing out against the sky, it is almost perfect in outline, crowned by three noble towers, highly pitched roof, lofty gables and pinnacles and the general harmony of design catches and pleases the eye of the traveller at first sight, and when more closely absorbed and studied, proves itself more worthy of the deepest admiration.

For purity of design, harmony of its parts, and the delicacy of execution of its details, as regards moulding and carving, Lincoln presents the best example of an instructive as well as the most delightful school for the architectural student who desires to make himself thoroughly acquainted with the styles and master of the first rudiments and development of Early English Gothic. For those students and others contemplating an architectural trip to old England, for the purpose of studying the true principles of Gothic Architecture, I strongly advise them to spend most of their time in Lincoln.

From the Norman work of Remigius in 1074 A.D., in the Western facade, and through Alexander "the Magnificent," Hugh of Burgundy, William of Blois, Hugh of Wells and Robert Grosseteste, we reach the touching point of the highest development of Early English Gothic Architecture in the Angel Choir which was finished in 1280 A.D., and exhibits the refinement and elegance as well as a delicacy of finish which can hardly be paralleled.

The observer will see for himself in this Cathedral that each successive epoch of the thirteenth century Gothic Style is complete in and separate of itself and it is obvious that under such circumstances the whole development of the Lancet Architecture can be studied under the one roof with ease.

To return to the history of the cathedral, the first cathedral was erected by Remigius de Fécamp, the first Norman Bishop, on the removal of the See from Dorchester on the Thames, in 1074 A.D. Of this cathedral the only parts remaining are the central portion of the west front, with its three recesses, a fragment of the first bay of the nave and the semi-circle foundations of the apse in the east end. Remigius' work is characterized by stern and almost savage plainness. After a fire in 1141 Alexander restored the cathedral. As to the parts remaining we may ascribe to him probably the three western doorways, the intersecting arcade above the two side recesses of the west front, and the three lower stories of the western towers, with their elaborately ornamented gables facing north and south. These are in the Transition style of the Norman and the Early English.

The great epoch of change which substituted the present exquisite fabric for the plain and bold work of the Normans, began 1196 A.D., during the Episcopate of Hugh the Burgundian, after the cathedral had been shattered by an earthquake.

Under St. Hugh, the choir and eastern transept with a portion of the east wall of the western transept were built. These portions of the building are very remarkable, as affording the earliest known example of pure Lancet Gothic or Early English free from any trace of Norman influence.

During the successive Episcopates of William of Blois, Hugh of Wells and Robert Grosseteste the great transept was completed and the nave gradually carried westwards in the Early English style between 1203—1253. To the close of this period we may assign the two western chapels, the arcaded screen-wall of the west front and its flanking turrets, the vestry and Galilee porch. The chapter house, with its detached buttresses and centre roof column, also belongs to this period. The two lower stories of the central tower were built in 1237 during Grosseteste's Episcopate. The upper story of the tower was commenced under Bishop Dalderby in 1307 and finished in 1311 in the Decorated style. A spire of timber covered with lead surmounted this tower to a height of 524 ft., and was destroyed during a tempest in 1548.

Between 1255 and 1280 we reach the last epoch and stage of the Early English work at Lincoln, in the carrying out of the Angel Choir built on the east end. This may really be called the Transition between Early English and Decorated.

This addition, the gem of the building, consists of five bays—two included in the ritual choir and three forming the retro-choir in which stood the shrine of the saint, and under the east window the altar of Our Lady. It is an exceedingly exquisite work, belonging to the very best period of English architecture and executed with the greatest delicacy of refinement.

There was no substantial addition to the main fabric of the minster after the completion of the Angel Choir. The cloisters and vestibule belong to the Decorated style, 1296. Although small, they present a beautiful example. Of a later date the upper stages of the western towers were built, and in this work will be seen the Transition from Decorated to Perpendicular. The wooden spires, which once crowned these towers, were taken down in 1808.

The Chantry Chapels of Bishops Fleming, Russell, and Longland are of the Perpendicular style.

The library at the north side of the cloisters is a classical work by Christopher Dean, 1674.

THE BYSTANDER.

On another page of this number of the Canadian Architect and Builder is published a letter from Mr. Cecil B. Smith, of Montreal, in reply to certain comments from the Bystander on Portland cements, published in the December issue of this journal. Mr. Smith evidently desires, if possible, to weaken the force of the statements there made, by saddling the authorship of the article in question, on some interested or uninformed source. Let the Bystander say, that Mr. Smith is altogether astray in his conclusions on this point. The Bystander is not interested a particle in Canadian cements further than as a citizen and journalist to give encouragement to the products of the Dominion. Written by a member of the editorial staff of the Architect and Builder, there is no necessity that the articles of the Bystander should carry an individual signature. Still less fair is Mr. Smith's reference to the connection in which Mr. Wright's name is used in the discussion. What views are credited to Mr. Wright, this gentleman is prepared to assume.

× × × ×

Now as to Portland cement. Readers can judge for themselves how far Mr. Smith has answered with any degree of argument or fullness, what was said in this column a month ago. His present letter only adds force to the contention of the writer that Mr. Smith would apply to Canadian cements a line of criticism, that he studiously withholds from English cements. It was stated plainly in former comments on this question that Mr. Wright and the Bystander were one with Mr. Smith in their desire to have produced in Canada a cement of "uniform fineness and strength, which will answer severe specifications." What is asked is, that this same rule be applied to imported cements. The Bystander does not contend that Canadian cements are perfect in uniformity of grinding or burning. Defects in this particular exist, though they are being rapidly overcome. Mr. Smith, however, would leave the impression in his original article and equally so in his letter of this month, that these defects were common only to the home product, and not to the imported article. The Bystander gave a number of facts to show that English cements were wanting in these particulars, just as the Canadian cement, and which disprove the statement now made by Mr. Smith, that English and other makers turn out an article, which is not variable. The Bystander repeats his inquiries of a month ago: What about the thousands of barrels of English cement of the poorest class, brought to this country, and yet supposed to come from an English maker of repute? Why are English manufacturers of Portland cement organizing for the purpose of securing an article that will not be variable? Why should Canadian cements be singled out for criticism, when, as Mr. Wright has shown, they will stand a test easily of 5%, and others have run as high as 3%, 2½% and even 1%, where large proportions of English cements will not average 10%?

× × × ×

Canadian manufacturers will, no doubt, thank anyone for suggestions that will lead to improvement in manufacture, and the Bystander would be sorry to say anything that would lull them into an unconsciousness of mistakes they may make. In doing this, however, there can be no occasion to free their competitors in foreign fields of defects in manufacture in which they are alike culpable with Canadians, and in some respects, are more so.

EFFECT ON THE ST. LAWRENCE OF THE PROPOSED DEVIATION OF A PORTION OF ITS WATERS TOWARDS THE GULF OF MEXICO, BY THE CHICAGO CANAL NOW IN PROCESS OF EXECUTION.

By Chas. Baillairgé, C. E., Quebec.

I DO not know that I can better answer your request for a New Year article than in treating in a cursory manner the necessarily interesting question of the effect which the Chicago drainage works will have on the waters and commerce of the St. Lawrence.

The so-called Chicago Canal, to be 42 miles in length, 160 ft. wide and to draw 20 ft. of water, with a legal capacity of 600,000 cubic ft. of flow per minute, has now been under way for some time. Twenty-nine separate contracts have been let of one mile in extent each, and the canal is expected to be ready for drainage and traffic by the end of 1896.

No doubt the riparians of the Des Plaines, Illinois, and Mississippi rivers have been wedded to the scheme, which, were it simply one of drainage of the great city, would be objected to on account of its polution of the waters of these rivers, by the fact that the sewage is to be thoroughly diluted and rendered so to say inoffensive by such an accession to it of Michigan water as may make of the canal one of a commercial and maritime nature, the prospective profits of the trade overcoming the dislike which the riparians might otherwise have to their waterways being made receptacles for and conveyors of this wealthy neighbor's detribus.

I have just said that the canal is to run 600,000 cubic ft. of water per minute, or 10,000 ft. per second. On the other hand Niagara runs 18 millions of cubic ft. of water per minute from Erie and the upper lakes into Ontario and the St. Lawrence, or 300,000 cubic feet per second. The St. Lawrence flow will therefore, of course, be thereby diminished by one thirtieth, and this of itself will naturally decrease our waters by say one thirtieth of their depth; which even on the channel of Lake St. Peter, must tell against the present draught of ocean steamers.

But Chicago, whose population is now but two millions, or close upon, in the near future may and likely will swell to six millions in another half or quarter of a century, when the canal will have to be enlarged to take the then increased drainage from the city with its percentage of diluting waters from Lake Michigan, in a way to run fully three times the quantity at present legally permitted. And that it may not be inferred that this is a gratuitous supposition, I have to remind your readers that extension has already been provided for in effecting the specifications necessary for the right of way. The ultimate flow through the canal will then be likely 30,000 cubic feet per second, instead of only 10,000, and diminish by one tenth the Niagara outpouring, and also by one tenth the depth of flow of the St. Lawrence; though, by less, below Montreal, due to such tributaries as the Ottawa, the St. Maurice, the Richelieu and other side issues; thus seriously affecting the present possible draught of vessels through Lake St. Peter, with a demand by our friends of Montreal and westward for a further dredging of the channel by some 3 ft. or 10% to make good the loss in flow, to say nothing of the fact that other portions of our maritime highway from the Great Lakes to the Ocean must suffer in a like manner, by forcing us to go back to river craft of less capacity.

Western traders, eastern to Chicago, are beginning to open their eyes to this subject matter of discussion, and it is strange to me that the Montreal, Quebec, and other Chambers of Commerce and Boards of Trade have not as yet in any way alluded to the fact in their more recent transactions.

But as a matter of international concern, or of mere legal right, how can one nation rob another of its God-given resources, turn aside its waters into new channels, any more than in a city, a village, an individual can impound and cause to deviate the waters of any stream or any notable portion thereof, without having, as bound by law, to turn them back into the same natural bed or channel for the use of his next neighbors on a lower level.

And this is why in my last report to the Quebec City Council on the proposed scheme of turning the waters of river Caché into river Huron and thus into lake and river St. Charles for the purposes of our aqueduct, and thus stay complaints and claims for damages by parties below the Lorette dam; this is why, say I, I put the Council on its guard and recommend that our legal advisers be consulted as to whether by thus deviating the Caché from its present purpose of supplementing the Jacques Cartier, the decrease in flow of the latter may not give rise to the same interparochial or intermunicipal complications as those which we are now striving against on part of mill owners who, below the dam are sueing for damages on account of the alleged decrease in the flow of the St. Charles by the off-take of our city aqueduct. Again, in the same way as damages may be caused and sued for on the one river, due to a decrease of its waters, in like manner an accession to those of the Huron and St. Charles above the dam, may be taken advantage of to proffer claims on account of more deeply flooded and otherwise cultivable lands on the borders of these rivers; and if the levees along the Mississippi can hardly hold out as it is during floods, how will it be with the riparians of this now comparatively shallow river, as of the Illinois, when added to in a way to put proprietors along their respective banks to the expense of raising the dams in a way proportionate to increase of flow.

This, Mr. Editor, is, of course, nothing but a mere sketch, destined to cause other engineers to think the matter over and air their views on an important subject of enquiry.

CONCERNING CHIMNEYS.

Americans do not make much of chimneys as do most of the builders of European countries. The builder is not sufficiently honest about his chimneys. Either he gives them undue prominence, overloads them with decorated materials or he treats them as though he were afraid of them. The chimneys of Amsterdam are beautiful indeed and add greatly to the picturesqueness of that city. Likewise in Paris, while they are there treated in a way somewhat more decorative than is common to the rest of the world, they are handled in an honest way, no effort being made to conceal them, and their decorative work is that of artists. There is often the idea that the chimney should maintain a symmetrical relation to the rest of the building. However, in no section of the world do we find a high regard for symmetry in chimneys successful; on the contrary, we find the most beautiful chimneys in that part of the world where they are allowed to have largely their own way; coming out of a building in unexpected ways and decorated by the hand of an artist.—The Clay Worker.

TRIMMING JOISTS.

The efficiency of single flooring is materially affected by the necessity which constantly occurs in practice of trimming round fire places and flues and across openings. Trimming is a mode of supporting the end of a joist by tenoning it into a piece of timber crossing it, and called a trimmer, instead of running upon or into the wall which supports the ends of the other joists generally. A trimmer requires for the most part to be carried or supported at one or both of its ends by some of the joists, which are called trimming joists, and are necessarily made stouter than if they had to bear no more than their own share of the stress. Commonly it is found enough to make trimmers and trimming joists from ½ inch to 1 inch thicker than common joists. In trimming tusk tenons should be used, and the long tongue or main body of the tenon should run not less than 2 inches through, and be draw pinned and wedged, moreover, if it do not completely fill the mortise in the direction of the length of the latter. The principal objection to single flooring, says a writer in an exchange, is that sound readily passes through, the attachment of the boards above and of the ceiling below being to the same joists throughout. Another objection is the necessity of making the joists so thin, not to injure the ceilings, that they with difficulty receive the flooring brads in their upper edges without splitting. A partial remedy for both these disadvantages is found in a mode sometimes adopted of making every third or fourth joist 1 inch or 1½ inches deeper than the intervening joists, and to these ceiling joists are notched and nailed, or nailed alone. This, by diminishing the number of points of contact between the upper and lower surface, for the ceiling joists must be carefully kept from touching the shallower joists of the floor, is less apt to convey sound from one story to another, and allows conveniently thin joists to be used for the ceiling without affecting those of the floor. It clearly, however, involves the necessity of cogging the deeper joists down so much more on the wall plates on which their ends rest.—Carpentry and Building.

OLD TORONTO BUILDERS.

THE dead past has not much interest to many whose lot is with the living present. As Artemus Ward has remarked, however, there is a pleasure in reminiscences of olden times, whilst Professor Wrong, of the Toronto University, in his lecture of a few days ago, is doubtless right when he says that many mistakes of the present would be avoided if people were better acquainted with the history of the past. "History is philosophy, teaching by examples," as another writer has said.

Though untempted to delve deep into the buried past there are few who have not an interest in that particular past which relates to their own selves or their individual callings. This has been the thought of the writer, as he has allowed memory, and historical incident and data, to take him back to the days when Toronto was best known as Muddy York, and the magnificent buildings which are the pride of her citizens to-day were unknown.

To make a start at the beginning of the century there came to York in 1800, Caleb Humphrey, a carpenter, builder and contractor. He was one of the pew holders of St. James church from its commencement in 1803, and pioneers whose memories will enable them to locate the south-west corner of Toronto and Adelaide streets, as it existed in those days, will remember Caleb Humphrey's house. More strictly speaking the late John. G. Howard, to whom the city owes a debt of gratitude for his handsome gift of High Park, ranks as an architect, rather than a builder, and yet many of the early houses of Toronto were built by him. The first 11-in. plank sidewalk on King street was laid by Mr. Howard. He designed the spire on St. Paul's church, Yorkville, in 1841, the work on which was performed by Mr. John Ritchey, the framing by Mr. Wetherald and the raising was superintended by Mr. Joseph Hill. This was one of the curiosities of the time and received significant mention in Dr. Scadding's "Toronto of Old."

A list of the inhabitants of York in 1805 includes in its numbers William Cooper, a builder, and owner of one of the first wharves and warehouses in York. Collin Drummond was a builder, and owner of a lumber yard, located on Yonge street, between Wilton avenue and Shuter streets, the burning of which, with other properties, is still fresh among the boyhood memories of the writer. Henry Hales was a builder and contractor of the first decade of 1800. He had a brick yard at the south-east corner of Duke and George streets. William Smith was a builder, who came to York with Governor Simcoe, and was the first man to take up a building lot after the laying out of the town plot. This was located at the north-east corner of King and Sherbourne streets, and the house which he built is still standing there. William Smith, jr., was a son and a builder. The boys of Toronto, who on Saturdays tramped out Yonge street to Hogg's Hollow, remember well the Severn brewery on Yonge street. This building was originally built by the father of the present John Baxter.

The recent burning of the new Globe building brings to memory the old Globe building, from which was published that journal, when some of us were boys in our teens. It was familiarly known as Dallas' building, and was situated on the property where now stands the Canadian Bank of Commerce. Let us go back, however, of the days when the printing press performed its mission on that site, and it will be remembered as the spot where stood in 1818 the first Methodist church at York. This remained a place of worship until 1833 when it was converted into a theatre. A memento of this church building is to be seen in a walking stick made from a portion of the altar rail by one who in those days was known as "Old Daddy Petch," and which later came into the possession of Mr. Robert Carroll, one of the best known contractors of the present day. Mr. Petch built the old church in question and at one time was a partner of ex-Mayor Manning. By the way, I am reminded that Mr. Carroll is to the manner born, being of the fifth generation of builders, bearing the name of Carroll. The history of the Globe corner of later days is well-known. The old buildings were afterwards supplanted by the fine warerooms of Jakes & Hay, furniture manufacturers, to take their place later by the Bank of Commerce.

The firm of Metcalfe, Forbes & Co., or as they were sometimes known, The Company, were builders of the old Bay street Presbyterian church, situated on the corner of Richmond and Bay streets, and of which the Rev. John Jennings, D. D., was for many years pastor. John Ross Robertson, in his Land Marks of Toronto, tells the story that early in the sixties a great storm occurred in Toronto, and one of the stone pinnacles at the south-east corner of the church was blown down and fell through the roof. The stone in its flight downward detached a piece of wood with a nail in it, which also fell, the nail piercing a Testament in one of the pews and punctured the book through to the text: Mark 7-25, "And the winds blew and beat upon that house; and it fell not; for it was founded upon a rock." The firm of Metcalfe, Forbes & Co. were also contractors for Trinity College and other prominent buildings. James Metcalfe, of this firm, was well-known to many as California Metcalfe, from the fact that he went off to that country and returned to Toronto a rich man, having struck it right in the gold diggings or elsewhere.

Messrs. Ewart & Parkes and Mr. Joseph Turton are known as the contractors of the old Parliament buildings. McDonald & Young make claim of having built the present city hall in 1845. The College avenue of a quarter of a century ago, was different from the College avenue of to-day and was a favorite excursioning point for the boys of that time. I can well remember the spot known as Sleepy Hollow, the residence of the Hon. John Beverley Robinson. This well-known residence was built by Mr. George Shaw, father of Ald. Shaw, and was the first building he ever put up.

The contractor for the masonry work of Knox church, Mr. J. Grant, was a familiar figure in building circles more than 25 years ago. He was known as Tam O'Shanter, because in addition to his business as a contractor he kept a tavern near Duchess street, to which he had given this name. The carpenter work of Knox church was done by McBean & Withrow, the latter the father of the present John Withrow. The gas office, the building of the Trust and Loan Co., and other commercial buildings, were erected by A. Burrowes, who was a contractor of prominence in Toronto 30 years ago. John Plenderleith's carpenter shop on the corner of Elizabeth and Edward streets, taking in the larger part of a square, gave employment to many men in the trade, who are still to be met on the streets of Toronto. An old builder of those days, who keeps active in the service, despite advancing years, is Mr. Wm. J. Hughes, a resident of Simcoe street. He came to Canada in 1832. It may have been forgotten by many citizens that Mr. James Dobson, late post-master at Yorkville, who died at the age of 85 years in December last, was a carpenter and carried on building operations in the city for a number of years.

One of the best known builders of more recent years, and yet an old-timer, was Mr. John Ritchey, who built Ritchey's Terrace, a row of houses on Adelaide street, between Bay and York streets, some of which are still standing, though ancient looking. He was born in 1796 and came to this country from Belfast, Ireland, in 1819. He died April 30th, 1866. He built St. George's church, St. James Cathedral, twice, before and after the fire, Judge Haggarty's residence, Simcoe street, the old Lyceum for French on King street w., the Dominion Express Co.'s offices, Yonge street, and his last work was the Dilworth house, on Jamieson avenue. There are a few men in the building trades to-day who remember John Ritchey, and his name suggests to them interesting incidents in the methods employed by contractors in ye olden days.

No sketch of the old builders of Toronto would be complete without a reference to John Harper, father of George Harper, a well-known Toronto architect of to-day. John Harper was a son of Richard Harper, who left Belfast, Ireland, for New York, in 1810. The father remained a resident of that city until 1817, when the family removed to Toronto, and Mr. Richard Harper entered into the building business. John Harper, the son, followed the father's calling and built St. Michaels Cathedral, Trinity Square, the first General Hospital, the first Toronto Observatory and laid the foundation of the present asylum buildings. He also built what is now known as the Newsboy's Home, a building intended at that time for the Canada Company's offices. The first depot of the Northern Railway was his work. John B. Smith, founder of the firm of J. B. Smith & Sons, lumber merchants, Toronto, and who died in March last, was a contractor, rather than a lumber merchant, in his early business days.

This much about old Toronto builders. The story is by no means exhausted. The digging process is an interesting one and much more could easily be unearthed. This task I may take up at another time, or what is not unlikely, enough has been said to prove suggestive to others, who will avail themselves of the opportunity the ARCHITECT AND BUILDER offers to supplement these reminiscences out of their own knowledge.

HOT WATER HEATING.

The hot water method of house heating is undoubtedly growing in popularity, both with the people and the dealers all through the country. Some idea of the extent, says the Building Register, can be gained from a well defined impression that exists that one-half of the radiation turned out by the manufacturers last year was for use with hot water. Preparations in a number of foundries this year have been made to supply a large demand for radiators for hot water use, both direct and indirect. People who have experienced difficulty in heating some rooms readily accept hot water as a means of heating, when it is explained that the radiator will be hot and throw off its heat in the apartment where it is located, no matter from what quarter the wind blows. The principle of the circulation of hot water is readily grasped by steam fitters, and the details of the pipe fitting can be learned much easier than the apportioning of the proper amount of surface for a given room.

ARCHITECTURAL REMINISCENCES.

A BRIEF HISTORICAL SKETCH OF THE LEADING ARCHITECTS OF TORONTO AND THEIR PRINCIPAL WORKS FROM 1842 DOWN TO THE PRESENT TIME.

THE first regular architect was Mr. John Young, a Scotchman, whose principal work in Toronto was the east wing of what was to have been the University of Toronto. This was erected in 1842, and was a bit of nice Edinburgh Classic work, in cut stone. The scheme was abandoned, and the building was used for some years as a branch lunatic asylum, and afterwards taken down to make way for the new Ontario parliament buildings. Mr. Young died in 1860.

The next architect was Mr. H. B. Lane, an Englishman, who designed the present City Hall and St. George's Church, in 1845, Little Trinity Church in 1846, and Holy Trinity Church in 1847. Mr. Lane returned to the Old Country.

The same year in which Mr. Lane arrived in Toronto witnessed the arrival of Mr. Kivas Tully, a native of the Emerald Isle—a man of good training and ability in his profession. His work was mainly in public buildings, such as the old Custom House, 1845, old Bank of Montreal, same year; St. Catharines Town Hall and Market, 1848; Trinity College, 1850; Welland Court House, 1851; Victoria Hall, Cobourg, in 1856. In the same year he was put in charge of the Toronto Lunatic Asylum and erected new wings and hospital to same in 1867 to 1870. In 1868 he was appointed architect, engineer and chief officer to the Department of Public Works. The public works reports furnish a fair idea of the number of these works passing through his hands, the latest of which is the Asylum for the Insane in course of completion at Brockville Mr. Tully, although well advanced in years, is still the picture of health, and fills well the demands of his onerous office.

Mr. John Tully, brother of Mr. Kivas Tully, came to Toronto in 1843, and after practising for a number of years here, moved to Chicago in 1868, and thence to New Mexico, where he died.

In 1847 a very important acquisition was made to the profession in the person of Mr. Wm. Thomas, architect, who had emigrated to Canada with his family. (A brother of Mr. Thomas was a well-known architectural sculptor in England for many years.) After the great fire here in ——, Mr. Thomas was entrusted with the rebuilding of the St. Lawrence Hall Market Block, which stands a monument to his taste and skill. He also designed Knox Church on Queen street, and the United Presbyterian Church, corner of Bay and Richmond streets, where the Medical Council building now stands. Many handsome shops and residences also give evidence of his skill and taste. Mr. Thomas' two sons, William and Cyrus, were associated with him for several years, and after his death, William settled in Montreal and Cyrus in Chicago. Mr. W. G. Storm was a pupil of Mr. Thomas, and imbibed much of his classic spirit.

Messrs. Cumberland and Storm, both well trained and capable men in their profession, filled a large space from 1847 to 1892 in the architectural progress of this province, and especially of the city of Toronto. St. James Cathedral, 1851; the Normal School Buildings, 1855; Old Toronto Post Office—now the Deputy Receiver General's Office; many county buildings; Toronto University and Osgoode Hall—both of these for many years being considered by visitors the best of their class on the continent.

Mr. Kaufman, a German architect of ability, came to Toronto in 1855. The Bank of Toronto and the Rossin House are samples of his work.

Mr. Joseph Sheard, with his son-in-law, Mr. Wm. Irving, enjoyed for many years a large and lucrative practice. Mr. Irving had the advantage of a good training in Scotch classic work, and their works, both public and private, were of the best class.

Mr. Matthew Sheard, son of Mr. Joseph Sheard, practised both here and in foreign cities, but has now retired from business and is enjoying the fruits of his ability and industry.

Mr. Henry Langley has been connected with the profession for a period of forty-one years, during the greater part of which time he enjoyed a large and lucrative practice, and from whose office a large representation of the present practitioners of the city and province has gone out. Among these are his nephew, Mr. E. Burke, Mr. Frank Darling, Mr. H. B. Gordon, Mr. Post, &c. Many of the largest and most costly churches in the city have been erected from his designs. The completion of the exterior of St. James Cathedral, as also of St. Michael's Cathedral, were his work.

Mr. James Smith, of the firm of Smith & Gemmell, who was contemporary with Mr. Langley, is now practically retired from business, enjoying the fruits of his toil and occupying himself with art and the work of the Royal Canadian Academy.

Mr. David Roberts, who for over thirty years enjoyed a lucrative practice, has now retired.

The new race of architects are now making their history. The new condition of things in the way of development in size of buildings, methods of construction and character of materials, will no doubt produce greater surprises than any in the past.

BOW WINDOWS.

MR. S. Smirke, R.A., remarks: "The bow window, as a peculiarly English feature well deserves our regard and attention. Though so cheerful and pleasant a feature in dwelling houses, it was, perhaps, in its origin designed not only for light and prospect, but also as conducive to security in troublous times, as a looking-out place; giving a wider area for observation than would be awarded by an ordinary window. We see the idea of a bow window carried out, although somewhat timidly, in the Border castles of the North. Subsequently, however, in Tudor times, when castles began to lose their frowning character, indicating a greater sense of security, and a desire to render home not only a place of refuge and defence, but also, to some extent, of domestic enjoyment, we then find them, as at Berkeley Castle, Kenilworth, and many other examples, assuming that particular character which afterwards became one of the principal attractions of an old English mansion. Indeed, we are justified, I think, in claiming this agreeable architectural feature as peculiarly English. Bow windows, no doubt, occur in some form or other in various parts of the Continent, scarcely even, perhaps, in Italy; not very commonly in France; but in Germany some types of the bow window are, I admit, common enough. At Furemburg, that great mine of picturesque architecture which every architectural student should visit and study, some particularly beautiful examples occur. Still there is a manifest local character that distinguishes all these German examples from the genuine old English manner of designing them. The Germans never appear to have so entirely departed from the ancient Gothic type as we find to have been the case in English domestic buildings. Their bow windows are apt to look more like perforated towers than with us; and there seems to have been retained a special disposition to place them at the angles of their houses, as if covertly intended to command the sides of the building, as the bastion of a fortification commands the curtain. Our Tudor bow windows, on the contrary, seem more designed for interior domestic enjoyment. As Bacon says of them, 'These be pretty places for a conference,' and it is certainly obvious that our ancestors, in building these bows, were far more bent on providing means for the pleasant occupation of a room than on producing any ornamental exterior effect. It is true they are always extremely picturesque, and never fail to contribute to the beauty of the building of which they form a part; but this only tends to prove what on former occasions I have repeatedly urged, that in design whatever is peculiarly fit and proper for its individual purpose rarely fails to be agreeable in its appearance."

COLORING METALLIC SURFACES.

A beautiful soft bronze color is now imparted to metals, says the Master Steam Fitter and Heating Engineer, by rubbing with a mixture of bloodstone and graphite, the application being made with a brush. Antique green effects are secured by dipping the metal into a solution of ten parts by weight of salt, ten parts cream tartar, ten parts acetate of copper and thirty parts carbonate of soda in 200 parts of vinegar. The satin finish is produced by green vitriol of copperas and subsequent treatment with wax.

Notice of dissolution of partnership in the firm of Gauthier, Vincent & Dufresne, architects, Montreal, has been filled and a new partnership registered bteween A. J. Vincent and L. A. Dufresne.

BUILDING IN CANADA IN 1894.

A Review of the Year's Operations in Leading Cities of the Dominion.

THE GENERAL SURVEY.

THE review of building operations in Canada for the year just closed, which we are enabled to give below, furnish readers with a fair conception, at least, of the conditions of the building trades in various parts of the Dominion. In a few cases the data that has come to us shows that an increase in building operations has taken place, but an analysis of conditions generally tell of a slow year for building. An increase at some points has taken place in the erection of dwellings for residential purposes. It is to be noted in regard to these, as also in the erection of business properties, that brick and stone are, in most cases, supplanting other materials for building. Even in cities like Winnipeg, and on the Pacific coast, where lumber is the natural product, brick is coming into enlarged use. There has been little done in the line of public works during the year, indicating, apparently, economy on the part of municipalities and governments, as much as individuals. This is a step that, while commendable in some respects, may yet be carried too far, and prove an injury, rather than a help, to the communities where exercised. Wise judgment needs to go with every attempt at economy, and it is to be remembered that the refusal to spend a dollar is not always a saving of that dollar. The labor market has undergone less change during the year than might have been expected, when one considers the depression that has existed in the ranks of skilled and unskilled labor. In the case of the former wages are fixed by the unions; and even though conditions would not permit of paying the highest wage, yet by these regulations men have been debarred from taking a smaller wage when work was offering them. This is one of the features of trade unionism hard for business men to understand when the situation compels a shrinkage in values and calls for a lessening of expenses in every other way. A hopeful feeling exists in regard to 1895, a condition that it is devoutly to be wished may be realized.

MONTREAL, QUE.

Architects and contractors complain with reason that the past year has not been brisk for them. Since 1890 there has been a steady decline in the volume of building operations, as the figures show. In 1893, which was not considered very good, there were about 1000 permits issued, while in 1894 only about 500 were issued, with an aggregate value of $2,750,000. The best year for the building trade in Montreal was 1889, when about 1800 permits were granted.

Although few in number, the buildings put up during 1894 include some of the finest erected in recent years, many of which will rank as architectural landmarks. There is also a decided improvement in the style and finish in all classes of buildings, but more especially in the three-storey stores and dwellings found on all business thoroughfares.

The widening of Notre Dame street has furnished the bulk of business to architects and contractors, as, had it not been for the rebuilding of that street, Montreal would have witnessed the poorest year of building operations ever recorded in its annals. All the buildings put up on that street are three stories in height, the ground floor being devoted to stores and the two storeys above to dwellings, and of pretty much the same type as those recently erected on St. Lawrence Main street, with the exception of a slight improvement in design and a more free use of stone. All are built with stone front, without mansard or peak roof, as the law governing that street states that they shall be built of stone and of no less than three storeys, without mansard or peak roof. Exception has, however, been made in the case of the new west end branch of the Merchants' Bank of Halifax, who are building, under the superintendence of Mr. Edward Maxwell, a substantial building built of sandstone and buff pressed brick, instead of entirely of stone. The building is four stories high, ground floor being occupied by the bank and the balance by tenants, with a handsome balcony on the top storey, decorated by Corinthian columns and the whole crowned by a Renaissance cornice, all of stone.

On the opposite side of Seigneurs street, on the corner of Notre Dame street, the Bank of Montreal is also putting up an elegant building, to be occupied by their west end branch. The building is entirely constructed of red sandstone, three stories in height, with a peak roof, but sloping towards Seigneurs street, and with a monumental gable facing Notre Dame street, decorated with Romanesque bas reliefs. This building is under the direction of the architects of the Bank, Messrs. Taylor & Gordon, who have just completed the Montreal branch of the Bank of Toronto.

Messrs. Perrault & Lesage have also built a branch office for the "Banque d'Hochelaga," and sixteen other buildings for various citizens on that street. Messrs. Perrault, Mesnard & Venne have built a dozen buildings on the same street for the estate of the late Hon. C. S. Rodier. Mr. W. McLea Walbank has also built fourteen buildings of the same class.

Amongst the public buildings erected this year the branch of the Bank of Toronto standing at the corner of McGill and St. James streets is the most important of all. It is built of sandstone, five storeys in height, well proportioned and richly carved. The building is a decided credit to the architects, Messrs. Taylor and Gordon; the sculptors, Messrs. Holbrook & Mollington, of Toronto, and the contractors for the masonry, Messrs. Whighton & Morrison. The porch forming the entrance to the banking room is profusely carved in the Romanesque style, and bears over the centre of two fine Tennessee marble columns the coat of arms of the city of Toronto. The interior is highly finished in marble and mosaics. The ground floor is utilized by the bank and the other storeys are laid out as offices. The six storey building of the "Banque du Peuple" comes next. Although not being an entirely new building—as the walls of the ground floor in the old structure were preserved—it might be considered as new, as no trace of the old structure is visible inside. The building is constructed of limestone; on the ground floor is located the banking room, which is entered by a large entrance porch, and which in proportion is about similar to that of the New York Life Building, which is situated opposite. The upper storeys are laid out as offices, all of which are admirably well lighted; in the centre there is a large light well running the full breadth of the building, elegantly finished in wood and painted in white enamel, with a gallery running all around at each storey. The cost of the building was $160,000, which is very low, if we consider the extent of the work done. The architects were Messrs. Perrault, Mesnard & Venne.

The Street Railway Company are building a six storey building at the corner of Place d'Armes Hill, Craig Street and Fortification Lane—built of limestone—to be partly used by the company and partly laid out as offices. Work has been at a standstill since its recent collapse, and has passed from the hands of a Montreal architect into the hands of Mr. Post, of New York.

The Birks block on Phillips Square is one of the many business blocks put up by Mr. Edward Maxwell; it is four storeys high and built of sandstone.

The Masonic Temple now going up on Dorchester street—future home of that confraternity—was won in competition by Mr. David R. Brown. It is four stories high, the ground floor being built of sandstone and the other stories above of buff pressed brick, contrasting singularly with the surrounding buildings, which are all of red brick.

The Murphy dry goods store is one of the most extensive business establishments put up this year. It is situated on St. Catherine street, is five storeys in height, built entirely of red sandstone, and was designed by Messrs. J. W. & E. C. Hopkins.

St. Antoine Market at the corner of St. James and Mountain streets, as the result of the fire of which it was the victim last winter, had to undergo a complete renovation. This task was entrusted to Messrs. Maurice Perrault and Eric Mann, who have jointly prepared the plans and superintended the construction.

Amongst the ecclesiastical buildings put up this year Erskine Presbyterian church is one of the finest. It is built on Sherbrooke street, in Deschambault limestone, with a graceful tower on the angle. The principal exterior feature is a large arch, half of its diameter being pierced by foliated lights in stone. The architect of this church was Mr. A. C. Hutchison, R.C.A. Knox church on Dorchester is another of the additions to ecclesiastical architecture that deserves to be mentioned. It is built of limestone and covered with a roof of conical shape, crowned by a lantern. The church has a seating capacity of 1200, and was designed by Mr. Edward Maxwell. Messrs. Brown & McVicar have put up the Taylor Presbyterian Church on Papineau Road—built of Scotch fire brick—with a seating capacity of 800. An important addition to St. George's Church (the finest church in the city after Christ Cathedral) was made during the year. The main tower, which had been left uncompleted at the level of the eaves of the roof, was completed under the direction of Messrs. Dunlop & Heriot, who have well succeeded in designing the tower in harmony with the architecture of the church.

The number of educational institutions has been augmented by three very important additions, viz.: The Seminary of Philosophy, five storeys in height, 300 feet long, with two projecting wings of 95 feet. The building is in the Renaissance style, built of limestone and situated on Sherbrooke street west. It cost in the neighborhood of $300,000. The Sacred Heart Academy on St. Alexander street, opposite St. Mary's College, is one of these three. The Academy is also a very large building and cost about $180,000. The chapel, which is very large, forms the central feature, and the class rooms are housed in two large wings on each side of the chapel. The other is the large building now being built on St. Denis street for the Laval University, which is also of limestone, four storeys high, and similar in its layout and proportion, to the new Board of Trade building. Its cost will be in the neighborhood of $200,000. Messrs. Perrault, Mesnard & Venne were the architects for these three institutions—the latter having been obtained in competition amongst forty competitors. Mr. A. C. Hutchison has also put up a substantial Academy at Cote St. Antoine, built of pressed brick.

The residences put up this year were not very numerous, but very good buildings were erected, amongst which are the residence of Mr. E. S. Clouston, of the Bank of Montreal, on Peel street, by Mr. Edward Maxwell; the residences of Messrs. C. Meredith and D. McIntyre on the same street and by the same architect, and the residence of Mr. Jas. A. Gillespie at the head of Stanley street, which has been designed to meet the owner's fancy for an old-fashioned English brick house, a desire which has been very successfully carried out by the architects, Messrs. Jas. and H. C. Nelson. Mr. Robert Findlay has also designed a house of quite artistic appearance in the Gothic style for Dr. D. F. Gurd, on Bishop street. Mr. W. McLea Walbank has also prepared the plans for the sandstone residence of Alderman Costigan on Dorchester street. Mr. A. Raza is building two large costly residences—one for Ald. Dubuc and the other for Ald. Brunet, on Sherbrooke street—both in the French Renaissance style, and elaborately decorated.

The price of material and labor, skilled and unskilled, has naturally slightly declined, owing to the dullness of building operations.

We look forward to a bright season in 1895. Early as it is, it can yet be said that 1895 will certainly excel 1894. The passing of the Anger Bill which renders the proprietor of a building responsible for the wages of men and cost of material employed in the erection of his building, if they are not paid for by the contractor, even if the contractor has already been paid the whole of his contract, has done a good deal to curtail building operations in this city during 1894. The Building Inspector is of opinion that the past year would have been very much superior to what it has been had this law not been in existence, and he says that the sooner it is repealed the better. A delegation of Montreal architects and building owners waited on the Provincial Government last December to urge the repeal of the Act but nothing has been done so far.

TORONTO, ONT.

Though rather more than a million dollars were expended in building operations in Toronto during 1894, as shown by the building permits granted, published below, the invariable reply from architects and builders is that the year has been most inactive. The permits fall below those of 1893 by some $340,000. A comparison of the two years also shows that 82 brick dwellings were erected in 1894, at a cost of $265,400, as against 139 brick dwellings, costing $446,700, in 1893.

Toronto has not fully recovered from the building excesses of the boom period, and though the vacant houses that numbered several thousands a few years ago are filling up, there are yet sufficient of these to meet all demands of the population, which happily, despite commercial depression, continues to grow. It would be a mistake for these reasons to say anything that would give unhealthy encouragement to an extension of house building, and yet the impression prevails in some circles that not a few dwellings might be erected with profit to the owners. The remark has been made by a well-known city builder that there are a good many houses in Toronto of a character that ought not to exist, some wanting seriously, because of age, in sanitary requirements. Others were built in the height of the boom and are not fit places to live in, and if people could only be made to understand this they would forsake the imperfect and unfit-to-be-inhabited houses and rent properties which are not possessed of these faults. The reply has been made that with curtailed incomes many persons are obliged to reside in houses that otherwise they would not rent, the low rent being the only inducement. In the better houses, to which reference has been made, the extra value would be secured in the additional accommodation and healthfulness of the home, and such houses are to be had to-day at low rental. As a result of an exodus of this kind from the poorer to the better houses it is believed that a stimulus would be given to improved building operations, and the old and imperfect houses would be torn down and others erected to take their place.

Perhaps the most notable buildings of the year have been the large seven-storey store erected on the south-west corner of Yonge and Queen sts. for R. Simpson, and the fine premises on King st. for John Catto & Son. The former is down on the permits granted as representing $80,000. In some respects the building stands out unique among the many fine warehouses and stores in Toronto. The architect was Mr. Edmund Burke, and we are glad to be able to give in this number of the ARCHITECT AND BUILDER illustration and letter press description of this store. Langley & Langley were the architects for the Catto store, and at another date we expect to publish an illustration and description of it. Both buildings are suggestive of innovations, and modern ideas, in store building and it is noticeable in the new store in course of erection for Kent, jeweller, as also in other store buildings, that some of these fresher ideas are being embodied.

In church building there has been hardly anything new in the year closed, outside of additions and alterations to several of the churches. School building has been more in the line of additions than new buildings. The Fern avenue school in Parkdale, opened for occupation after the holidays, is the only building that stands out for special mention. Work on the Union Station, which is down among the permits of 1893 for $185,000, and helps to swell the increase of that year, was pushed ahead vigorously in 1894, and is represented in the permits of the year by $52,000. Though not singled out in the permits of 1894 the alterations and additions in the head office of the Imperial Bank on Wellington street occupies a prominent place in the work of the year. These alterations practically mean a remodelling of the entire bank and will cost from $30,000 to $35,000. Messrs. Darling, Sproatt & Pearson are the architects and have reason to be congratulated on the character of the work done.

It seems but fair to note the fact that whilst the large music hall erected by Mr. Massey, and the Fred Victor Mission Hall, another evidence of this citizen's philanthrophy, appear on the permits of 1893 for $60,000 and $50,000 respectively, that a large part of the work on both buildings was done in 1894, the Mission Hall, which went in excess of the proposed expenditure, not being completed until near the end of 1894. Work on the new Court House was also pushed ahead with improved energy in 1894 and gave increased business to the building trades.

Building materials have in sympathy with the shrinkage in values in every branch of business shown a tendency to weaken, and better properties for relatively less money were erected in 1894 than in some years previous, a fact that cuts some figure in estimating the value of the work of the year. There has been no lowering of the standard union wage in the leading building trades within the year, and yet the labor market has been just that dull that contracts have been taken at unusally low figures and by different methods this reduction in price has been in part levelled up in securing labor at a reduce wage. This disposition, born of the depression of the past few years, to con-

tract for work at prices that can present only a small margin of profit to the contractor, if not in some cases, actual loss, is a problem that gives concern to thoughtful men in the business.

Returns from the City Registry Office for the year just closed showed the total number of mortgages recorded during the year to be 2,133, and the aggregate amount of incumbrances, $6,188,449. The city, for the purpose of registry, is divided into the eastern and western divisions and the returns show that there were 213 more mortgages recorded in the eastern than in the western division, and a difference in the amount loaned of $2,413,125.

What is the outlook for 1895? This is a question that seemed difficult to answer up to the first few days of the new year. Architects could not report that any large business was ahead of them. There have been talked-of operations in different lines. A million dollar hotel for Toronto has been named, and will be considered at a public meeting to be held this month, but whether it will go on, it is a hard matter to say. It would certainly add encouragingly to the work of the year. It is unnecessary to say that every citizen was pained to learn on Sunday 6th inst. of the disastrous fire that swept away the Globe building, the McKinnon warehouse and other valuable properties in the business part of the city, and they were appalled when on Thursday night it came to their knowledge that a second immense fire had broken out, and before its ravages could be stayed that a number of large wholesale warehouses, in the vicinity of Melinda, Wellington and Bay streets had been destroyed. The total loss in buildings from the two fires will represent nearly $1,000,000. With hardly an exception it is to be expected that these buildings will be rebuilt. This, of course, will mean an unexpected increase to building activities in 1895.

BUILDING PERMITS, 1894.

		Cost.
82	Brick dwellings	$ 264,400
4	Brickfronted dwellings	4,100
6	Roughcast dwellings	7,000
24	Brick stores	63,200
48	Alterations and additions to stores	67,500
8	Factories and work shops	54,600
8	Additions and alterations to factories	15,300
5	Warehouses	25,700
5	Alterations and additions to warehouses	31,000
34	New stables and additions to stables	12,140
133	Alterations and additions to houses	85,860
5	New schools and additions to schools	53,500
7	Churches and additions to churches	15,600
6	Hotels and additions to hotels and breweries	17,600
4	Coal sheds	14,300
2	Car houses and additions	32,000
1	Chemical laboratory at University	58,000
1	Addition to Hospital	30,000
1	Freight shed	20,000
3	Parts of new Union Station	52,000
2	Brick towers, gas works	5,000
1	Large store for R. Simpson	80,000
9	Miscellaneous buildings	11,425
	Total	$ 1,620,125.

Total number of permits granted, 400.

BUILDING PERMITS, 1893.

139	Brick buildings	$ 446,700
9	Brick fronted dwellings	9,800
9	Roughcast dwellings	6,900
14	Brick stores	72,350
28	Alterations to stores	49 600
4	Factories	37,500
26	Additions to factories	73,710
8	Warehouses	112,600
6	Additions to buildings	30,200
27	Brick stables	24,100
4	Roughcast stables	590
139	Additions and alterations to buildings	68,040
2	Club buildings	19,000
9	Office buildings	29,775
3	Hotels and additions	12,100
3	Additions to churches	2,750
1	Addition to Registry office	16,000
1	Music hall	60,000
1	Mission hall	50,000
1	Addition to Haven	15,000
1	Railway station	185,000
1	Motor shop	30,000
8	Miscellaneous	10,000
	Total	$ 1,361,850.

Total number of permits granted 444.

OTTAWA, ONT.

The greatest dullness in building circles prevailed in Ottawa during 1894, and the business done showed a marked decline over that of 1893. Few new buildings were erected. The work done consisted principally of structural remodelling of old buildings. The work of greater importance that may be specially named is as follows: Young Women's Christian Association, $15,000; Maternity Hospital, $7,000; Grant's block, $18,000; Stavis' block, $11,000; Hayter Reed's house, $16,000; St. Andrew's church, improvements, $5,000, together with certain additions to the Windsor Hotel, the Bank of Ottawa, and alterations in the Perley block. The main work done throughout the year was under the direction of Arnoldi & Calderon, G. M. Bayley, F. J. Alexander, Gregg & Gregg, William Hodgson, M. C. Edey and James Mather. There appears to have been little, if any, difference between the cost of building materials in 1894 and 1893, and prices for labor have remained about the same. With a few insignificant exceptions the principal material used in building has been local stone and brick. Ottawa is not a place where speculative building is indulged in to any alarming extent, and yet each year a number of cheaply finished dwellings are erected by contractors on speculation, meeting, seemingly, the requirements of a certain class of the population. Time alone will tell what 1895 will bring forth; as yet no new work is in view.

HAMILTON, ONT.

The total value of permits issued in Hamilton for 1894 was $464,832, against $471,768 in 1893, showing a decline of only $7,136. It may, therefore, be said, that despite dull times the Ambitious City has held its own better than many other cities in the Dominion. The work completed has shown a goodly increase in residential buildings, with 18 business buildings and 4 public buildings. Among the latter can be included two schools, at a cost of $20,000 each, Mr. A. W. Peene and Mr. W. A. Edwards being the architects; House of Refuge, $22,000, R. H. Barber, architect; addition to St. Joseph's Hospital, $12,000, R. Clopecy, architect. The larger part of the work of 1894 was undertaken by the following contractors: Halliday & Webber, G. H. Mills, R. Press, Wark & White and Hannan & Jacques. The cost of building materials in 1894 was considerably less than in 1893. Labor, skilled and unskilled, commanded about the same price as a year previous. Not a little of the prosperity of Hamilton during 1894, and this likely explains the increase in the erection of residential buildings, is due to the Hamilton smelting works, located in the outskirts of the city, a concern employing a large number of workmen. Architects and builders look forward to a prosperous year in 1895.

LONDON, ONT.

Building operations in London for the years 1893 and 1894 have run about parallel with each other. The more important buildings erected in 1894 were: St. Paul's Cathedral, at a cost of $50,000; First Presbyterian Church, $25,000; remodelling the Huron and Erie Savings and Loan Building at an expenditure of $15,000. These buildings were designed by Spiers & Rohns, of Detroit, Mich. Tambling & Jones were contractors of the first named building, E. Martyn and W. Tytler of the second, and J. Haymon and Jones Bros. of the third. A large amount of residence building was done during 1894 and of a character that reflects credit on Moore & Henry, H. C. McBride, J. A. Gauld and George Craddock, home architects. It is to be noted that the heavier work of the year has fallen to American architects, and this disposition on the part of the people of London has been further aggravated in awarding the designs for the new Free Library buildings to Mr. C. C. Haight, of New York, though he has since established himself in business in London. Why should this be so with talent of the first order at home? The money that goes to pay for such edifices as St. Paul's Cathedral, the Presbyterian church and the Loan Society comes from the people of London. Prices of material during 1894 were considerably less than in 1893. The labor market has remained about the same. The prospects in building for 1895 are exceedingly encouraging.

OWEN SOUND, ONT.

The growing town of Owen Sound in 1894 did not fall behind the year previous in building operations, the figures for both years running about $35,000. The most noteworthy feature has been the erection of a considerable number of residential buildings of the decidedly better class. Only one business block of importance was erected in 1894. Brick and limestone trimmings have predominated in material employed. Prices of material were about the same in 1894 as in 1893. An unhealthy feature of the building trades has been the disposition in many cases to take work at abnormally low prices. Some contracts of the year were undoubtedly taken at a loss. This may be considered a good thing for the capitalist who is putting his money into

property, but taking a wider view, from the business standpoint, it is a feature of trade that in the end can only be productive of evil. Work in this locality commences, owing in part to a late spring, later than in some other places, which renders it difficult to say just yet what the prospects will be for the new season.

GUELPH, ONT.

The Royal City during 1894 showed a degree of activity in building operations that was common to few places. The volume of business done amounted to $150,000, which was about $10,000 in excess of 1893. These figures can be divided as follows: Residential, $61,300; business, $21,700; public buildings, $67,000. The erection of an opera house at a cost of $37,000, a large addition to the hospital, costing $30,000, and a block of stores for Thomas P. Coffee embraced the heavier contracts. The architects to whom was assigned the chief work of the year were H. J. Powell, Stratford, G. M. Miller, Toronto, and John Day, Guelph. Brick and stone have been nearly altogether used in building operations. There has been no change as compared with 1893, either in the price of material or labor. The prospects for 1895 are good.

BELLEVILLE, ONT.

About $100,000 is the figure that will cover building operations in Belleville during 1894, a slight decrease over 1893. Largely these have consisted of buildings for business purposes and the material used has been nearly altogether brick. Neither in prices of material or labor can it be said that the conditions of 1894 differ from those of 1893. No public buildings were erected during the year, calling for particular mention. A hopeful feeling exists regarding the new year, and it is expected that the volume of business done will exceed that of the year just closed.

QUEBEC, QUE.

Building records in the Old Capital for 1894 do not augur hopefully for the growth of the city. The volume of operations will not total more than about $500,000, about one half of that of 1893. This work has been largely covered in the erection of residential buildings of brick and stone. No buildings of sufficient importance have been erected during the year to call forth special mention. Prices of brick were lower in 1894 than in 1893, whilst stone and lumber have remained nominally unchanged. Wages commanded by bricklayers have been decidedly less than a year ago. Masons, carpenters, joiners and roofers have been paid about the same wage in 1894 as in 1893. With a retrospect as dull as that here stated, it is yet too early to make any reliable forecast for 1895.

ST. JOHN, N. B.

The year 1894 was one of extreme dullness in building operations in St. John, falling below the average of other years. No buildings of any importance were erected that could be singled out for special reference. There has been more or less in the line of repairing and the erection of a few low priced houses. What the new year will bring forth "no fellow can tell" yet.

HALIFAX, N. S.

More money was expended in building operations in Halifax, N. S. in 1894 than in 1893. About 130 buildings were erected, besides alterations and improvements to 40 others. These may be divided as follows: Residential 79, of these 6 brick and 73 wood; business 45, 14 brick and 31 wood; public 6, 1 brick and 5 wood. The buildings that stand out most prominent are: Roman Catholic Seminary, brick and stone, J. C. Dumaresq, architect, M. E. Keefe, contractor, cost $35,000; N. S. Furnishing Co.'s store, brick and stone, E. Elliot, architect, Rhodes Curry & Co., contractors, cost $30,000; Clayton's business block, brick and stone, J. C. Dumaresq, architect, John McInnis & Sons, contractors, cost $12,000; Roy's business block, brick and stone, S. H. Tremane, architect, T. M. Brookfield, contractor, cost $12,000. Prices of material in 1894 showed little change as compared with 1893. Wages of carpenters and laborers were about 25% less in 1894 than 1893. Prices of labor in other trades remained unaltered. The decrease in wages of carpenters may be accounted for, in part, from the fact that the depression in the United States drove many in this line to seek employment in the Maritime Provinces. On the other hand there was a scarcity of masons, as a good many were engaged in work in St. John's, Nfld. Prospects for the new year seem fair, though it is difficult to speak correctly until about April. Several good buildings are in contemplation.

VANCOUVER, B. C.

The year 1894 has held its own in building lines fairly well when compared with 1893. The total cost of buildings erected was, perhaps, a little less than that of 1893, but the difference has not been particularly noteworthy. Residences of the better class have run into fair numbers, though, generally, too many of these have borne the stamp of the speculative builder. Office buildings, rather than warehouses, have predominated among the business class. There has been little or nothing in the way of public buildings during the year closed, except what remained to complete of the court house, representing a cost of $40,000. The architect in this case was Mr. R. Mackay Fripp, F.R.I.B.A. Other buildings of considerable size are as follows: The Dunn block, cost $20,000, architect, William Blackmore; Hudson Bay warehouse, $30,000 to $35,000, architect, O. Wick; Bank of Montreal, (completed), Mr. A. T. Taylor, F.R.I.B.A., of Montreal, architect. In both the prices of material and of labor there has been a slight decline. Buildings, as a whole, in this new Pacific coast city, show a marked improvement in quality of workmanship, durability of material, and in a few isolated cases the designing and planing are far in advance of past years. The Bank of Montreal is the most noticeable example of this. With timber in rich abundance in British Columbia, residential buildings are almost entirely of wood. For business purposes brick and stone is coming into increased use. Brick with Portland cement facing and cornices is prominent in the public buildings of Vancouver. No one is over sanguine of the outlook for 1895; the indications at present point to a somewhat dull season.

WINNIPEG, MAN.

As is the case with most new and progressive cities Winnipeg has had a varied experience when viewed from the standpoint of architect and builder. It has had its boom, and its collapse. But of late years the growth of the city has been of a more steady and reliable character. The fact that the year 1894 was less favorable in building than 1893 may doubtless be accounted for by the financial depression that has existed the world over, and which has not left unscathed our own country. There was less building in Winnipeg in 1894 than in 1893. Few residences of any importance were erected, the work in this line being confined chiefly to cottages and houses of a small class. An unfavorable feature in connection with house building has been a manifest tendency to speculative building. Only disaster can follow the continuance of this method, and in the best interests of Winnipeg it is to be hoped that neither capitalists or building societies will allow themselves to encourage this line of work. Prominent among the more important buildings erected during the year have been the new court house, or rather its completion in 1894, at an expenditure of $53,000, and representing a total cost of $72,000. The Ottawa Bank was also finished during the past year. The total cost of the building was about $60,000, and rather more than half of this was expended on the work in 1894. The Davis block of stores was erected at a cost of $20,000; alterations were made in the Union Bank, amounting to $10,000; buildings for water works purposes were erected at a cost of $13,000. The architect of the buildings named was Mr. Charles H. Wheeler. There was also erected in 1894 St. George's Church (Episcopal), brick veneer and stone foundation; basement used for Sunday School purposes; cost $12,000; architect, Mr. George Browne. The Nurses' Home in connection with the General Hospital, solid brick and stone foundation, two storeys and finished basement and attic, was the work of Mr. McGowan, architect. St. Andrew's Church (Presbyterian) was erected at a cost of from $35,000 to $40,000; materials used, stone and brick; architect, J. McDiarmid. A work of marked importance in 1894 was the Wesley College, erected at a cost of $75,000; materials used, Calgary stone, backed with brick, slate roof; Geo. H. Browne and S. F. Peters, associate architects. Compared with 1893 no remarkable change has occurred in the labor market. Skilled labor command as good a wage as in 1893, whilst unskilled labor has shown a slight decline. Brick and stone were cheaper in 1894 than in 1893, materials in use in wood-work holding unaltered. Brick, stone and steel are coming into increased use in building in Winnipeg. Well informed authorities say that things at present are so dull that it is difficult to predict what will be the outcome of the building trades in 1895.

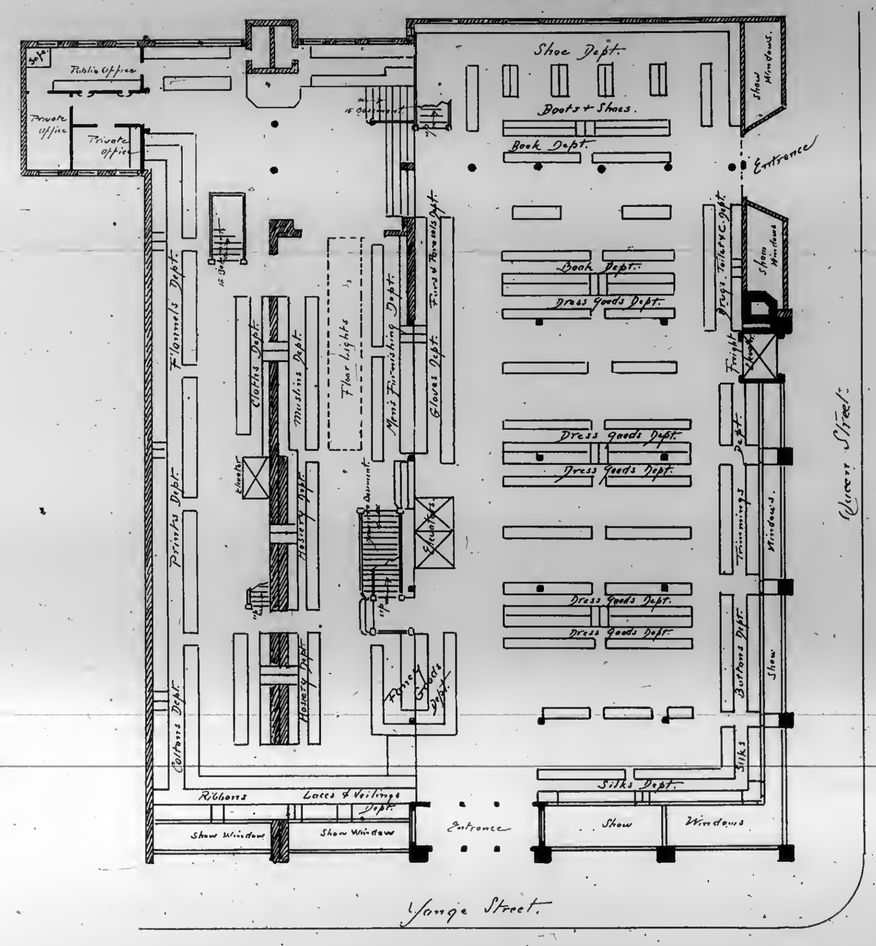
ILLUSTRATIONS.

STORE OF R. SIMPSON, CORNER OF YONGE AND QUEEN STREETS, TORONTO.—EDMUND BURKE, ARCHITECT.

THE premises cover a frontage on Yonge street of 118 feet, and on Queen street 157 feet, the corner, 70 × 100 feet, being occupied by the new building.

Building operations were somewhat hampered and difficult owing to the conditions and surroundings. Some of the heaviest traffic on the streets of Toronto is centered at this point, street cars passing up and down Yonge street about once a minute, and along Queen street at about double that interval. The foot traffic on Yonge street is also exceptionally great, and as the tracks are double on both streets, and turn the corner within a few feet of the curb, it was found necessary to provide a passage of ample width without encroaching on the roadway and permit at the same time the prosecution of the excavation under the sidewalk. This was accomplished by the construction of a raised bridge kept three feet above the level of the roadway, supported by shores, which were lengthened as the excavation was deepened. This bridge was covered in to form the usual hoarding for the protection of the public, and the whole was maintained till the completion of the building and also of the granolithic sidewalk beneath. The Queen street sidewalk for a length of 105 feet was fenced in, and most of the material was taken in through one or two openings. Long girders, etc., had to be taken in at night or in the short intervals between the passing of the cars. Business had also to be maintained in the Queen and Yonge street stores without interruption. To this end a complete wooden wall, dust and weather proof from cellar to roof, was constructed in these stores, sufficiently far away to permit of the removal of the party walls and to make connections of old floors to new beams supported from the columns carrying the new building. Some of the work was carried on night and day, chiefly the excavation and the structural steel works, the night work being done by the aid of electric lights.

Store For R. Simpson Esq.
Cor. Yonge and Queen Sts Toronto.
Edmund Burke Architect.


Shoe Dept.
Boots & Shoes.
Book Dept.
Entrance
Book Dept.
Dress Goods Dept.
Dress Goods Dept.
Dress Goods Dept.
Dress Goods Dept.
Dress Goods Dept.
Silks Dept.
Show Windows
Entrance
Show Windows
Ribbons
Laces & Veilings Dept.
Show Windows
Yonge Street
Queen Street
Public Office
Private Office
Flannels Dept.
Clothing Dept.
Muslins Dept.
Flannels Dept.
Gloves Dept.
Hosiery Dept.
Corsets Dept.
Hosiery Dept.
Fancy Goods Dept.
Trimmings Dept.
Buttons Dept.
Silks
Trimmings
Mantles
Show Windows
Fancy Goods Dept.
Millinery Dept.
Mens Furnishing
Floor Lights
Elevator
Stairs
Shoe Windows
Trimmings Dept.
Shoe Windows
Trimmings Dept.
Shoe Windows
Trimmings Dept.

STUDENTS' DEPARTMENT.

"C. A. & B." COMPETITION FOR A MUSKOKA COTTAGE.

THE judges in the above competition have submitted the following report:

"Although a great many designs have been submitted, this competition is not at all satisfactory. The competitors have exercised the greatest freedom in the interpretation of the conditions, but in spite of this not one of them has produced anything approaching an ideal "Muskoka Cottage."

"Ye Olde" has been placed first because in this design alone some artistic skill is evinced in the treatment of the elevations, but the planning is very weak. No advantage has been taken of the variation in levels in the site, and the avowed purpose of enclosing the walls of the two elevations not shown with siding, cannot be too strongly condemned.

> "Rearing our temple let it be our pride
> Nought to neglect, but build with patient care,
> A perfect building, finished everywhere;
> Not a mere facade with one good side."

A 12x22 room without a fireplace and with a stair and four doors opening off it, is not a "generous living room" for a Muskoka cottage, and the pantry would be very much better between dining room and kitchen. The 10x10 room with a stair reducing the height of one side to 4 ft. 6 in., lighted only from a window overlooking the front verandah, and labelled "bedroom," would be of very little use for that purpose, and there are not enough closets.

"Bydand" gets 2nd place by the ingenious manner in which he plans his bedrooms, but the verandah is much too narrow and would be much better without the rise of three steps at the west end. This difference in level, while it prevents an entrance to the verandah at the ground level, has the effect of reducing the privacy of the front bedroom. The fireplace in living room is very badly placed, and this room would be much better for a window unshaded by the verandah. The arrangement of doors to kitchen and pantry is bad.

"Eureka," which takes 3rd place, is unquestionably the most carefully thought out plan submitted, and would, but for the silly affectation of symmetry, in showing two stairs from the living room, both landing in the same spot on first floor and balancing the porch by the cloak room, have taken a better place. The idea of giving the whole of the ground floor to the living room and verandah, and taking advantage of the hillside site to get the kitchen department at a lower level is good and well adapted to the requirements of Muskoka life, but it would be better to have the dumb waiter larger, so that it could act as a sort of moveable pantry, as this would enable the removal of dishes, &c., from the living room after meals to be effected very rapidly and easily. The fireplace alcove is too near the door, and the cloak room too far from it. The bedroom floor is well planned, but a bath-room is hardly necessary in a Muskoka summer cottage. The flat roof would be an excellent place for a dance on a moonlight evening. Although excessively ugly, praise is due for the frank way in which the elevations are treated, and the drawing is good.

"Rosseau" comes in a good fourth, with a good verandah but very poor living room. The fireplace between the stairs and pantry door is utterly useless, and the cutting off of the internal corners of the living room is childish. The "den" would be better treated as a simple alcove off the living room. The bedroom floor is fairly well planned, but would be better if the little triangular closet were left out and the N. W. bedroom finished like the N. E.

"Gravenhurst" submits a simple plan, substituting dining room, reception hall and sitting room for the living room called for, but all the windows to these rooms are shaded by the verandah and the proportions of the elevations are not good. A fireplace and chimney built of boulders as shown in the section would be cumbersome and difficult to keep clean.

"Hunter" has a very good arrangement for his earth closet and the kitchen and pantry are fairly well arranged, but both living room and verandah are poor, and the bedrooms are not sufficiently lighted.

"Kenozsha" has a good living room but very poor verandah. The space between kitchen and ground floor bedroom would have been much better as one good pantry than cut up as it is. The bedroom floor plan is good, but rather too much space is devoted to the hall.

The work submitted, with perhaps the single exception of "Ye Olde," points to a familiarity on the part of the students with second rate examples of American design, but evinces little or no knowledge or study of the principles of true architecture, and we would advise the students to direct their attention to the study of better examples of architectural design. Osbourne's House Planning gives the principles of domestic planning in a very concise form, and examples of skilful and artistic design for small houses are to be found in plenty in the pages of the "Builder," "Building News," and other similar publications.

Most of the drawings submitted might, for any evidence of artistic knowledge they contain, have obtained their motive from some of the publications issued by the "Co-operative Building Plan Association" or other similar institutions, and if "the budding architect" cannot produce better work than this, the public can hardly be expected to go to the expense of architectural services for buildings of this sort.

S. H. TOWNSEND.
H. J. EDWARDS.
JOHN GEMMELL.

[The names of the winners of the competition are as follows: "Ye Olde," T. R. Johnson, 74 Baldwin St., Toronto; "Bydand," Kenneth Gordon, Toronto; "Eureka," J. Eugene Payette, N. Y. Life Building, Montreal.—EDITOR C. A. & B.]

BEARING POWER OF FOUNDATIONS.

FROM the valuable note-book of Mr. E. L. Corthell, of the Western Society of Engineers, we have been permitted to extract the following data respecting the bearing power of foundations.

Clay.—From 2 to 8 or 9 tons per square foot, without allowance for friction.

Sand.—The different kinds vary greatly in bearing power Sand mixed with loam will not bear more than 5 tons per square font. 9.3 tons per square foot were placed on fine gravel and sand at Urk viaduct: masonry piers on cylinders 4.8 inch diameter; friction neglected.

In India, on coarse sand in deep foundations, not over 9 tons are used.

In experiments 20 tons have been put on sand without measurable settlement.

Friction.—Side friction varies from 200 to 600 pounds per square foot.

All the above are in gross tons=2,240 pounds.—B. Baker April 17, 1888.

Clay.—Black Friars Bridge, 5 tons per square foot. Settled badly.—Randall Hunt, Engineering and Building Record, June 23, 1888.

New London Bridge, 5 tons per square foot on piles, =80 tons per pile. Settled badly.

Newcastle-on-Tyne, 1½ tons per square foot; no settlement.

Fargo, Dakota, four-story building, 2½ tons per square foot; failed. Then 1½ tons per square foot; no settlement.

Cleveland, new viaduct, 1 to 1.7 tons per square foot.

Washington Monument, 9 tons per square foot, inside edge. Clay and sand, 3 tons per square foot, outside edge.

Sand.—Coney Island pier, 5 tons per square foot.

New York Steam Company's chimney, 4 tons per square foot on fine sand; settled.

Brooklyn Bridge anchorage, 4 tons per square foot.

Nantes Bridge, 6.8 tons per square foot; settled.

Berlin, considered safe, 2.3 tons per square foot.

Sometimes used to 4.1 tons per square foot.

Albany Capitol, 2 tons per square foot; settled.

Cairo Bridge, fatigue weight:

Channel piers, 3.34 tons per square foot.

River Piers, 33.08 tons per square foot.

Friction on sides taken at 4,000 pounds per square foot; fine sand.

Sioux City, Pier III; sand, 2.64 tons per square foot.

Soft Soil.—India, one ton per square foot used.—Journal of Engineering.

SAFE BUILDING REQUIREMENTS.

IN view of the necessity for immediate revision of the by-law which is supposed to govern the erection of buildings in the city of Toronto, we print below the provisions of the building laws of the cities of New York and Boston regulating the thickness of walls of brick and stone buildings of varying heights:—

THICKNESS OF WALLS REQUIRED IN THE CITY OF NEW YORK DWELLING HOUSES.

HEIGHT OF WALLS.	THICKNESS. FOUNDATIONS. STONE.	FOUNDATIONS. BRICK.	EXTERNAL WALLS	PARTY WALLS.
Not exceeding 55 feet.	20″	16″	12″	12″
Exceeding 55′ but not exceeding 80′.	24″	20″	16″ to top of second floor, 12″ remaining height, if not more than 40′.	16″
Exceeding 80′	8in. thicker than the wall next above.	4in. thicker than the wall next above.	4″ thicker than the above for every 15′ added to the height of the wall above 80′.	16 inches.

BUILDINGS OTHER THAN DWELLINGS.

HEIGHT OF WALLS.	STONE.	BRICK.	BEARING WALLS.	OTHER WALLS.
Not exceeding 40′.	20″	16″	12″	12in.
Exceeding 40′ not exceeding 55′.	24″	20″	16″	12in.
Exceeding 55′ not exceeding 75′.	28″	24″	20″ to height of 20′. 16″ to height of 55′. 12″ remaining height	4in. less than bearing wall
Exceeding 70′ not exceeding 85′.	32″	28″	24″ to height of 12′. 24″ to height of 60′. 16in. remaining h'g't	
Exceeding 85′	8in. thicker than the wall next above.	4in. thicker than the wall next above.	4in. thicker than the above for every 15′ added to the height above the 85ft.	

THICKNESS OF WALLS REQUIRED IN BOSTON DWELLING HOUSES.

	THICKNESS. FOUNDATION. BLOCK STONE.	FOUNDATION. RUBBLE STONE.	BRICKS.	EXTERNAL WALLS.	PARTY WALLS.
Not exceeding 35 ft.	16in.	20in.	16in.	12in.	12in.
Exceeding 35 ft., not exceeding 55 ft.	18in.	22½in.	16in.	12in.	12in.
Exceeding 55 ft.	20in.	25in.	20in.	12in.	12in.

BUILDINGS OTHER THAN DWELLINGS.

HEIGHT OF WALLS.	THICKNESS. FOUNDATION. BLOCK STONE	FOUNDATION. RUBBLE STONE.	EXTERNAL WALLS.	PARTY WALLS SOLID.	PARTY WALLS VAULTED.
Not exceeding 35ft.	24in.	30in.	16in. to top of upper floor, 12in. remaining height.	20in. to top of second floor, 16in. to roof, 12 in. remaining height.	20in. from foundation to under side of roof boards.
Exceeding 35ft.	28in.	× × ×	20in. to top of third floor, 16in. remaining height.	Same as above.	

In Germany water pipes are being made of glass with asphalte covering, to prevent fracture. It is claimed that they give thorough protection against moisture in the ground, and against the action of acids and alkalies.

FIREPROOF FLOORING.

THE increased interest which has within the past year or two been shown in the construction of fireproof floors is indicated in a marked manner by the experiments, though small in number, which have been made for the purpose of testing the strength and fire endurance of concrete and hollow-tile flooring, as well as by other tests now contemplated. These evidences show that this class of construction is receiving an amount of attention which is destined to soon bring it to a much more satisfactory condition than it has hitherto attained. It is obviously easy and simple enough to construct a floor which will be both strong enough and essentially fireproof with either concrete by itself or with any of the rather numerous clay products in the shape of hollow terra-cotta or tile, provided it is not at the same time requisite to attain low cost and a minimum weight. As a matter of fact, up to the present time fireproof floors of the best quality and requisite strength are excessively heavy, as anyone must readily realize who has designed a modern high building of the skeleton type. The weights or loads under which the column sections are designed, are made up largely of the weight of the floors, which are dead weights in the most intense sense of the word. They add extremely little to the stability and stiffness of the building, but they add both directly and indirectly to the cost of the structure, and hence any kind of floor which is found to yield an increase in unit strength, as it were, and thus decrease total weight, cannot fail to be of material advantage.

The recent tests of a combined concrete and iron-wire floor, together with corresponding tests of flat and arched hollow-tile flooring recently made at Trenton and fully described in The Engineering Record of Dec. 22, show that the combination of metal and concrete possesses some characteristics of considerable merit in this connection. A number of combinations of the same materials and for the same purpose, as is well known, have for some time been advocated and even employed for fireproof floor construction, but we do not recollect that any quantitative tests of strength and resistance to fire have been made prior to those which have just been named. The two chiefly interesting features brought out by these tests were, the large reduction in weight (about 40 per cent.) over the hollow-tiled floors with which experiments were made and the apparent fire endurance of the combined iron and concrete. Sufficient data are not at hand to enable any reliable comparative estimates of cost to be made, but there seems to be no costly elements in either the material or processes required by the lighter construction, while its high load-carrying capacity certainly fills every reasonable demand for strength. It is obviously a necessity for the fire endurance of such a combination that the metallic portion should be well imbedded in the concrete, but having attained that end, it would seem that an essentially fireproof quality is attained.

It has been maintained by some engineers that the rates of expansion and contraction due to change of temperature would in a short time destroy such a combination, but it is now well known that the two rates for iron and steel and cement mortar or concrete are so nearly the same that for practical purposes they may be considered identical, and hence that there is no ground for criticism on this score. The whole field is one of no little structural interest, and the questions involved can be satisfactorily settled in no other way than by intelligently conducted quantitative tests such as those we have named and others now in preparation.—Engineering Record.

It is probable the Normans, after their arrival in England, adopted the dwellings they found in existence until the necessity of their removal, through decay, induced the re-erection of the buildings in an improved and more commodious form, and it began to be found that the repeated destruction by fire of the frail tenements of their predecessors induced the necessity of a change in the material of the houses. Accordingly, in the twelfth century stone with shingle or thatch as a roof covering began to be employed by those who had the means of doing so. This, of course, tended to confine the ravages of fire to the building where it originated; but the houses thus erected were comparatively few in number, and it is to be remarked that in the decrees of the Assize of London, in the first year of Richard I.'s reign, no provision is made for chimneys. Richard's ordination says the walls were to be 3 ft. thick, 16 ft. high, and of hewn stone; upon these were built wooded gables of heights irregular, and instead of thatch they were to be slated or covered with Brent tiles.

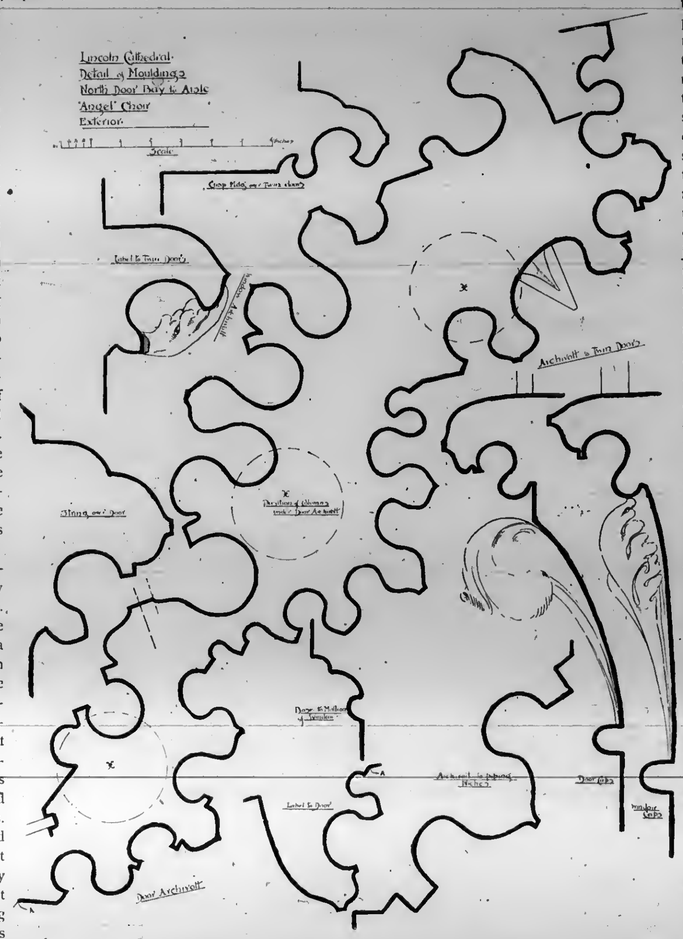
POINTERS ON TRADE JOURNALS.

It is a prominent and indisputable fact that those periodicals known as trade journals are great factors in individual business success at the present day. This is owing to their educational character and to the care and judgment exercised in their preparation. And while the field of trade journalism may be in many instances overcrowded, still there are few papers of this class which do not possess a peculiar merit that entitles them to consideration.

In the distribution of advertising patronage the importance of trade journals as mediums is too frequently overlooked, or else a proper value is not placed upon the quality of the publicity which they can give their patrons. Few general advertisers give thoughtful consideration to the claims which such papers present, and consequently fail to do justice to their worth; but indefatigable efforts on the part of the journals themselves must ere long bring to them the recognition they deserve. When an advertiser prepares to distribute his patronage there are three facts in connection with the different advertising mediums which he takes into account—quantity of circulation, quality of circulation and space rates. These then, are the facts to be considered in regard to the value of trade journals to advertisers.

First as regards quantity of circulation. It cannot be expected that a class publication will enjoy the same field favorable to the acquirement of enormous circulation figures that is accorded to newspapers. Being published for a class, it is of necessity confined to that class in securing readers, and its circulation is therefore limited to the magnitude of its class. But notwithstanding this fact, a study of the American Newspaper Directory will reveal a number of trade journals that possess a clientage surprisingly large, and there can be no doubt that the leading exponents of each line of business go to a very large percentage of the members of its own trade brotherhood.

But the shrewd advertiser well knows that the true merit of a medium does not lie in the size of its edition only. He looks deeper than this before investing in its pages, and it is here that the trade journal will bear the closest investigation and comparison. In the quality of its circulation, it possesses an unquestioned superiority over any other sort of publication. It fills a place that no newspaper or magazine can occupy, because it is of individual interest, while the latter is of general interest. It talks only about subjects that concern its class of readers, teaching them new business methods and the most profitable manner of applying these methods, so that it becomes a veritable schoolmaster in its own particular field. Thus by its educational facilities it contributes to the final success of many a struggling young business man, helping him over the rough places and guiding him to safer paths. It therefore follows that each issue of such a journal is regarded by its readers as a thing of value and carefully studied as a source of profit to themselves. It is preserved for future reference, and the advertisement it contains brings forth fruit long after those that have appeared in a newspaper are forgotten. I think it will be admitted that these valuable characteristics entitles the trade journal to a high position among advertising media. Now, a word about rates. It is true that class publications, as a rule, ask more for their space than newspapers, but take into consideration the quality of this space and then tell me if they do not deserve all they ask. Of course excellent judgment must be used in selecting the class of journals in which to advertise a certain kind of goods, but after this has been happily done compare the results with newspaper results in proportion to circulation. All articles cannot be profitably advertised in class journals, but many can be, and to advertise the latter I would rather pay five cents per line per thousand of circulation to trade papers than one-half to newspapers. Results will justify this assertion. — Jas. B. Kirk, in Printers' Ink.

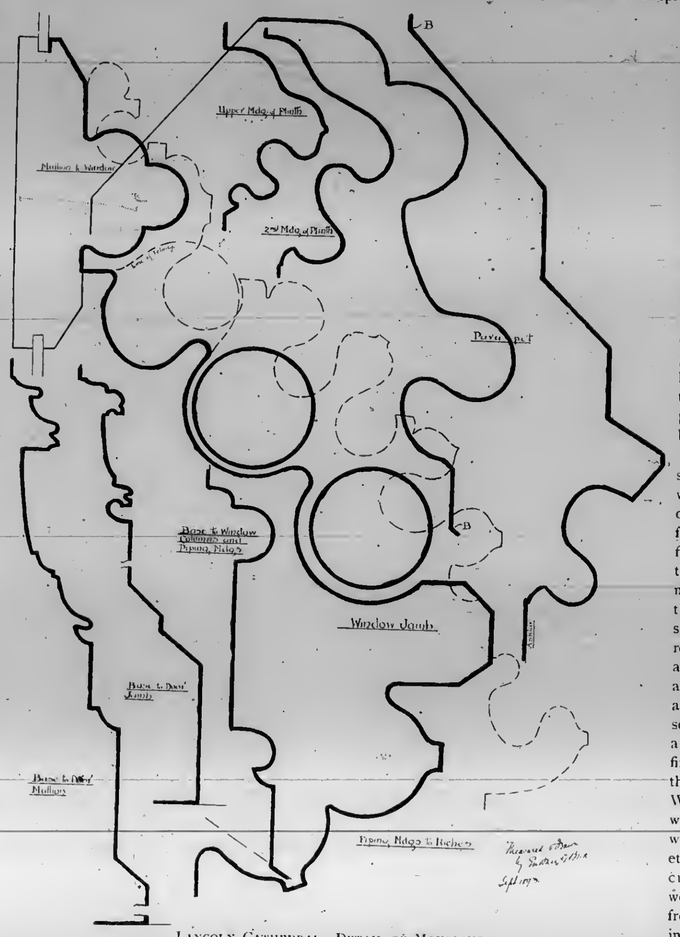


Whites from lead should never be used in water-color drawing. In many of the drawings by the old painters patches of black occur where the high lights were introduced. This is due to the use of white lead.

There has just come from the bending kiln of the Diamond Plate Glass Company, of Kokoma, Indiana, the largest bent plate glass ever made in America. The glass was cast and bent to order, and measures 108x133 inches, containing 100 square feet. The magnitude of this product can be appreciated when it is understood that in the two largest bending works in the country—the Oriel, of St. Louis, and the Trenton, of Trenton, N. J., no plate has ever been bent which contains over 35 square feet. The plate just completed will be used in a fine business building at Duluth.—Southern Manufacturer and Builder.

CONCRETE.

The discovery of the use of concrete is curious. In excavating for one of the piers of Waterloo Bridge, says the Builders' Reporter, the workmen had a good deal of difficulty, owing to the very compact state of the gravel forming the bed of the river, which everywhere else they had found perfectly loose. This effect had been produced by the accidental sinking of a barge-load of lime over that spot some time before, which had cemented the loose gravel into a solid mass, resembling the calcareous conglomerates of nature which are gradually formed by a similar process. Mr. Rennie having mentioned this circumstance to Sir Robert (then Mr.) Smirke, the latter with great judgment availed himself of the hint and subsequently used it in all his foundations, none of which have ever been known to fail. Part of the penitentiary at Milbank, begun by another architect in a different manner before Sir Robert Smirke was employed there, was evidently giving way. The superior efficiency of concrete was also proved in a remarkable manner at the new Custom House, where the floor of the large apartment called the Long Room actually fell in and the whole building was in danger, owing to the insufficient manner in which the piling had been originally executed in a very difficult situation. At this period Sir Robert Smirke was consulted, who found it necessary to pull down a small part of the building, but saved the rest of it by undersetting all the walls with concrete, to the average width of 12 feet and to the depth of from 12 feet to 15 feet—that is, until he found a natural bed of gravel, including one course of Yorkshire landing stones and twelve courses of brick laid in cement, having three offsets or footings between the Yorkshire landings, resting on the concrete and the base of the original walls. No other expedient could possibly have saved this fine edifice from entire demolition. It must be allowed that not only the ancient Romans and after them the Moors, but even the Norman barons of England in their feudal castles used concrete, of which Kendal Castle is one of the most striking examples; and more recently Belidor, in his "Architecture Hydraulique," treats of beton mortar, which is much the same; so that is not absolutely new. In fact, according to the old proverb there is scarcely anything new under the sun; but the merit of introducing this immense improvement systematically and generally into the modern practice of architecture is undoubtedly due to Sir Robert Smirke.



Lincoln Cathedral.—Detail of Mouldings.

PREVENTION OF FIRE.

A circular was recently issued by the Fire Underwriters of Missouri, under the above title. We quote here a few of the hints which will be found to be not only plausible, but eminently practical.

Electric trolley railroads should not be permitted to furnish light or power to any building, as it is highly dangerous, being almost certain to cause a fire in every instance.

Elevators, staircases, etc., should be in fireproof or fire-resisting shafts or in hallways, cut off from the main structure by brick walls, with self-closing doors at each storey, which latter would be improved if covered with metal on both sides. Where elevators and staircases are not cut off by brick walls, they may be cut off at small expense by metallic lath or plaster partitions of patent plaster blocks.

Ventilating shafts, dumb-waiters and all other openings from floor to floor throughout the buildings, if necessary (and they seldom are) should be of fire-resisting material throughout; at best they are are likely to serve as flues, and convey fires throughout the structure. Wooden-chutes, wooden dumb-waiter shafts, etc., are inexcusable, and well-holes, while frequently found in mercantile buildings, ought not to be allowed anywhere. Electric wires should be run through strong tubes of brass or other metal, with hard leather insulation. Where not so protected, the driving of a nail by some careless mechanic, breaking the insulation and cutting the wire or combustible material, may cause a short circuit and a serious fire. A small inexpensive fire-extinguisher kept on the premises may be the means of saving your property in case of fire.

PUBLICATIONS.

The Consolidated Plate Glass Co., of Toronto, have issued a perpetual calendar, handsomely mounted, with the company's name and address in silver letters on the front.

Just preceding the famous Charcot's death he prepared an article for The Cosmopolitan on Pasteur, to be published after Pasteur's death. But Charcot has died first, and so with the consent of Charcot's executors, the article is given now.

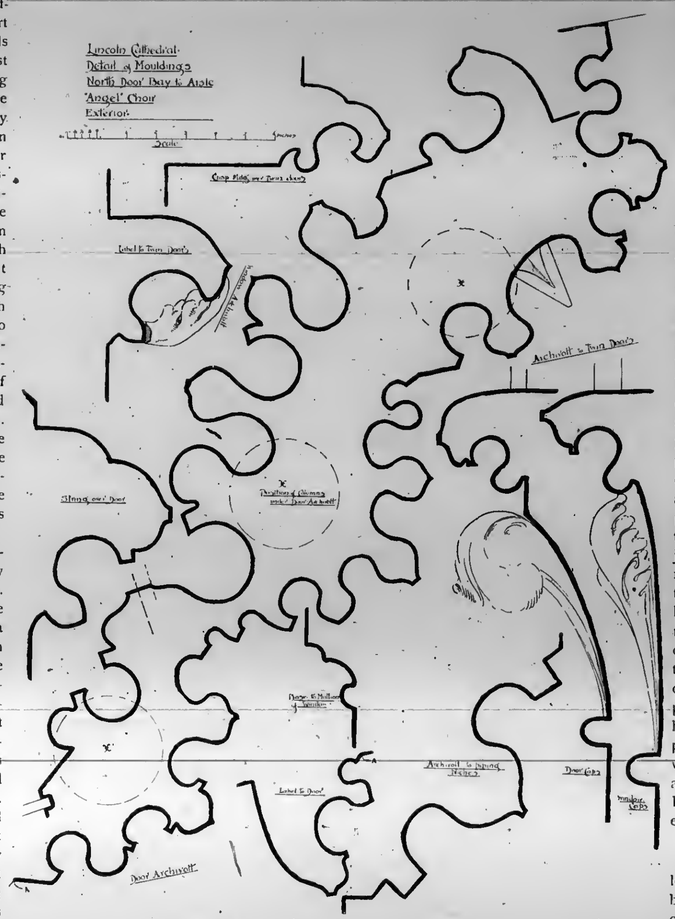
POINTERS ON TRADE JOURNALS.

It is a prominent and indisputable fact that those periodicals known as trade journals are great factors in individual business success at the present day. This is owing to their educational character and to the care and judgment exercised in their preparation. And while the field of trade journalism may be in many instances overcrowded, still there are few papers of this class which do not possess a peculiar merit that entitles them to consideration.

In the distribution of advertising patronage the importance of trade journals as mediums is too frequently overlooked, or else a proper value is not placed upon the quality of the publicity which they can give their patrons. Few general advertisers give thoughtful consideration to the claims which such papers present, and consequently fail to do justice to their worth; but indefatigable efforts on the part of the journals themselves must ere long bring to them the recognition they deserve. When an advertiser prepares to distribute his patronage there are three facts in connection with the different advertising mediums which he takes into account—quantity of circulation, quality of circulation and space rates. These then, are the facts to be considered in regard to the value of trade journals to advertisers.

First as regards quantity of circulation. It cannot be expected that a class publication will enjoy the same field favorable to the acquirement of enormous circulation figures that is accorded to newspapers. Being published for a class, it is of necessity confined to that class in securing readers, and its circulation is therefore limited to the magnitude of its class. But notwithstanding this fact, a study of the American Newspaper Directory will reveal a number of trade journals that possess a clientage surprisingly large, and there can be no doubt that the leading exponents of each line of business go to a very large percentage of the members of its own trade brotherhood.

But the shrewd advertiser well knows that the true merit of a medium does not lie in the size of its edition only. He looks deeper than this before investing in its pages, and it is here that the trade journal will bear the closest investigation and comparison. In the quality of its circulation, it possesses an unquestioned superiority over any other sort of publication. It fills a place that no newspaper or magazine can occupy, because it is of individual interest, while the latter is of general interest. It talks only about subjects that concern its class of readers, teaching them new business methods and the most profitable manner of applying these methods, so that it becomes a veritable schoolmaster in its own particular field. Thus by its educational facilities it contributes to the final success of many a struggling young business man, helping him over the rough places and guiding him to safer paths. It therefore follows that each issue of such a journal is regarded by its readers as a thing of value and carefully studied as a source of profit to themselves. It is preserved for future reference, and the advertisement it contains brings forth fruit long after those that have appeared in a newspaper are forgotten. I think it will be admitted that these valuable characteristics entitles the trade journal to a high position among advertising media. Now, a word about rates. It is true that class publications, as a rule, ask more for their space than newspapers, but take into consideration the quality of this space and then tell me if they do not deserve all they ask. Of course excellent judgment must be used in selecting the class of journals in which to advertise a certain kind of goods, but after this has been happily done compare the results with newspaper results in proportion to circulation. All articles cannot be profitably advertised in class journals, but many can be, and to advertise the latter I would rather pay five cents per line per thousand of circulation to trade papers than one-half to newspapers. Results will justify this assertion. — Jas. B. Kirk, in Printers' Ink.

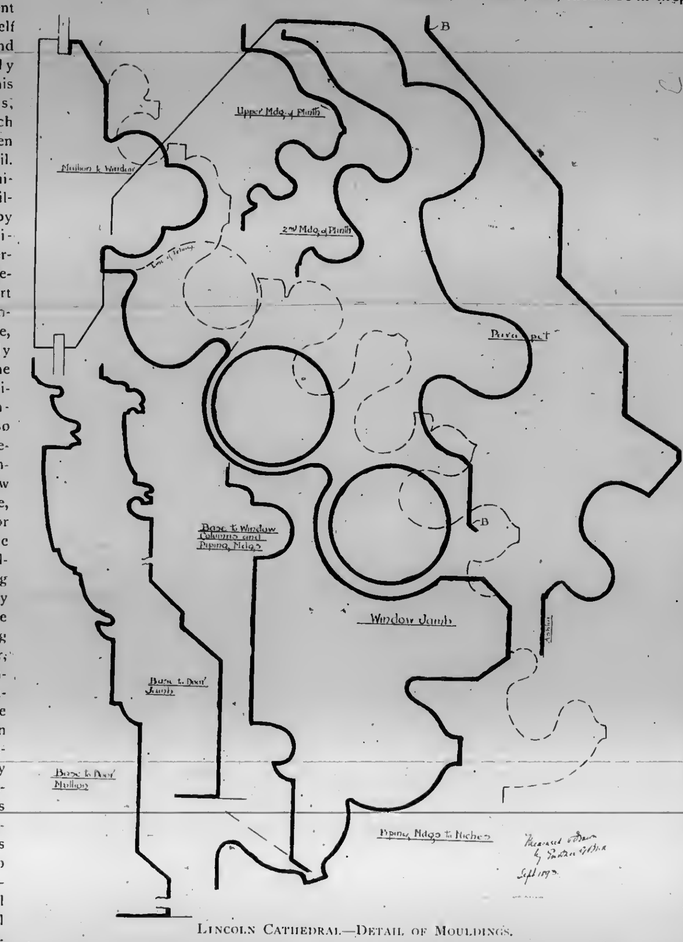


Whites from lead should never be used in water-color drawing. In many of the drawings by the old painters patches of black occur where the high lights were introduced. This is due to the use of white lead.

There has just come from the bending kiln of the Diamond Plate Glass Company, of Kokoma, Indiana, the largest bent plate glass ever made in America. The glass was cast and bent to order, and measures 108x133 inches, containing 100 square feet. The magnitude of this product can be appreciated when it is understood that in the two largest bending works in the country—the Oriel, of St. Louis, and the Trenton, of Trenton, N. J., no plate has ever been bent which contains over 35 square feet. The plate just completed will be used in a fine business building at Duluth.—Southern Manufacturer and Builder.

CONCRETE.

The discovery of the use of concrete is curious. In excavating for one of the piers of Waterloo Bridge, says the Builders' Reporter, the workmen had a good deal of difficulty, owing to the very compact state of the gravel forming the bed of the river, which everywhere else they had found perfectly loose. This effect had been produced by the accidental sinking of a barge-load of lime over that spot some time before, which had cemented the loose gravel into a solid mass, resembling the calcareous conglomerates of nature which are gradually formed by a similar process. Mr. Rennie having mentioned this circumstance to Sir Robert (then Mr.) Smirke, the latter with great judgment availed himself of the hint and subsequently used it in all his foundations, none of which have ever been known to fail. Part of the penitentiary at Milbank, begun by another architect in a different manner before Sir Robert Smirke was employed there, was evidently giving way. The superior efficiency of concrete was also proved in a remarkable manner at the new Custom House, where the floor of the large apartment called the Long Room actually fell in and the whole building was in danger, owing to the insufficient manner in which the piling had been originally executed in a very difficult situation. At this period Sir Robert Smirke was consulted, who found it necessary to pull down a small part of the building, but saved the rest of it by undersetting all the walls with concrete, to the average width of 12 feet and to the depth of from 12 feet to 15 feet—that is, until he found a natural bed of gravel, including one course of Yorkshire landing stones and twelve courses of brick laid in cement, having three offsets or footings between the Yorkshire landings, resting on the concrete and the base of the original walls. No other expedient could possibly have saved this fine edifice from entire demolition. It must be allowed that not only the ancient Romans and after them the Moors, but even the Norman barons of England in their feudal castles used concrete, of which Kendal Castle is one of the most striking examples; and more recently Belidor, in his "Architecture Hydraulique," treats of beton mortar, which is much the same; so that is not absolutely new. In fact, according to the old proverb there is scarcely anything new under the sun; but the merit of introducing this immense improvement systematically and generally into the modern practice of architecture is undoubtedly due to Sir Robert Smirke.



Lincoln Cathedral.—Detail of Mouldings.

PREVENTION OF FIRE.

A circular was recently issued by the Fire Underwriters of Missouri, under the above title. We quote here a few of the hints which will be found to be not only plausible, but eminently practical.

Electric trolley railroads should not be permitted to furnish light or power to any building, as it is highly dangerous, being almost certain to cause a fire in every instance.

Elevators, staircases, etc., should be in fireproof or fire-resisting shafts or in hallways, cut off from the main structure by brick walls, with self-closing doors at each storey, which latter would be improved if covered with metal on both sides. Where elevators and staircases are not cut off by brick walls, they may be cut off at small expense by metallic lath or plaster partitions of patent plaster blocks.

Ventilating shafts, dumb-waiters and all other openings from floor to floor throughout the buildings, if necessary (and they seldom are) should be of fire-resisting material throughout; at best they are are likely to serve as flues, and convey fires throughout the structure. Wooden-chutes, wooden dumb-waiter shafts, etc., are inexcusable, and well-holes, while frequently found in mercantile buildings, ought not to be allowed anywhere. Electric wires should be run through strong tubes of brass or other metal, with hard leather insulation. Where not so protected, the driving of a nail by some careless mechanic, breaking the insulation and cutting the wire or combustible material, may cause a short circuit and a serious fire. A small inexpensive fire-extinguisher kept on the premises may be the means of saving your property in case of fire.

PUBLICATIONS.

The Consolidated Plate Glass Co., of Toronto, have issued a perpetual calendar, handsomely mounted, with the company's name and address in silver letters on the front.

Just preceding the famous Charcot's death he prepared an article for The Cosmopolitan on Pasteur, to be published after Pasteur's death. But Charcot has died first, and so with the consent of Charcot's executors, the article is given now.

CORRESPONDENCE.

Letters are invited for this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not resume responsibility for the opinions of correspondents.]

CANADIAN v. IMPORTED CEMENTS.

McGILL UNIVERSITY,
MONTREAL, Jan. 1st, 1895.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—I notice in your December issue, a somewhat lengthy criticism on an article written by myself, for the Canadian Engineer. I prefer, myself, to write over my own signature in criticising other articles, and, I am sure, if Mr. Wright had known that his name was to be dragged into the discussion, he would have preferred to have made his views known in a letter signed by himself. The Bystander, I presume, is a reporter or else someone interested in Canadian cements.

It is somewhat amusing to see myself put down as having English and Montreal sectional feeling, being as I am of Canadian stock for many generations back, born in Ontario not far from Toronto, and trying at every possible turn to do all I can, in my humble way, to make Canada greater and stronger. It is not necessary to state this to my friends, but as most of your readers have now heard of me for the first time I think this ought to be stated in justice to all concerned.

What has my critic proved? Nothing! I stated that the Canadian portland cements could be very good, and gave facts to prove it. I stated that they could also be found, at times, very poor, and gave facts there also! What has this on the face of it? Lack of patriotism? Is it to the true interests of an infant industry to lull it into the belief that it has reached a safe position?

If you will pardon a little more discussion, I will give you some incidents: A gentleman building sub-aqueous work asked me about a certain Canadian brand. I praised it highly, but explicitly stated that my samples had come from the manufacturer. I was then commissioned to test *it* and the Burham English brand. The Canadian one would have been taken if satisfactory, as the Burham, though a safe ordinary cement, is very coarse, having 5% residue on a 50 sieve. When I went to get the samples, at the dealer's, the Canadian cement I was shown for *competition*—far from being a good one—was simply vile. I protested, and urged the dealer to see if this was not an especially poor grinding. He obtained samples from another shipment, which I also tested. This also was too poor to consider at all—and thus the Canadian manufacturer lost a heavy sale—lost prestige. Why? Because, although he could turn out a very good cement, he also allowed very poor grindings to pass out of his own works (all marked with the same brand) to earn him a reputation. I have no doubt that many other experiences could be given by your readers of similar cases, whereas it is well known that the many years experience, large plants and careful chemical inspection have enabled English and other makers to turn out an article which, although not first-class, is yet not *variable*. A shipment of 4,000 bbls., if tested say every 100 bbls., could be depended on, while, if a Canadian maker who turns out 50 to 100 bbls. per day does not keep turning out the same article day by day, it will take the most exhaustive testing to detect the sudden variations.

What I advised was, increasing vigilance on the part of Canadian makers, that they might, by turning out a *uniformly* good article, gain the confidence of the army of consumers who do *not* test every 10 bbls; and, I repeat it, I see no better way than to have impartial tests made monthly, and published.

That, however, is a matter of judgment. As to the matter of facts, they stand uncontradicted. They were written with the best of intentions, and I believe will bear fruit. If, no other, they will call public attention to the industry, and warn the manufacturers of the pitfall. I explicitly stated in my article that I believed some makers were not in need of this criticism, and my best wish is that, in the near future, increased care, increased output and increased appreciation of that which is worthy, may put them all in the front ranks and put an end to importation.

Yours sincerely,
CECIL B. SMITH.

The CANADIAN CONTRACTORS' HAND-BOOK. Price $1.

THE ACCIDENT AT THE MONTREAL STREET RAILWAY COMPANY'S BUILDING.

MONTREAL, January 14th, 1895.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—Amongst the correspondence in the last number of the CANADIAN ARCHITECT AND BUILDER, under the heading, "Montreal Street Railway Building Collapse," appears a report purporting to have been drawn up and signed by Mr. W. McLea Walbank, B.A.S., M.C.Soc.C.E., &c., and Mr. Lacroix, City Building Inspector.

It was commented upon in the following terms, namely: "That as there was much diversity of opinion amongst the experts examined, you would print only the conclusions arrived at by them; whose opinion as embodied in the report you should regard as being impartial."

It may perhaps be somewhat of a surprise to you, as it certainly has been to Mr. Lacroix and myself, to find his name attached to a report which, as he states in his letter to me, given below, he did not sign, and was no party to; and further, which arrives at conclusions he has not yet gone into or expressed any opinion upon.

What object was to be gained by tacking the City Building Inspector's name to the report, without his knowledge, is left for those doing so to explain, if possible.

[COPY OF THE INSPECTOR'S LETTER.]

OFFICE OF THE BUILDING INSPECTOR,
CITY HALL, MONTREAL, Dec. 24th, 1894.

EDWARD C. HOPKINS, ESQ., Architect.

DEAR SIR,—Your favor of the 22nd just received. In answer beg leave to say that I have not seen the article referred to in THE CANADIAN ARCHITECT AND BUILDER; furthermore, that I have never signed Mr. Walbank's report; besides I have yet to express an opinion as to the true cause of the collapse.

Yours truly,
(Signed) P. LACROIX, Building Inspector.

Trusting you will give this communication the same prominence which you have to Mr. Walbank's report,

I am, Sir, yours respectfully,
E. C. HOPKINS.

RECENT CANADIAN PATENTS.

No. 47,361, steam radiator to Edward Ethel Gold, New York.

No. 47,382, frame for window sashes to Peter McKenzie, Ottawa, Ont.

No. 47,403, Tread for floors, Wm. Henry Lindsay, Ashton Gate, Bristol, Eng.

No. 47,418, window sash, R. Heinrich Wilhelm Rump, Hamburg, Germany.

No. 48,434, process of making building blocks, Theodore Sanford Pierce and Fred. C. Norris, Lansing, Mich.

No. 47,446, Closet, W. B. Malcolm, Toronto.

No. 47,448, Brick mould, Carl F. Kaul, Madison, Neb.

No. 47,450, water closet flushing device, W. R. Baker, Watertown, N. Y.

No. 47,459, Sash fastener, Lewis Cass Miller, St. Louis, Mo.

No. 47,482, plate or pieces of glass having imbedded in it metallic wires covered with asbestos.

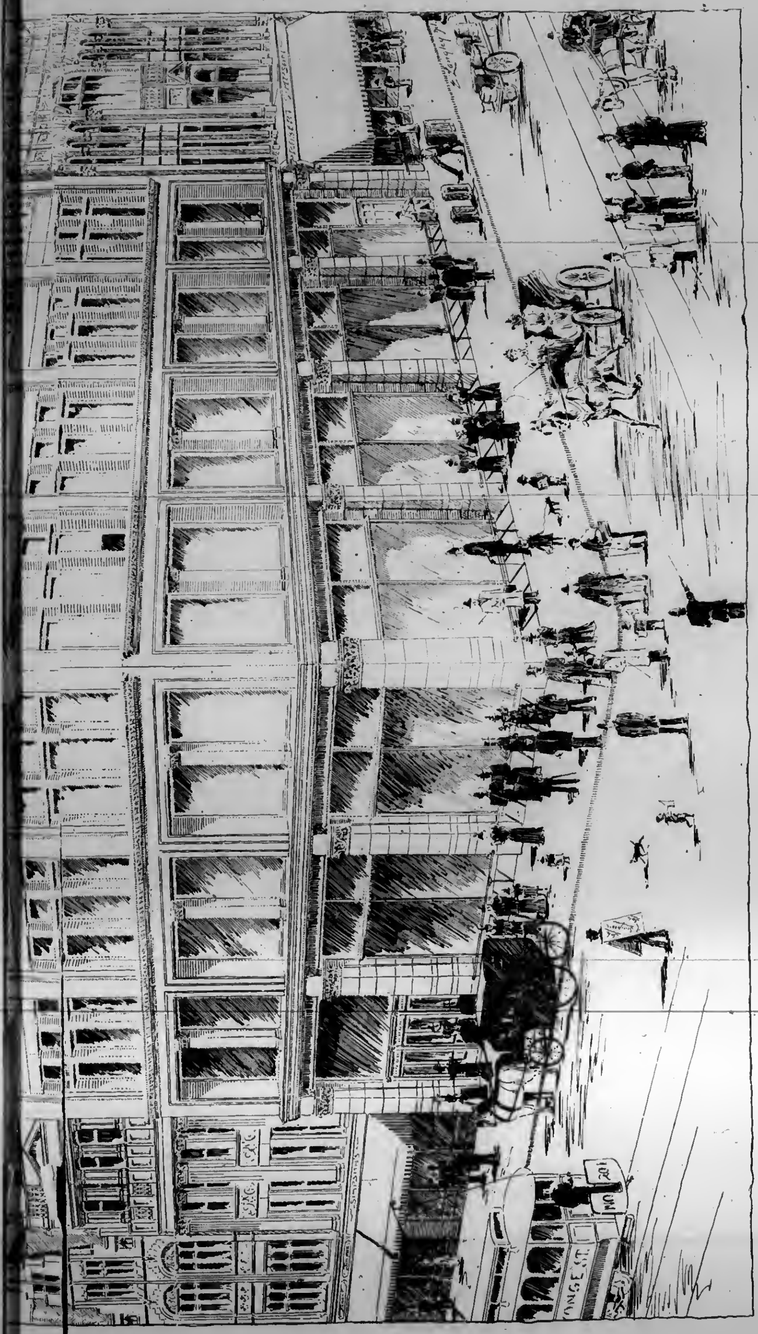
No. 47,503, a bath, consisting of an inner shell with a covering of pulp or papier mache, J. O. Thorne, Toronto.

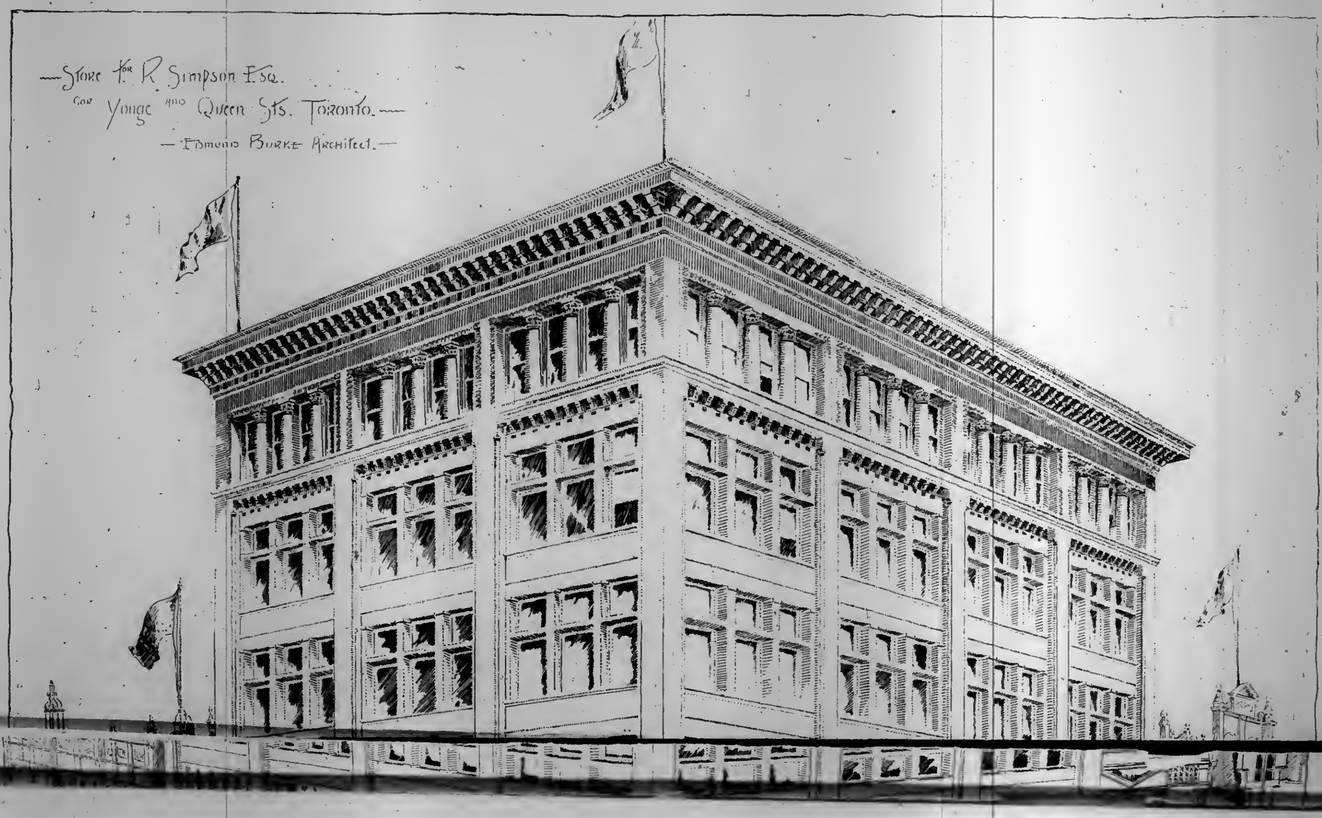
No. 47,532, fastening for metallic roofs, John Osborn Pew, North Bloomfield, Ohio.

No. 47,541, window frame, Oscar Frostscher, Philadelphia, Pa.

No. 47,556, roofing tile, Thos. Arundel Aldridge, Bridgewater, Somerset, Eng.

There are many ways of frosting glass, some of the plans making the glass permanently frosted, others only temporarily so. For permanence, take a flat piece of marble, dip it into glass cutters' sharp sand, moistened with water; rub over the glass, dipping frequently in sand and water. If the frosting is required very fine, finish off with emery and water. As a temporary frosting for windows, mix together a strong, hot solution of Epsom salts and a clear solution of sulphate of soda, warm; and when cool, wash with gum water. Or dab the glass with a lump of glazier's putty, carefully and uniformly, until the surface is equally covered. This is an excellent imitation of ground glass, and is not disturbed by rain or damp.




Store for R. Simpson Esq.
Cor Yonge and Queen Sts. Toronto.
Edmund Burke Architect.

CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—NO. 2. FEBRUARY, 1895 { PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

KING ARNOLDI	Ottawa.
FRANK DARLING	Toronto.
D. B. DICK	Toronto.
THOS. FULLER	Ottawa.
J. GEMMELL	Toronto.

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

A. F. DUNLOP	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
L. Z. GAUTHIER	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. MCLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.	FRED. WAKEFIELD.
JOHN ALDRIDGE, 1st Vice-President.	WM. BOOTH.
WM. PARK, 2nd Vice-President.	JAS. ISAAC.
DAVID WILLIAMS, Treasurer.	H. LUCAS.
JAS. CRANG.	H. MARTIN.
WM. PEARS.	THOS. CANNON, Jr.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD'S reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Negotiations have been in progress of late between the Brick and Stone Masons' sections of the Toronto Builders' Exchange and delegates from the unions representing the journeymen in these trades, as to what should be the rate of wages on the termination on the first of May of the agreement entered into by the employers and employees five years ago. The employers are understood to be averse to making a new agreement except the rate of wages be reduced to correspond in some measure to the universal depreciation in values. On the other hand they show no disposition to depreciate wages beyond this point. No understanding has yet been reached, but it is entirely probable that the matter will be amicably adjusted, either by the renewal of the agreement, it may be on different terms, or by mutually consenting to do without an agreement. There is no doubt that a satisfactory agreement would be the most advantageous settlement of the matter for all concerned.

THE Ontario Association of Architects has decided to hold an exhibition of architectural drawings in connection with the Royal Canadian Academy exhibition, which is to take place in Toronto next May. The Academy have very generously granted the Association the exclusive use of one of their rooms, which in point of light and location is equal to those allotted to paintings. Such a favorable opportunity of exhibiting their work was never presented to the architects of this province at least, and we trust they will not be slow to manifest their appreciation of it. A hanging committee, composed of members of the O. A. A., will be appointed, who will select from the drawings submitted those which by merit would be entitled to a place in the exhibition. No drawing which has previously been exhibited in Toronto wil be allowed a place in the exhibition. It is important to the success of the exhibition that the hanging committee should have in its composition sufficient back-bone to unhesitatingly reject without fear or favor such drawings as fall below the proper standard of merit. It is no less important that those submitting drawings should determine that they will cheerfully bow to the judgment, favorable or otherwise, which the committee shall pass on their work. If these points are strictly observed, we may expect that the approaching exhibition will be one which will be creditable and in every respect advantageous to the profession.

THE greater part of our space in the present number is given to a report of the proceedings of the recent annual convention of the Ontario Association of Architects. Notwithstanding that the number of pages has been increased, the space at our disposal is insufficient to present all the excellent papers read at the convention. Those which we are obliged to hold over will appear in our March number. In point of interest the convention was probably the most successful in the history of the Association. As regards the attendance, there is still ample room for improvement. Each year serves to emphasize the fact that there is a useful work for the Association to do, principally on the line of the education of future generations of architects. It is to be hoped that there will be manifest on the part of students of architecture a greater appreciation of the self-sacrificing efforts which are being put forth on their behalf by the older members of the profession in the Association. Instead of shirking the

examinations, because they do not happen to be of pulsory character, every student who hopes to succeed in profession should gladly present himself as a candidate for examination for the sake of the benefit which must accrue to himself from a thorough mastery of the examination subjects. It is to be hoped that the recommendation embodied in Mr. Gordon's resolution with regard to the Association Library, may be successfully carried out.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE monthly dinner and meeting of the Province of Quebec Association of Architects took place on Tuesday, the 15th January. Mr. A. T. Taylor, F. R. I. B. A., gave a very interesting lecture on "The Three Cathedrals of St. Pauls, London," accompanied by numerous sketches and drawings of the different structures that succeeded one another on the present site of the Cathedral. The present St. Paul's rests on the site previously occupied by two other churches; it is even claimed that on the same site was erected a temple to Diana. Very little is known of the Saxon church, which must have been of a primitive character, and built of perishable material as were most of the buildings of that agitated period. The structure that replaced the last named was well worthy of notice; it was in the gothic style and of a typical English character. Its spire was the highest in Europe at the time, and was rich in "souvenirs" and legends, and also contained in itself two parish churches, which had, strange to say, preserved its servitudes and priveleges. At about the period of the Reform it was used successively as a market and exchange and even as a stable. Later on Sir Christopher Wren, the architect of the present St. Paul's, was commissioned to repair the building, and added to its principal facade a porch in the Renaissance style of that period. The great fire of London put a stop to the restoration of the church. Sir Christopher Wren then prepared numerous drawings and schemes for the cathedral destined to replace it, but as often happens, the scheme recommended by the architect was not accepted, and Charles II adopted the plans of what he thought was a more ecclesiastical looking building, but leaving to the architect the liberty of altering and improving the original design. The architect took advantage of this latitude and produced one of the finest monuments in existence. This cathedral is the only building of any magnitude erected under one architect, the cross surmounting the dome having been set in position thirty-five years after the laying of the corner stone. Its dome is reputed the finest and best proportioned in the world.

A discussion took place after the lecture, and a vote of thanks was tendered to the lecturer for his interesting paper, proposed by Mr. J. E. Resther and seconded by Mr. J. Venne.

At the last monthly dinner of the Association held on the 12th instant an interesting lecture was also given by the Secretary, Mr. J. Venne, on "The Interior Management of the Architect's Office," and was discussed amongst others by Messrs. Jas. Nelson, A. Raza and J. E. Resther.

BRITISH COLUMBIA AFFAIRS.

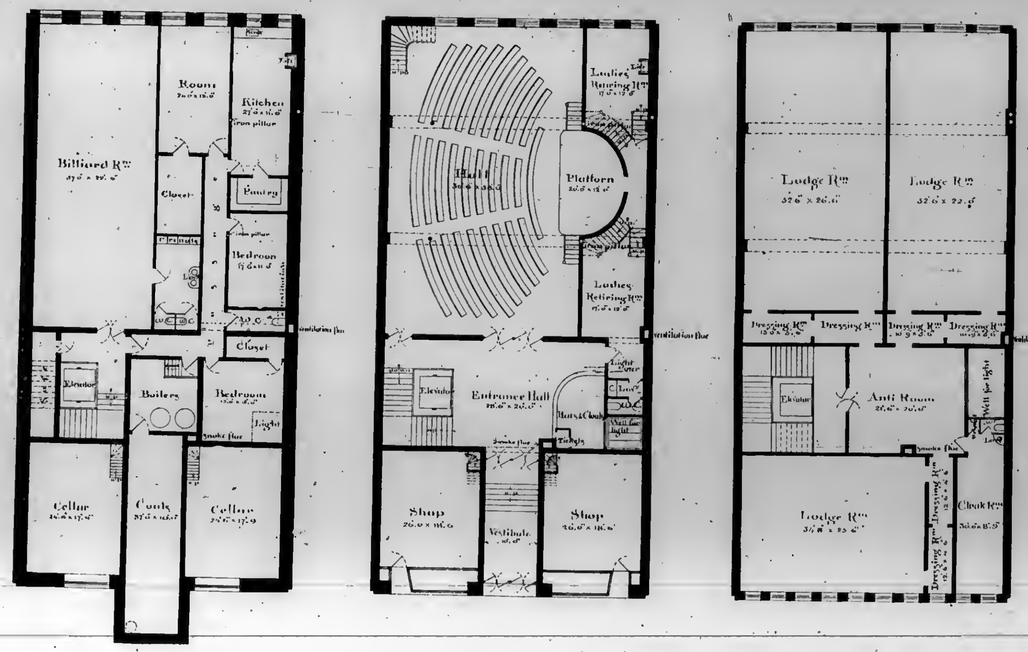
VANCOUVER, B. C., Jan. 29th, 1895.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—Please find enclosed P. O. order for renewal of my subscription to your journal, which in my opinion is making steady progress and becoming of more value to men in my line of business with each issue. I am much pleased with the current number, but notice several errors in your building notes from this city. Mr. N. Hoffar and not Mr. Fripp was the architect of the court house. Mr. Fripp was the architect of the "Inns of Court," a large office building costing about $30,000, which was built opposite the court house last year. Mr. N. Hoffar was also the architect of the Horne block (stores) $10,000. Another neat building built last year was the Garnbrinus Hotel, Mr. Thos. Hooper, of Victoria, B. C., architect This building was faced with pressed brick; cost $10,000. "O. Wick" is rather an obscure contraction for C. O. Wickenden, the name of the architect of the Hudson Bay Co.'s building.

An article on the rights and privileges of owners who wish to build basement buildings adjoining those which have none, would be appreciated here I think. I know of no law (local) governing such cases. This question should include another, that of putting outside footings on foundation walls which extend to the adjoining property. There has been no trouble that I am aware of on these points as yet, though there have been several cases which might have resulted in a law suit. We ourselves have had some narrow escapes. In one case we put a footing out on a lot adjoining the lot on which we built a building having no basement. This footing was about six inches over the line and the whole length of the lot, 120 feet. The owner, as many Vancouver owners do, resides in Europe I think. If you can give us some information about the laws and customs regulating these matters I am sure they will be much appreciated.

Yours respectfully, A. E. CARTER.



PLANS ACCOMPANYING COMPETITIVE DESIGN FOR MASONIC TEMPLE, MONTREAL.—J. R. RHIND, ARCHITECT.

ONTARIO ASSOCIATION OF ARCHITECTS

PROCEEDINGS OF THE FOURTH ANNUAL CONVENTION.

At 2 o'clock p.m. on Tuesday, January 15th, the President, Mr. Edmund Burke, called the Convention to order. The minutes of the last convention were read and approved. The President then delivered the following address:—

PRESIDENT'S ADDRESS.

GENTLEMEN: It is my pleasing duty to meet the members of the Ontario Association of Architects in this, the fifth annual convention since our incorporation. The year has been comparatively uneventful as far as our own history is concerned.

In response to the expressed wish of the convention, the Council inaugurated a system of lectures under the auspices of the Association. Two lectures have been given. The first, by Mr. Grant Helliwell, was open to the public, and was given in the hall of the School of Practical Science. It was a well prepared paper on "Current Architectural Styles," splendidly illustrated by Mr. Wright, of the School of Practical Science, with the aid of the fine lantern of the institution. The attendance, especially of members of the Association, was much less than the merits of the lecture deserved. The second lecture, given in the Canadian Institute by Mr. Wright, on "Graphic Statics," was a thoroughly good and practical exposition of the subject, and deserving of a much larger audience than was present—the total attendance, including lecturer and assistant, being only 18. Half of that number, only, were members of the Association, and the rest mainly students and draughtsmen. These facts are noted in view of the tendency to criticise the Council by some members of the Association who are prone to hint that this body is inactive and not alive to the interests of the Association. It is safe to assume that not one of these critics took the trouble to attend either of these meetings. Other critics have from time to time been invited to lend their aid to advance the interests of the Association, and have either refused or ignored the request. The members would do well to remember that their attendance at the meetings would not only be of benefit to themselves, but an encouragement to the gentlemen who, at much expense of time and thought, have prepared papers. The interchange of thought in the after discussions on the subjects presented, may be made most interesting, especially when the attendance is large—numbers always adding to enthusiasm and interest. It is an encouragement, however, to those who so kindly prepare papers for the enlightenment of others, to discover, as so many have by experience, that, while adding to the information of others, the knowledge they impart becomes doubly their own.

An event of decided interest, and having possibly an indirect bearing on the future of the Association, was the election of a new legislature for the province, a few months since. Your Council seized the occasion to endeavor to enlist the members of the Association in an effort to obtain an expression of the views of the various candidates with regard to the proposed change in our act. Our efforts were very poorly received, few of our men reporting any action in the premises.

Now that a new House has been elected, it is of the utmost importance that every member be up and doing from this time on. If each man would make a point of seeing his representative, of urging upon him our claims and explaining fully our position and aim, the chances of success in the next session of the legislature would be greatly improved. Leading men on both sides of the House have expressed themselves as favorable to our cause and have assured us of their support, at the same time warning us that we must work hard to secure the support of a large number of the rank and file, if we would look for success.

We were advised, as was stated in the address of our President at the last convention, that the temper of the House in its closing session was not favorable to the increase of close corporations. As we unfortunately were in the company of other organizations seeking, for them, unusual powers, discretion seemed to be advisable, and we withdrew our bill. Such may have to be our course again, and as the composition of the House has been considerably altered, no forecast of the situation is possible. But even if we do fail in our object at the coming session, we must not be discouraged, but hope on. We believe our cause is just and right, and that not only ourselves but the public will share, in days to come, in the benefits that will accrue to the profession in the elevation of the standard of education and professional training which will assuredly follow the legislation sought. We must, therefore, not swerve from our goal though it take years to reach it.

Education must ever be our watchword; the higher we reach in professional attainments and knowledge, the farther away will we get from charlatanism and unprofessional conduct, and the nearer will we approach the highest type of professional ethics. The question of education means for the older men considerable self-sacrifice; for the examiners much time and trouble; for the principals, the yielding to their students of considerable time for study and examinations, and the prospect of raising up competitors, who in years to come, by reason of their better preparation, will outstrip their masters in the race for employment. But what of this? Shall the profession stand still that the older men may not be outstripped? This would indeed be a low platform for men aspiring to be artists and the leaders of artistic thought in the community. The coming Canadian architect needs a better education for another and more sordid reason, but a very present one nevertheless, and one which we have very severely felt in this country of late years, namely—the competition of foreign architects. Some of our most expensive buildings have been erected from the designs of aliens. The apology for this is the alleged want of experience and ability on the part of the native architect. We do not admit for one moment the validity of this contention, the fine buildings erected by local men attesting to the contrary; but that this is, to a considerable extent, the condition of affairs is a well known fact. This contention is not advanced with regard to the employment of other professions in Canada, because they have aimed at and attained a high standard of professional education. The lesson for us is evident.

We need also an education, or lifting up, in the matter of professional ethics. Too often an architect is confronted with the competition of two or three of his fellows in a case where he supposed he had a client. He submits a sketch, perhaps without a definite engagement, talks it over with his client and leaves the matter with him for a few days' consideration. On his next visit he is confronted with the information that Mr. So-and-So has submitted a sketch (a catchy, showy one), probably backed up with the assertion that the design can be executed for 30 or 40% less than his, and at a commission far below the regular fee. There is little use in telling the client that your rival is not speaking the truth. The aforesaid rival has offered to guarantee the cost, and the client does not see why he should pay so much more for his building to oblige you. You are accordingly allowed to depart without a commission, meeting, perhaps, one or two more hungry applicants on your way out. It is small satisfaction to be informed, after the building has been erected, that your rival has run his client into an expenditure far greater than your estimate.

Good men are sometimes drawn into this unseemly form of competition from the fact that they do not feel like being ousted in such a manner—losing work which to all intents and purposes is theirs. And what is, what only can be, the inference drawn by the client? Simply that architects are a parcel of fools, and that he can use them as tools, one against the other, and thus dictate his own terms.

I speak thus plainly, because I notice a growing tendency along this line since the advent of an Ishmaelitish element into the craft a few years since. The other professions are an example to us. Physicians and lawyers observe their codes of ethics; they set their standard high and are rated by the public accordingly. When will we be wise enough to learn the lesson? Closer association and more intimate acquaintance with each other has helped us greatly; but ever and anon are some found who resort to the original type when assailed by the temptation of a possible commission. It is a pity that men, especially young and clever ones, should descend, even for the sake of obtaining work, to anything in the shape of unprofessional conduct. In an experience of 25 years, I have found that none have succeeded permanently and obtained a good name in the community who have endeavored to build their success at the expense of their professional brethren.

No competitions of importance have been inaugurated in the province this year. The few small ones, notably the London Free Library, have been unsatisfactory in results, as usual, the two chief reasons being the lack of proper judges and the absence of a properly prepared programme of requirements. Both these necessary accompaniments of a well conducted competition are embodied in the form suggested by the Council and approved by the Association, and it rests entirely with the architects themselves as to whether satisfactory methods of competition be insisted upon. The remedy is in our hands. Are we going to be always so miserably selfish as to ignore proper methods in ridiculous scrambles for the opportunity to obtain a commission?

The question of an exhibition of drawings in connection with our annual meeting was broached a few weeks since, but it was felt that the time was too short in which to assemble a representative collection. Possibly a mid-year exhibition would be practical and popular, and while keeping up an interest in the Association would avoid a possible clashing with the business of the convention.

Our sister Association in the Province of Quebec has not been idle during the year. A reading room for members and students has been opened, classes for students organized and examinations conducted. A very successful exhibition of drawings was organized in connection with the annual meeting last October. It had the advantage of being held in the galleries of the Montreal Art Association and drew a fair attendance. A considerable number of drawings was sent by members of the Ontario Association, under arrangements for transport made by our Registrar.

The Quebec Association has followed up the suggestions of Mr. A. T. Taylor, who read a paper at the annual meeting, advocating an Advisory Art Committee, by passing a resolution proposing to the City Council of Montreal the appointment of such a committee, consisting of artists, architects and others to supervise the erection of public monuments and the laying out of public parks, squares, etc. A league having similar objects in view is being formed in Chicago, while Boston and New York have their municipal art societies. Other cities and towns in Canada should join in a similar movement. Monuments are being located and erected without that thought and supervision which would add greatly to their character and effect; and committees and officials often take upon themselves responsibilities for which they are unfitted, not through any fault of their own, but simply for lack of education and taste in such matters.

The architectural department of the School of Practical Science is making considerable progress and appears to have developed as fast as the funds at disposal will permit. The period of study embraces a course of 3 years with a 4th or post graduate course. An expansion of the course, however, is a prime necessity if this department is to be fully and properly developed. If this is not done, there is a danger that the architectural schools in the United States will attract many of our young men, who can afford the additional expense, by reason of the more complete courses of study afforded, including training in design, a most necessary phase of an architectural student's education. The architectural library of the school is growing by judicious purchases including valuable photos of ancient and modern buildings. Having begun the work it behooves the Ontario Government to as wisely forward the development of this department as it has that of the engineering department. Failing this, much that has already been done will fail of its expected result.

In connection with the School of Science, I would here refer to the series of tests which have been made during the past year in the institution by Mr. Wright with our local Portland cement. This industry has witnessed a remarkable development during the past decade which is an evidence of the increasing demand for more enduring methods of street paving and better building construction.

The Toronto Technical School conducting evening classes is an institution which is doing a considerable service for Toronto architectural students in helping to prepare them in mathematics for the Ontario Association of Architects examinations. Eleven architectural students and ten draughtsmen were in attendance at the classes of 1893-94.

The three chief architectural bodies in the mother land appear, from their reports, to have been actively engaged during the past year. The Royal Institute of British Architects in November last inaugurated a system of progressive examinations, which have succeeded the former and partly tentative arrangement. The President, Mr. F. C. Penrose, F. R. S., in a late address considered that these examinations "could not but have an excellent effect; first and directly in securing to future members of the Institute the reputation of having satisfied a certain standard of proficiency; secondly and indirectly, by excluding from the Institute in the first instance and by reaction from the profession at large, young men whose abilities would have been more advantageously directed towards the pursuit of some other calling." Some conception of the work of the Institute and the number of architectural students may be found from the following figures, viz: In the preliminary examinations 165 students attended, 28 were conditioned and 136 passed. In the intermediate 55 attended, 19 were conditioned and 36 passed, while in the qualifying or final examinations 150 attended, 84 were conditioned and 63 passed. The Journal of the Royal Institute forms a quarterly volume of exceeding value and interest, many of the papers being profusely illustrated.

The Architectural Association appears to be a model institution, and doing good work in the matter of architectural education. Its classes are divided into two groups—the lecture and the studio side—with courses or years divided into four divisions, with examinations, medals and certificates in each. In addition there are valuable prizes as follows: Architectural association medal with a prize of the value of 10 guineas; measured drawing prize; essay prize, value 10 guineas, and silver medal; Cates scholarship tenable for two years; travelling studentship with bronze medal and the Oliver prize. These prizes were awarded at the opening of the session, and the President, Mr. Mountford, F. R. I. B. A., in stating that the past session had been the most successful one under the present order of things, announced that of the 96 new members who joined their ranks last session no less than 73 joined either the classes or studio, while 78 students took up complete courses of lectures and classes.

The third of the Associations referred to—the Society of Architects—is also a flourishing institution, with over 500 members and associates on the roll. The Society is ten years old and has been incorporated one year. It supports a journal which includes in its columns the proceedings of the Society, architectural notes and queries, notes on new books, etc. A somewhat unique feature of this Society is the periodical visits of the secretaries to the members residing in various provincial towns. It is also in contemplation to hold meetings in large provincial centres if the members in those districts indicate a substantial interest in the scheme. The Society has decided that after Oct., 1896, election to membership will only be open to candidates who have passed certain prescribed examinations, making exceptions however in favor of applicants over the age of 35 and who have practised for seven years. The adoption of this scheme by the third great architectural body has given rise to some dissension regarding the question of confining the examinations to a sole examining body, one of the past presidents maintaining that all examinations ought to be in the hands of the older and representative body, the R. I. B. A.

The R. I. B. A. is named in the registration bill as the sole examining body, the promoters belonging to various architectural societies having made this concession to the Institute. The Institute, however, persists in opposing the bill, taking the high ground that the members of a great profession should carry on their work in a manner perfectly free from the trammels of legislation. The R. I. B. A. at the same time admits that its provincial members, especially, are subject to the "depredations of unprincipal quacks." The only remedy suggested by the Institute is, that the provincial newspapers be used in disseminating the fact that the members of the Institute have signed a declaration that they will not accept illicit, or surreptituous commissions, and that they will be bound by the rules of the Institute. It is to be feared that it will take a great many years to educate the public by this means. Legislation has not curtailed the usefulness of the legal and medical societies, neither should it that of the architectural, and the quackery complained of would soon be a thing of the past were it obtained.

The various architectural societies in the provinces of the United Kingdom are being affiliated with the Royal Institute, under the name of Allied Societies, with centres in the various large cities, thus very greatly extending the influence of the Institute and the prestige of the profession.

The 28th annual convention of the American Institute of Architects was held in New York in October last. The membership of 475 Fellows was reported the same as the preceding year, the increase having exactly equalled the falling off. The chapters of the Institute number 26, with an aggregate membership of about 600. A most important amendment to the by-laws was passed. By this amendment, an architect, in order to become a member of the Institute must first join one of its chapters, and every practising member of a chapter must become a member of the Institute. There is quite a possibility of friction arising out of this state of affairs, as some of the local bodies, notably the Boston chapter, have a greater voting strength outside than inside the membership of the institute. The two most important reports presented at the convention were, that on Education through Mr. H. Van Brunt, and on Competitions through Mr. Geo. B. Post. The report on education is a notable production of literary merit, and will repay a careful perusal, as it advances several good suggestions regarding the present phases and necessities of a proper architectural education. An important measure in the interests of architecture is now before Congress. It is known as the McKaig bill, and deals with the much vexed question of the preparation of designs for the government buildings. Under it a commission is to be appointed by the President, consisting of a board of two government engineers and three architects of high attainment and large practical experience. This Board is, in the case of buildings costing less than $100,000, to select an architect without competition, employing him to prepare the designs, working drawings and specifications. In the case of buildings costing more than the above amount, the Board is to inaugurate a limited competition, selecting at least five firms, and all competitors to be paid at the rate of one-tenth of 1% on the estimated cost of the building. It is fully expected that the inauguration of this departure from the present method will mark the commencement of a new and brilliant era in the character of government buildings in the United States.

It will be seen from these brief outlines that the English speaking societies of the architectural world are making the education of architects their chief business. The British societies are all looking towards an educational test for membership; they, with the strength gained through numbers, are conducting classes with progressive and systematic studies and examinations which are yearly becoming more exacting. In addition to the work of the societies, most of the large centres have the advantage of splendidly equipped technical schools, many of which have special classes for preparing students for the examinations of the architectural societies. The University of London is also abreast of the times, having a chair of architecture ably filled by Mr. T. Roger Smith. Our association is to some extent following the lines of the English societies in regard to examinations, preliminary, intermediate and final, the latter admitting to membership; but, so far, through lack of means and strength, without the establishment of classes. The Americans, on the other hand, have, so far, instituted no examinations for admission to membership, and have not, through their chapters or institute, organized any system of classwork. The development of architectural departments in many of the United States colleges, however, has been very marked, largely taking the place of the English methods, and in some of them the courses of study have become very thorough, the influence of the Paris school being predominant. This, with the return of American students from the Paris Ecole de Beaux Arts, has greatly stimulated the spread on this continent of that phase of Renaissance architecture which has long been the fashion in Europe and which bore such abundant fruit in the buildings of the great Fair at Chicago. A Society of Beaux Arts has been organized in New York, composed of men who have studied in the Paris school. The primary object of this society is to preserve among its members the traditions of the French school and to propagate its methods in the United States and thus educate the younger men in the profession along its lines. Quarterly competitions have been established, conducted similarly to those in Paris, and open to all students of architecture. Several of the members have opened ateliers and conduct them on similar models to those of the patrons in Paris.

But from the expresssions sent forth by the leaders of architectural thought, there is an evident movement towards a more thoughtful and appropriate treatment of the architectural problems of to-day. They are depreciating the selection and slavish copying of certain historic styles, and yet insisting that the study of all the historic styles should be systematized and co-ordinated, not, as Mr. Van Brunt says, "with the minute patient scrutiny of the archaeologist; but with the spirit of the artist seeking to learn how forms and ornament were developed out of the genius of civilizations and peoples and how, as they were significant of the progress of human culture in the past, they should be used in the service of modern art."

The need of our architectural era is therefore without doubt such education in design as will enable us to make architecture as a fine art keep pace with science. In the mediaeval times the scientific practical constructor and the artist were one person; in our times they are practically two. Must we not at least learn how to unite the two into one with our new problems and new materials? Engineering needs to be converted into architecture and the architecture of the near future must therefore be made to conform to this new character. Practitioners, engrossed with the details of business are too busy to solve these problems or to enter into the study necessary to satisfactorily solve them without a long process of evolution, with many hideous examples and failures on the way, as we are witnessing in the high structures of to-day. The schools then must needs help us with, to again quote Mr. Van Brunt, "a much more scientific co-ordination of precedent, a much more philosophic analysis of the architecture of the past than is secured by our present methods of education."

I must not close without reference to the severe visitation of fires which has caused such a stir and comment in Toronto during the past few days. Advantage should be taken of the occurrence by all architects to inculcate and advocate the necessity of erecting a more solid class of structure in the business districts. It may not be possible to accomplish this with clients who are anxious to erect the largest buildings for the least money; but we can at least lend our aid to the enactment of more stringent building laws and the enforcement of closer and more intelligent inspection of buildings under course of erection. It seems to me that the chief lessons to be learned from an examination of the burned structures are:—The necessity of thick walls, including party walls; the resting of wooden joists wherever practicable, on corbelling, instead of the ends being built into the wall; the necessity of fire-proof shutters on all openings which are exposed to risk of fire from adjacent premises; the unreliability of steel unless thoroughly protected from even a moderate degree of heat, and the necessity of fire-proofing all business premises which exceed a height of about seventy feet.

And now I will not detain you farther from the business for which you have met than to say, that I hope we may enjoy our annual reunion; that the papers and addresses may be as beneficial to the hearers as they have doubtless already proved to those who have so kindly prepared them; that our criticisms and remarks may be uttered in the spirit of frank brotherly kindness, that the occasion may be one of refreshing to us all, and that we shall be encouraged to enter upon another year with fresh impulses towards the highest development of our powers in our noble calling, and with a firm resolve to observe the golden rule in all our dealings with one another.

TREASURER'S REPORT.

The Treasurer, Mr. H. B. Gordon, then read his report as follows:

THE TREASURER IN ACCOUNT WITH THE ONTARIO ASSOCIATION OF ARCHITECTS.

Dr.

1894.			
Jan. 1	To balance from 1893		$1,930 50
Dec. 31	Members' Annual Fees		217 00
"	Members' Registration Fees		75 00
"	Students' Registration Fees		42 00
"	Students' Examination Fees		16 00
"	Sale of Examination Papers		1 25
"	Library Fines		1 00
"	Interest on Registrar's Bank Account, 1893		2 35
"	Interest on Treasurer's Bank Account, 1894		69 73
			$2,354 83
	To balance forward to 1895	$1,780 00	

Cr.

1894.			
Dec. 31	W. A. Langton, one year's salary as Librarian		$ 100 00
"	W. A. Langton, one year's salary as Registrar		200 00
"	W. A. Langton, one year's disbursements (1894)		42 27
"	Travelling expenses, Members Council		19 54
"	R. W. Gambier Bousfield, fees as Examiner and Sec'y		51 12
"	Caretaker, Sch. P. S., re Convention and Examinations		15 00
"	H. Webb, Luncheon for Convention		17 00
"	W. R. Butcher, Typewriting		2 70
"	C. H. Mortimer, Printing		81 75
"	Bingham Printing Company		3 00
"	Curry Bros., printing Examination Papers		25 00
"	Hart & Riddell, Stationery		17 45
			$ 574 83
"	Balance on hand		1,780 00
			$2,354 83

H. B. GORDON,
Treasurer O.A.A.

We have examined the books, vouchers, etc., of the Association, and certify that the above is a correct statement thereof.

HENRY LANGLEY, WM. R. GREGG, } Auditors.

STATEMENT OF ASSETS AND LIABILITIES, JANUARY 1ST, 1895.

Assets.

Cash Balance in Bank		$1,780 00
Unpaid Membership Fees,		
1891, 9 Fees	$ 42 00	
1892, 21 Fees	270 00	
1893, 52 Fees	182 00	
1894, 98 Fees	334 00	
	828 00	
		$2,608 00

Liabilities.

Half year salary of Librarian due Jan. 1st, 1895	$ 50 00
Proportion of Registrar's salary due (Half year due February 10th, 1895)	74 20
Balance	2,483 80
	$2,608 00

On motion by Mr. M. B. Aylsworth, the Treasurer's report as adopted.

REPORT OF REGISTRAR AND LIBRARIAN.

Mr. W. A. Langton, Registrar, then read the following report:

REPORT OF THE REGISTRAR AND LIBRARIAN AT THE ANNUAL MEETING ON JANUARY 15, 1895.

Members.

The following is the state of the roll of membership of the Association:—

Membership on December 31st, 1893—	
Resident Members	65
Non-resident	70
Residing out of the Province	4
Total	— 139

The names of four resident members who had left the country were omitted from the printed register of 1894. One resident member subsequently resigned and a non-resident member died. There were three resident members registered in 1894; and one member residing out of the Province. The roll of membership on Dec. 31st, 1894, therefore, was as follows:—

Resident members	63
Non-resident	69
Residing out of the Province	5
Total	— 137

The status of members with regard to the annual fee is as follows:

In good standing	35
Honorary	1
In arrears for 1894	49
" " and 1893	31
" " " and 1892	12
" " " " and 1891	9
	— 137

The classification of members with regard to the grading of fees, and the amounts of fees due and paid, are as follows:—

CLASSES.	No.	Fee.	Amount Due.	No. P'd.	Amount Paid.
I.—Practising in York County, 5 years and over	53	$5.00	$265.00	9	$45.00
II.—Practising in York County, under 5 years	4	3.00	12.00	4	12.00
III.—Practising in cities outside of York, 5 years and over	34	3.00	102.00	7	21.00
IV.—Practising in cities outside of York, under 5 years	2	2.00	4.00	2	4.00
V.—Practising in towns, villages, etc	23	2 00	46.00	4	8.00
VI.—Civil servants	13	2.00	26 00	4	8.00
VII.—Not practising in Ontario	7	2.00	14.00	3	6.00
Honorary	1	.....	.....	...	.....
	137		$469 00		$104.00

NOTE.—The number of members in Classes II. and IV. is variable, and is established by application for the rebate by those who are entitled to it when paying their fees. In the above list the number fixed for these classes is the number of those who have paid the reduced fee in 1895.

Of fees overdue at the end of 1893 there have been $113.00 paid during 1894, making the total payments of fees from members during the year $217.00. There have also been four new registrations and one registration fee of last year, which comes into this year's accounts.

Students.

Seven new students were registered during the year. There are now 92 students on the list, but of this number there are less than 50 with whom I can feel reasonably sure that I am in actual communication. Some are not in the country; some are, I think, engaged in other work; some I hear of as practising, having abandoned or postponed the idea of registration. But their indentures are still with me, and I have received from them no notice of their withdrawal from the Association.

Classified according to the examination required of them, the roll of students is subdivided as follows:—

For first intermediate examination	14
For second " "	27
For final examination	51
	— 92

Of the 51 students who must pass the final examination before registering there are 45 who have served their time.

The members of the Board of Examiners are:—Professor Galbraith, Principal of the School of Practical Science Chairman; Mr. C. H. C. Wright, Lecturer in Architecture of the School of Practical Science, Examiner in Mathematics, Graphic Statics, Strength of Materials, Nature and Propety of Building Materials; Mr. Edmund Burke, M.O.A.A., Examiner in Design; Mr. R. W. Gambier Bousfield, M.O.A.A., Examiner in the History of Architecture, Technical Terms and Architectural Jurisprudence; Mr. S. G. Curry, M.O.A.A., Examiner in Foundations, Heating and Ventilation and Sanitary Science; Mr. Frank Darling, M.O.A.A., Examiner in Design; Mr. S. H. Townsend, M.O.A.A., Examiner in Elements of Construction, Structural Iron Work, Practical Knowledge of Building Trades and in Design.

There were 13 students examined this year, with results as follows:—

	No.	Passed at first exam.	Passed at supplemental exam.	Plucked.
First intermediate	8	4	2	2
Second intermediate	2	1	1	..
Final	3	2	..	1

There is no supplemental examination granted to candidates who fail in the final examination.

Proceedings of the Council.

The Council, in order to keep down the running expenses of the Association, met only on the day after the Convention (Jan. 18), and on the morning of the present Convention.

In fulfilment of the instruction from the Convention to consider the advisability of calling an occasional meeting in Toronto of members of the Association, or of encouraging the formation of a local branch, it was decided to have two lectures in the course of the year, one to be of interest to the public, and one of a more technical nature for members. The first lecture was given on March 8, at the School of Practical Science, by Mr. Helliwell. The lecture was an expansion of his paper on Current Architectural Styles read at the Convention, and was illustrated by Mr. Wright by a large number of carefully selected views of buildings thrown on a screen by means of the magic lantern. The second lecture was on Graphic Statics, and was given by Mr. Wright on November 16, at the Canadian Institute.

An application was received from the Royal Military College Club requesting that graduates of the Royal Military College be placed on an equal footing with graduates of the School of Practical Science, with reference to the requirements of the Association from its students. The question arose whether the Association has the power to grant such a concession. The matter was referred to the Minister of Education, who decided that it was not within the power of the Association to so enlarge the scope of the Ont. Architects' Act. The Minister expressed himself in favor of granting the concession if found warrantable, and undertook to investigate the character of the work done in the architectural course at the Royal Military College.

Renewed efforts were made during the year to press upon the attention of the Dominion Government the need of an exact method of collecting the customs on foreign plans. Copies of the memorial presented to the Minister of Customs by a deputation from the Association in 1892 were presented again by Members of Parliament representing Toronto. The Controller of Customs replied that the system proposed in the memorial was already in operation.

The Library.

There have been no books added to the Library this year.

The number of lendings was 111, or 41 less than in 1893.

All of which is respectfully submitted.

W. A. LANGTON, Registrar and Librarian.

Mr. Billings took exception to the sense in which the terms "Resident Members" and "Non-Resident Members" were used in the report. He thought the Association being a Provincial one, that all members residing within the Province should be termed resident members, and not only those living in the City of Toronto and the County of York.

Mr. Townsend said the use of the word in that way was merely an error, which had no doubt occurred in the endeavor to distinguish between members residing within the City of Toronto and the County of York and those living elsewhere in the Province. He felt sure there was no intention on the part of the Toronto members to regard themselves as the only resident members.

The Registrar stated that the term referred to had been used in the by-law governing the classification of members, which was passed by the Council, and had in that way come into use, but he never made use of it in sending out notices in regard to the payment of fees, &c., without feeling its inappropriateness.

The President said he had no doubt if it was felt by the meeting that a change in this particular was desirable, the Council would willingly make it.

On motion by Mr. Aylsworth, seconded by Mr. Gibson, the report was adopted.

Mr. Paull expressed his appreciation of the comprehensiveness and instructive character of the President's address, and desired to call attention to some points referred to in it which he considered of great importance. One of these was the allusion to what was being done in Montreal in the appointment of a committee to look after monuments, &c., and to impart a more aesthetic spirit to the way in which such works were designed and carried out. Such a committee of architects, he thought, would be of great advantage to Toronto in the way of inducing authorities, where opportunity offered, to widen our streets and give open spaces such as were found in Detroit and other American cities. The President had also referred to the London competition. It was understood that in that competition there had been very considerable variation from the instructions issued, and he thought it would be well if the Ontario architects would take the practice of English architects as their example in that respect.

In a competition for civic buildings in Birmingham, England, some twenty years ago, the umpire, Mr. Waterhouse, declined to give the award to the plan which he thought had most merit simply because it departed from the instructions in the fact that a bridge not called for by them connected the public buildings and the new hall. A different system from that prevailing here was adopted in England regarding the premium given competing architects. In the case of the law offices they offered a premium of £1,000 to each of ten or twelve architects for their plans, and paid the one whose design was chosen, five per cent.

Mr. Tully said that before the discussion closed he desired to refer to the recent fires that had taken place in Toronto. He thought the civic authorities had made themselves subject to adverse criticism by the changes made in the fire by-law regarding the thickness of walls. After the great fire of 1849 the corporation asked the architects of the city to frame a by-law and he had been one of the architects on that occasion. After a full discussion of the matter, extending over a month, a by-law was framed by the architects and adopted by the Council, and remained in operation for a few years, but through the pressure brought to bear by speculative builders and others interested in putting up inexpensive buildings, this by-law was eventually amended, and had been at different times since amended in a way not at all in the public interest. Had the by-law framed by the architects remained in force he had no doubt much loss would have been saved to both owners of buildings and insurance companies. He thought it would be well before the convention adjourned to adopt a resolution calling attention to these facts, and offering, if the Corporation would refer the matter to the Association, to frame a new by-law, or suitably revise the existing by-law regarding building and fire limits in such a way as would prevent a recurrence of the late calamities. He thought such an offer would convince the citizens that the Association had their interest at heart, and if a proper by-law was framed it might be adopted not only in Toronto, but in other cities in the Province, and thus decrease the loss by fire now sustained by the community. He was much pleased with the manner in which the matter was alluded to in the President's address.

Mr. Gordon said that the matter had been alluded to at the meeting of the Council in the morning, and before the convention adjourned a resolution very much along the lines suggested would be submitted.

The President remarked upon the great pleasure he, and he was sure all the members, felt in having among them to-day Mr. Tully. When Mr. Tully referred to the year 1849, most of the members would realize that that was before they were born. In regard to the proposed revision of the fire by-law, he would say that two or three years ago the Toronto Architectural Guild was asked to appoint a couple of members to co-operate with a commitee from the City Council in regard to that matter. The work of the committee, however, was so intermittent, and the gentlemen from the Council appeared to know so much more of the subject than the architects, that many of the suggestions made were ignored, and the architects never saw the revised by-law until it was printed, and therefore could not in any way be held responsible for the inadequacy of the present regulations. It was the intention of the Council of the Association that the matter should be brought to the attention of the Mayor and Council.

Mr. Tully did not think the Association should consent to act in conjunction with persons not professional men in this matter. The City Council should refer the whole matter to the Association, who would draw up an amended by-law and send it on to the City Council as what they recommended. If that body then chose to amend the by-law the responsibility would rest upon them. He thought it would be most objectionable for the members of the Association to be placed on a committee of laymen, with whom they would have to wrangle in regard to the matter. He felt sure the public at large would support the architects in any by-law they would frame.

Mr. Paull thought the matter was one of the highest importance, and that it was imperative that some such action as that proposed by Mr. Tully should be taken, and he had prepared a memorandum dealing with the subject which he would read. "The recent experiences in this city in regard to the large fires; the great loss of property by owners; the great loss by insurance companies; the great and providential escape by the falling of snow from even greater calamities—but for snow we might have had a similiar experience to Chicago and Boston. Now a very important question arises, what is to be done for future protection against fire in Toronto? The answer to this question is a problem worthy of solution by the architects of the Ontario Association. No doubt with proper precaution and watchfulness much danger may be avoided. Outside of the buildings themselves there exist some means of salvation, as for instance, the procuring by the City Corporation of suitable and effective steam fire engines; the substitution of larger mains than those now in use, as recommended by Mr. Keating, the City Engineer. More care should be taken by the fire insurance agents themselves; more watchfulness by selected nightwatchmen, by the warehouse men and others of Toronto. But the erection of the buildings themselves is what more immediately concerns the architectural profession, so as to have all the available safeguards that can be possibly and prudently introduced during the erection of such buildings for the best protection against fire.

"First, as great care as possible to be taken by isolation from the surrounding buildings either in space or by effective outside walls.

"Second, the introduction by the Corporation of Toronto of the London (England) Building Acts as to brick walls and other building appliances now in operation in the largest city in the world.

"Third, great care in the selection, as far as possible, of indestructible materials, and such as will stand the action of great heat and steam.

"Fourth, greater introduction of hydrants into any newly erected buildings.

"Fifth, careful general supervision.

"Sixth, special care in the heating and ventilation.

"Seventh, introduction of new methods by the architectural profession, such as automatic apparatus, &c."

Mr. Tully, while agreeing that Mr. Paull's remarks were practical, considered that in any action it might take, the Association should confine its attention strictly to buildings. As an engineer he had his own opinion on the question of water mains, and he thought that defective methods in introducing electricity into buildings was a source of danger, and might possibly have been the cause of the recent fires, but these were matters which should be dealt with by the engineers and electricians. He did not think the insurance companies appointed proper surveyors when insuring buildings, many of them being men having no knowledge of architecture, and he could not believe that any man without that knowledge or a practical knowledge of the value of material could make an accurate estimate.

NEW BUSINESS.

The President invited the Association to consider the suggestion thrown out in his address in regard to an exhibition of architectural drawings annually.

Mr. H. B. Gordon, in order to bring the matter before the Association, moved "that it be a recommendation to the incoming Council that it is desirable to have an exhibition of architectural drawings held in Toronto at the time of the Industrial Fair, or about that time, when cheap railway fares would be an inducement to outside members to come in."

Mr. Harper seconded Mr. Gordon's resolution.

Mr. Billings (Ottawa) called attention to the fact that such an exhibition was a feature of the meetings of the Royal Academy. Though poor, so far as numbers were concerned, the exhibit was good in quality.

The Registrar suggested the holding of the exhibition in connection with the annual exhibition of the Royal Canadian Academy.

Mr. Billings approved of the suggestion, the more so that the Canadian Academy, like the Association, was "a struggling industry."

Mr. Gordon expressed his willingness to so amend his motion that the exhibition could be held at the time of the Canadian Academy's exhibition.

The motion as amended was then carried.

The Registrar said that, beginning at Chicago, and taken up

in Montreal and Quebec, a movement was on foot for the formation of societies to have the supervision of the ornamentation and laying out of those cities. He thought the Association ought to keep this in view, and inaugurate some similar action in Toronto. It might be some time before such an association was thoroughly recognized by the city, but he moved that the Council of the Association be instructed either to communicate with the City Council, with a view to establishing, if possible, such an association, or to consider how best to form such an association as would be recognized by the City Council.

Mr. Townsend, in seconding the motion, said he considered it a matter of very great importance that some standard of good taste should be established in connection with the matters referred to, and he could see no other way of establishing it than by the formation of such a body as suggested.

Mr. Paull agreed as to the importance of the suggested step, and instanced the proposed utilization of the Old Upper Canada College grounds as a hotel site as a matter in which such a society might find something to do. There was no site in the city better adapted for making a display worthy of it, similar to the Champs Elysee in Paris. The tendency in Toronto seemed to be towards covering every open spot of ground with buildings. If the promoters of the hotel project, instead of putting the hotel in the east end, would contribute $100,000 more and place the hotel in the centre of the block, there would be room for ornamentation. Unless something was done very shortly this opportunity would be lost.

Mr. Gregg thought that too much was being put into the hands of the Council, and that the present matter was one in which the Association as a whole was interested. Would it not be well to leave it in the hands of a committee of the Association residing in Toronto?

The President suggested that there were other places besides Toronto in which such action as was proposed might be desirable. A committee might be formed, representing all the cities of the Province, who would be in close touch with each other. He thought that a pronouncement on this subject coming from the Association would have much weight, and there was no reason why the movement should be restricted to Toronto.

Mr. Townsend was of the opinion that a representation coming from the Association as a whole would carry more weight than one from a local committee.

Mr. Aylsworth favored Mr. Gregg's view, because the Council met so seldom that it had little time in which to deal with such matters, and the Council did not seem to be very well known to the public. Instead of attempting anything so ambitious as the plan in connection with the hotel, he thought much might be effected in a smaller way to the advantage of the city. For instance, at the head of Bay St., opposite the new city buildings, the corners might be cut away to give an open area, and a fountain or statuary placed in the vacant space. Something of the same kind might be done at the corner of King and Yonge Streets, as it would not cost very much, now while the old buildings remain, to acquire the two north corners and cut them away, leaving a resting spot in the centre.

Mr. Gregg moved in amendment that the Council appoint a committee of members to consider the question of forming a larger committee of citizens.

Mr. Gouinlock thought the matter was one which could be better handled by the "Guild" than by the Association; he was unable to see in what way outsiders were interested in it.

Mi. Paull provoked some laughter by inquiring, "What is the Guild?" or "Who are the Guild?" He had supposed that when the Association was formed the Guild was at an end. He felt assured that action taken by the Association would be more effective than if taken by the Guild.

Mr. Wickson expressed himself in favor of action being taken by the Association rather than by the Guild. He did not think it well for the latter body to bring itself before the public.

Mr. Gouinlock said that leaving the Guild entirely aside, the matter was one of interest only to city architects; it was something referring to the City of Toronto, and not the Province at large.

Mr. Wickson dissented from that view. Other cities in the Province were interested both in the matter of improved fire by-laws and more systematic ornamentation of their open spaces.

The President thought Mr. Gouinlock misapprehended the object of the Guild. That body had no more to do with Toronto than the Young Liberal or Young Conservative Clubs, as it held its meetings merely for social objects. He thought, with the Registrar, that action by the Association as a whole would have more weight. He could see no reason why there should not be a committee having sections in different cities. There was no need of frequent meetings, as action could be had as a result of correspondence.

At the suggestion of the President, after a little further discussion, the following committees were appointed on motion of the Registrar, seconded by Mr. Townsend, to prepare resolutions and report to the Association to-morrow:

On the fire by-law: Messrs. Tully, Gordon and Burke.

On the city ornamentation: Messrs. Billings, Baxter, D. B. Dick, W. R. Gregg, A. A. Post and W. B. Aylsworth.

Mr. A. H. Gregg called attention to the apparently decreasing popularity of the examinations of the Association, there being only 13 students who presented themselves at those held last year. He thought all would admit that the examinations were one of the chief bulwarks of the Association, as they fixed the standard they were attempting to raise. He thought that some tangible recognition in the shape of a diploma given to those who had already passed the examinations, as well as to those who might be successful in passing them in the future, would be an incentive to students to come up to them, and therefore would move, "That diplomas be granted to all students who have passed the final examinations up to the present time, and also to those passing them in the future."

Mr. Baxter seconded the motion.

The Registrar said he had some time ago received a letter in regard to this matter from the mover of the resolution, and it had been spoken of at the Council meeting in the morning, the only question being as to the expense of getting up a diploma of such artistic merit as would be creditable to the Association. He himself thought the idea a good one.

Mr. Billings, referring to the objection of the expense, said that in the civil service men had to pay $7 for their commission, and similarly, a charge might be made for the proposed diploma.

The President asked in the event of non-payment of fees or for other sufficient cause, the diploma, if given, could be withdrawn?

To this there seemed to be a general dissent.

Mr. Wickson thought it a feasible plan to make a charge for the diploma as suggested. He had been surprised to learn that in the medical profession, in certain hospitals at St. Louis, even when medals were earned, they were not given out until a certain amount was paid for them.

Mr. Gordon threw out the idea that one item of the expense be reduced by holding a competition among the members for a suitable design, which would leave only the mechanical part of the work to be paid for.

The motion was then carried.

Mr. Aylsworth said there was a matter rising out of the minutes regarding which he wished to speak. It appeared from the Librarian's report that, while the annual expense of his department continues as usual, the number of books called for had so declined that each loan cost the Association something over a dollar, besides the first cost of books, &c.

Could we afford to be so generous to the few members or students who seemed to appreciate or desire the books?

At a former meeting he had questioned the wisdom of founding a library which must remain so weak and unattractive, and that view had now been confirmed. There is a much more valuable collection of architectural works in the Toronto Public Library, free to all. The library of the Provincial Parliament contains a number also easily accessible, and the School of Practical Science has here a magnificent collection, not only of books, but photographs and plates of everything worthy of study. This collection is growing and is freely offered for our use and benefit. Would it not then be a graceful act to offer the donation of our small library to be added to that of the School?

Mr. Paull depreciated the tendency to despise the day of small things, and could not believe that Mr. Aylsworth was serious in his proposition. Speaking for himself, he would rather give a subscription for the purpose of increasing the efficiency of the library.

Mr. Aylsworth assured the last speaker that he was quite sincere in what he had proposed. It did not seem feasible to maintain a library that would be serviceable to an Association whose members were scattered all over the province. Then again there were so many libraries started in the city that not one of them was what it might be. He would like to see all the books on architecture now scattered in the various libraries brought together where they would be more accessible and consequently more made use of.

Mr. Helliwell seconded Mr. Aylsworth's motion, expressing his concurrence in the views of that gentleman regarding the desirability of concentrating the works on architecture now scattered in different libraries in some one place at which members of the Association might avail themselves of them for reference, and could also have the privilege of taking them out if necessary.

The Registrar reminded the members that as the Association held examinations, it ought to have a library that at least embraced all the text books necessary to the examinations. The lack of these books had been made an excuse for not coming up for the examinations.

Mr. Paull stated that he had learned from the chief librarian that the medical books in the reference department of the public library had been handed over to the medical profession and he thought proper action and representations would result in similar action by the architectural works being handed over to the custody of the librarian of the Association.

Mr. A. H. Gregg thought the committee should consider the desirability of enhancing the utility of the library rather than wiping it out of existence.

The President said he understood Mr. Aylsworth's motion to be that the committee should consider the propriety of doing away with the library.

Mr. Aylsworth said his motion was that the committee should take into consideration the subject of the library, and bring in a resolution to deal with it one way or the other.

The motion was then carried and the President nominated

the following committee to consider and bring in to-morrow a report concerning the future of the library: Messrs. Aylsworth, Wright, Wickson and A. H. Gregg.

Mr. Aylsworth then read a paper entitled "A Chapter from my Note Book—Building Methods in Rome," which will appear in our March issue.

The President asked how the vaults referred to by Mr. Aylsworth were held together.

Mr. Aylsworth presumed they were built a good deal in the same way as bakers' ovens. In the case of a room 15 feet square or thereabouts, a scaffold might be erected and covered with sand and the vault formed over that. In some cases they were of brick work, but not at all carefully done, seeming rather to depend on the strength of the mortar.

The Registrar stated that the Italian vault was something he had had an opportunity of seeing something of, having been shown through a mansion at Florence, owned by an American, who had described to him the way in which it had been built. Every floor was vaulted with an elliptical brick vault. The walls were not very thick, as even the top floor, which was unused, had the benefit of a good deal of vertical wall. It had occurred to him that the process was one which might be adopted in other countries, even our own. The process of vaulting, as described to him, was to outline on each wall with chalk the form the vault was to take; then to mark the courses on these outlines and stretch strings across, laying the courses to the string as in ordinary walling. Every third or fourth brick was propped up by a stick from the platform the bricklayers were working from, until the course was completed and held itself. The bricks were not laid as in an arch, but edge to edge, and as the Italian brick is thin the vault was not more than two inches in thickness—and this over quite a large room. The moment the last brick was in, while the mortar was still new, the workmen got on the back of the vault to continue building. On one occasion a derrick pole had fallen and broken through the crown of each floor, but only made a small hole. If fire-proof building is to be talked about a construction of this kind might well come in for consideration.

Mr. Aylsworth said there was no reason why we should not have fire-proof buildings, using concrete more than we do. He believed in California they used concrete beams in which sufficient iron rods were laid and the concrete floor laid at the same time.

SECOND DAY.

The convention resumed its session at 10 o'clock a. m., when Mr. D. G. Baxter, of Stratford, read a paper on "Points on Acoustics," which will be printed in a later issue.

At the close of Mr. Baxter's reading the President called on the members for any remarks they might have to make on the subject, and the Registrar suggested that the President, having a wide experience in the erection of churches, would be able himself to give the convention some valuable information.

The President said one method he had found very effective was to have a flat wall behind the speaker. He had known instances where by reason of an octagon form behind the speaker, the echo had been such that he could hardly be heard, and this was in a great measure remedied by cutting off the octagon.

Mr. Wickson enquired if there was not some theory about the ellipse being the most perfect form; he had been given to understand that it was, although he had not found any authority for the statement.

Commander Law remarked that the Mormon Temple at Salt Lake City, Utah, was said to be almost perfect in its acoustic properties, and was shaped like half an egg.

Mr. Edwards added that the form of the pavilion at Grimsby Park was suggested by the Mormon Temple referred to by Commander Law, but although, as that gentleman had said, the Salt Lake building was believed to be acoustically the most perfect on the continent, the Grimsby imitation bore the reputation of being the very worst in that respect.

Mr. Wickens said he had heard it remarked by a musician that any building which was good to speak in was poor to sing in. It seemed almost universal that a church or any building which pleased singers was not one that pleased speakers.

The Registrar suggested that if the choir was placed in a recess of resonant wood above the level of the speaker, he would not be effected.

Mr. Baxter said the objection to seating the choir in a groined recess behind and above the speaker was, that it formed a volume of air behind him which he had to maintain in vibration all the time he was speaking and which weakened the sound. The higher the recess could be raised behind the speaker the better. He had noticed one church in which the chior was directly above the speaker, the front of the chior gallery being brought out about four feet, the under side of it forming a cove, which to a great extent kept the sound vibration directed from him out to the audience, and leaving a clear and sympathetic vibration which did not affect the main church at all.

Mr. Edwards agreed with the essayist that it was difficult to formulate any definite laws on the subject of acoustics; it was a case in which "doctors differ." The whole theory of wave sound was doubted by some, who adduced very good reasons in support of their unbelief, contending that it takes so much effort to set in motion the atmosphere which is the means of communication, or which is the matter on which the wave sound has to act. As an illustration of that they contended the distance the sound of a grasshopper is heard would require tons of power to produce the wave sound at such a distance if the wave theory were correct. That being the case, it was necessary to look carefully at the beginnings on this subject, and to avoid building up any superstructure before the foundations were securely laid, and he thought the foundations of the matter required some further negotiation yet.

Mr. Geo. Browne (of Winnipeg) related his experience of a church in Winnipeg which on account of its great height was very defective in acoustic properties, and in which it was almost impossible to speak effectively. It was at last decided to take down the building and re-erect it on the same foundations, but with the height greatly reduced, and after that was done the pastor stated that whereas the old church was one of the very worst he had spoken in, after being so rebuilt it was one of the very best. He thought this demonstrated that not only length and width, but height also, had a very important bearing on the subject of acoustics. He had this summer completed a Presbyterian church, which was built exactly square, about sixty-five feet square, in which he had adopted the American system of placing the preacher in a corner. It had a gallery on two sides and coved plaster ceilings, and the tie beams formed deep panels in the ceiling. The result had been one of the finest buildings for speaking in the city, so much so that whenever religious meetings were held requiring a building with good acoustic properties, the persons interested tried to get this church to hold them in. In the Convocation Hall of Manitoba College they had a hall 65 x 35 feet, and he was told by the principal that he found no difficulty whatever in speaking in it. There was a gallery at one end of the room and a coved ceiling. From his experience he believed that the coved ceiling aided very materially in causing the sound to travel freely throughout the hall.

Mr. Wickson asked if a coved ceiling at the end of an audience room opposite the speaker had the effect of causing an echo.

Mr. Browne said he always continued the cove all around the building; he thought it reflected the sound.

Mr. Baxter said he had observed in nearly all the Chicago buildings that the cove on the rear wall was far deeper than around the sides, in fact they drew the cove line right round so that the entire body of sound was directed right down, and there was no chance for the formation of an echo, whereas, if there were any straight line between the curve and the floor of the gallery, it would not have so good an effect.

Mr. Paull said an important matter was what should be the limit of size in a church in order to secure proper acoustic qualities. He had heard it said that 1200 persons was the greatest number that could be accommodated so that the preacher could command their hearing. The church in Winnipeg spoken of by Mr. Browne as 65 feet square would have about that capacity. He would like to ask Mr. Browne how the extremities of the panels in the ceiling of that church were finished? Were they coved at the ends.

Mr. Browne stated they they were finished simply by running up a false rib. The tie beams came across and then they ran them down on the cove to a small projecting cornice.

The President stated that in regard to the remarks of Mr. Edwards about the grasshopper, he thought it was necessary to take into consideration the number of vibrations in the air; he supposed the more rapid the vibrations of the air the more penetrating the sound would be.

Mr. Edwards said he had not the confidence in coved ceilings that had been expressed by some of the members. He had in his mind a large room or auditorium which was almost as bad acoustically as the Grimsby temple, the ceiling of which was very deeply panelled and with a very extensive cove and all the other features which had just been pronounced of no great advantage. It was really a most miserable place to speak in. At one time the platform was placed on the long side of the building, but the echo was so bad that it had to be changed to the other side, which produced slight improvement, though it was not perfect by a great deal yet. These things did not always work in accordance with one's preconceived ideas. He had happened to have a building somewhat similar to the Winnipeg church rebuilt by Mr. Browne, and he had recommended putting in a gallery, which he hoped would remedy the trouble that existed.

Mr. Browne said he regarded a gallery as necessary to secure good acoustic properties in a church. Another matter he wished to mention was that the windows in Westminster church had circular heads, cutting into the cove, just the same as a vault or groin, and he would not at all wonder but that assisted the sound.

Mr. Edwards said one of the best auditoriums he had ever been in, speaking from the acoustic point of view, was the Casino, of New York, which was built very much after the style of the Massey Hall in Toronto, only the recesses were much deeper all round. This had a very beautiful effect from the artistic standpoint, as well as being very beneficial to its acoustic properties.

The President said that in view of Mr. Browne's opinion that a gallery was necessary to good acoustic properties in a church, it would be interesting if any one could tell what had been the effect in St. James Cathedral in this city, from which the galleries had lately been removed. He thought an instance of the detrimental effect on good acoustics of a high ceiling was to be found in the chamber of the Parliament Buildings in Toronto, which was one of the worst rooms possible for hearing in.

Mr. Wickson facetiously suggested that that might be due to the influence of having been designed by an American architect.

Commander Law asked if the Massey Hall was regarded as a good building acoustically, and what effect the "gingerbread" work had on its acoustic properties.

Mr. Edwards said he had no knowledge of the acoustic properties of the building referred to, and had only spoken of it with reference to its structural resemblance to the New York Casino.

Mr. C. H. C. Wright, Lecturer in Architecture at the School of Practical Science, then read an interesting paper on "Portland Cement," which is printed elsewhere in this issue.

A paper was also read by Mr. McCarthy, which, with the discussion thereupon, will be printed in a future number.

Mr. Townsend, on behalf of the committee appointed to consider the matter of the library, presented the following report:

REPORT OF COMMITTEE APPOINTED TO CONSIDER THE STATE OF THE LIBRARY:

Your committee—while recognizing the absurdity of attempting to furnish the members of the Association with architectural books to read, at a cost to the Association of something over one dollar for each reading, feel that to dispose of the library—constituting as it does one of the strongest bonds of union in the possession of the Association—would be a very serious mistake.

They are of the opinion that, notwithstanding the fact that but few members have availed themselves of the privilege of reference to the books, this privilege is of considerable value to many members of the Association, particularly to those members who are so placed as to be unable to make use of the larger city libraries, and therefore recommend that in place of disposing of the library of transferring it to other institutions, every effort should be made to increase its efficiency, both by purchase of additional books—so far as the funds at the disposal of the Council will admit—and by endeavoring to obtain donations from members and others interested in architectural education.

They believe that books of a strictly technical nature being of comparatively little value to persons outside the profession, a properly circulated appeal might result in considerable increase to the library from bequests and donations from members giving up practice. Such an appeal is meeting with a very hearty response in the society of engineers.

The Architectural Association of the Province is unquestionably a most qualified custodian for architectural works of reference which have become public property, and your committee believes that if the Association library becomes properly established and generally used, it is reasonable to expect that other bodies having control of architectural books will transfer them to the Association, just as the Public Library Board has recently handed the medical books of that institution over to the Medical Association.

They would further recommend that until the finances of the Association are in a better condition, purchases should be confined to books necessary to the students in preparing for their examinations, and those dealing with the most modern methods of constructinn, nature and properties of building materials, and other matters of a practical nature.

In conclusion, they would suggest that the cost of managing the library be reduced to a minimum, and that a circular be sent to all members explaining the conditions upon which the books are loaned.

S. H. TOWNSEND,
M. B. AYLSWORTH,
C. H. C. WRGHT,
A. H. GREGG,
A. FRANK WICKSON.

The President said he had listened to the report just read with more pleasure than to anything else during the present convention.

Mr. Aylsworth moved the adoption of the report, seconded by Mr. Townsend.

The President said he understood it was the intention to send on the report as a recommendation to the Council.

Mr. Townsend replied that was the intention.

The President then asked for discussion on the report of the committee.

Mr. W. R. Gregg suggested that a certain sum of money be each year devoted to the improvement of the library, no matter how small that amount might be.

Mr. Gordon approved of the suggestion, and thought a resolution should be passed to the effect that the yearly revenue over and above the sum necessary for the economical administration of the Association should be applied to increasing the library.

Mr. Townsend thought the recommendation on the subject contained in the report was in better form than that suggested. The Council was certainly in a better position to judge of the financial standing of the Association than the convention could be.

Mr. Gordon thought too many things were being thrust upon the Council, and the members throughout the province consequently felt little responsibility with regard to the work of the Association. He would embody his ideas in a motion that all revenue received by the Association over and above that which is necessary for the efficient administration of the affairs of the Council, should be devoted to improving the library.

Mr. Billings seconded the motion.

The President said the motion could be made after the report had been adopted.

Mr. Power thought Mr. Gordon's remarks pointed in the right direction, and the course he proposed would, as he said, throw the responsibility more on the members, which was desirable in his opinion.

The report of the committee was then adopted.

Mr. Gordon then moved that it be an instruction to the Council that all surplus revenue yearly over and above what is necessary for the efficient and economical administration of the affairs of the Association, be devoted to the increasing of the efficiency of the library.

The President said if there were a surplus of fees over expenses amounting to say $500, it would be rather a questionable proceeding to spend it all on the library.

Mr. Aylsworth said he understood the resolution only contemplated dealing with the revenue of each year. Last year there had been no surplus, but during the coming year it is hoped there would be a small amount.

The motion was then carried.

The members partook of luncheon served in an ante-room of the School of Practical Science at 1 p. m.

AFTERNOON SESSION.

On resuming proceedings at 2.30 p. m., Professor Coleman, of the School of Practical Science, read a paper on "The Weathering of Building Stones," which appears on another page.

Mr. Darling spoke of the peculiar way in which some of the projecting stones in a building erected by him, and in which great care was exercised in selecting the stone, had become damaged, apparently by water soaking through; the exposed surface being perfectly sound and good and the damage occurring where it was perfectly dry. He was unable to understand how the water could soak through.

Professor Coleman inquired if it was a white efflorescence?

Mr. Darling said it was.

Professor Coleman suggested the presence of iron pyrites in the stone.

Mr. Darling stated that it was chosen because of its supposed freedom from iron.

Prof. Coleman expressed his willingness, if furnished with specimens, to endeavor to ascertain the cause of the action.

The President enquired if there was any likelihood of the water soaking through vertically.

Mr. Darling said that was exactly what seemed to have taken place.

Professor Coleman said there must be some soluble salt in it—perhaps a sulphide.

The President had noticed in the Bank of Commerce, that the underside of the Connecticut brown stone of which it is constructed was becoming friable.

Mr. Townsend said there were indications of the same kind in a great many stones in Paris, and the explanation was offered that the water gets into the stone and gets down a certain distance, and not being able to dry out, forms certain salts.

Professor Coleman said unless there was something in the stone that would dissolve that could not happen; there must be some sulphide or something of that kind.

Mr. Power said there was a limestone in Kingston which was affected in the same way, in St. George's Cathedral in that city.

Mr. Billings referred to a similar effect at Ottawa in certain balustrades of Ohio sandstone in the Parliament buildings which had crumbled away.

Mr. Tully said that some years ago his attention was drawn to the yellow sandstone at Osgoode Hall, the balusters at the centre entrance being all decayed away—the surface completely gone. As architect for the Government, it gave him some concern, and he spoke to a painter about it, who invented a paint which was effective in arresting the decay. On finding the paint efficacious he induced the Commissioner to have all the stone work of the building painted with it, because the surface of all the stone was becoming affected in the same way. Some critic in the newspaper had referred to the bad taste displayed in painting the stone work of a beautiful building like Osgoode Hall, but it was a necessity in order to preserve it. He would not advise architects to permit the use of that yellow stone.

Mr. Darling pointed out that in the Molsons Bank and the old Board of Trade building, constructed of Ohio stone, the surface was in almost perfect condition.

The committee appointed to bring in a report in regard to a revision of fire by-laws, then presented a report dealing in detail with several points in which buildings could be better protected from damage by fire.

Mr. Aylsworth was of opinion that some provision should be made that elevators and stairs should be separated as far as possible.

The President suggested as changes desirable in the report the addition of fire proof shutters on all windows above ground floor, on main areas or narrow thoroughfares, and a reduction of

the weight to at least 100 pounds for offices, increasing in buildings devoted to mercantile purposes.

Mr. Aylsworth was opposed to the report in its present form being adopted. It might serve as a recommendation or suggestion to a committee who should give it more time than could be spared now in convention.

Mr. Power was in favor of taking more time to consider the matter, so as to prepare a by-law carefully that could not be picked to pieces. He thought the committee in the time at its disposal had done well, but he would like to see a little more time allowed for consideration.

Mr. Symons thought the report could only be regarded as a partial report, and advocated giving the matter further consideration. He moved that the whole matter be referred to a committee of city architects to be named by the President for further consideration.

Mr. Gouinlock seconded the motion.

Mr. Darling thought it advisable to have as wide a discussion as possible regarding so important a matter; he thought too much time could not be expended on it. He felt that in the short time that could be devoted to it now a satisfactory conclusion could not be reached, and he did not deem it wise to adopt the report in its present shape as an expression coming from the whole Association.

Mr. Gregg thought the discussion so far had shown that there were many additional points to be considered, and he supported the motion of Mr. Symons, that it be left to a local committee to consider it in all its respects, including the state of the present city by-law.

Mr. Symons' amendment was then carried.

The President requested the former committee to retain the matter in their hands and to place it in as good shape as possible, and then to call a meeting of the city members to further discuss it.

A paper entitled "Electricity for Architects," was then read by Mr. John Langton, which is published elsewhere.

Mr. Aylsworth then presented the report of the temporary committee on the improvement of cities, approving of the idea and suggesting the appointment of a permanent committee for carrying it out.

On motion of Mr. Aylsworth seconded by Mr. Baxter, the report of the committee was adopted.

The Civic Adornment Committee was then appointed by the President, as follows:

For Toronto, Mr. Aylsworth and Mr. D. B. Dick; for Kingston, Mr. Power; for Hamilton, Mr. Edwards; for Stratford, Mr. Baxter; for Ottawa, Mr. Billings, with power to add to their number.

EXHIBITION OF WORK BY MEMBERS.

A number of slides prepared from drawings and photographs of designs by members were then exhibited by means of the stereopticon, and as the views were thrown on the wall comments were made by the meeting upon points in the design of the buildings. There were about eighty slides exhibited and much interest was shown.

On motion of Mr. Gouinlock, seconded by Mr. Belcher, the thanks of the Association were tendered to Mr. C. H. C. Wright for preparing the slides for the views shown.

ELECTION OF OFFICERS.

Messrs. Post and Helliwell having been appointed scrutineers, the President suggested that it be a recommendation that retiring members of the Council shall not be eligible for one year after their period of service.

Mr. Edwards moved that the Association adopt the suggestion made by the President.

Mr. Gordon seconded the motion, which was carried unanimously.

The election was then proceeded with, and the following gentlemen declared elected as members of the Council: Messrs. F. J. Alexander, of Ottawa, G. M. Moore, of London, and W. R. Strickland, of Toronto.

Votes of thanks were passed to the Minister of Education for the use of the building; to Messrs. Galbraith and Wright and the members of the School of Practical Science for assistance on this and other occasions; to Professor Coleman, Mr. John Langton and Mr. Hamilton McCarthy for their valuable papers.

The convention then closed.

THE DINNER.

Following their usual custom, the Toronto members of the Association gave a dinner in honor of the non-resident members. The event took place this year at McConkey's restaurant, at the close of the Convention. About fifty members and guests participated in the enjoyment of the many good things, of a physical and intellectual character, which the occasion afforded.

THE ARCHITECTURAL GUILD OF TORONTO.

At the annual meeting of the Architectural Guild of Toronto, the following officers were elected: Sec.-Treasurer, Geo. W. Gouinlock; Trustees, D. B. Dick, Henry Langley; Executive Committee, W. R. Strickland, Com. F. C. Law; Auditors, S. H. Townsend, C. H. C. Wright; Representatives on Technical School Board, Edmund Burke, A. F. Wickson.

PORTLAND CEMENT—A PLEA FOR A GREATER UNIFORMITY IN THE TESTS AND SPECIFICATIONS.*

By C. H. C. Wright, B. A. Sc.

At the present time when the American Society of Civil Engineers are using a uniform system of testing and the Canadian Society of Civil Engineers is endeavoring to get its members to work along more uniform lines, it may not be out of place for me to draw your attention to this question.

In a publication of last year (1893) by Geo. L. Sutcliffe, Associate R.I.B.A., on "Concrete," we find the following:—"The variety of specifications for Portland cement is somewhat bewildering." He is speaking of English specifications. This is not so in Germany, for there they have standard regulations. In England they are taking steps to remedy this evil, and there is no reason why we in Ontario should not do likewise.

The object in testing Portland cement is not that pursued in testing other materials of construction, viz: to determine their absolute strength, except in a few special circumstances—the reason being that the cement is seldom employed where it is subjected to stresses in the vicinity of its safe load. What we do wish to know, however, is that the cement will set, harden and continue to increase in strength, and not subsequently disintegrate or blow. Many of you have heard the statement that there is no use in testing cement, as the proper test is experience. There is no doubt but that the test of time in any actual construction is the very best, but how expensive when the material proves a failure. Or again, having proved that a particular brand is good, we are uncertain but that the very next shipment may prove to be utterly worthless, as illustrated by the following cases in the laboratory of the School of Practical Science: In August, 1894, there were two samples of the same brand of German Portland cement. The first was unfit for use, while the second was an excellent cement. In June and July, 1893, there were two samples of the same brand of English Portland cement—the first being unfit for use, while the second was a good cement. In February, 1892, there were two samples of Canadian Portland cement—the first being unfit for use while the second was a cement of excellent qualities.

I have made the above classification because it is very common in Ontario at the present time. We are then expected in the laboratory to make certain observations and from these predict the most probable behavior of the Portland cement in the work under construction. In order to determine with any degree of certainty the properties of a Portland cement, the observer requires from 1 to 3 months, as will be shown later, but unfortunately in practice in Ontario he has but a week or two at his disposal. The observations usually made are: 1. Fineness of grinding; 2. Tensile strength; 3. Soundness; 4. Specific gravity or weight, the latter being omitted quite frequently, while we have occasionally added chemical analysis, compression and transverse tests.

With a complete knowledge of the above we are able to say what may be expected of the samples of Portland cement under consideration.

Fineness of Grinding.—It has been demonstrated and admitted for some considerable time by all who use Portland cement, that any particles which will not pass a No. 50 sieve, i.e., 2500 meshes per sq. inch, are inert and act as sand. It is now, however, generally held that particles not passing a 100 sieve are inert. From this point alone it will be seen that the question of fineness is a very serious one. The cement in practice is mixed with definite proportions of sand; is it not therefore of first importance to know how much sand is already in the barrel labelled "Portland Cement?" Further, as the duty of the resulting fine cement is to form an envelope around the particles of sand and unite them together, it follows that the finer the grinding the less the amount of cement required, or the greater the amount of sand which may be mixed with it. One of our English authorities, Mr. H. K. Bamber, in discussing this point says, that these large particles (retained in a No. 50 sieve) not only remain inert while the cement around them is setting, but after the process of hardening is well under way, they absorb water, causing internal expansion and the disruption of the cement in the same manner as small lumps of lime disintegrate.

Mr. W. F. Reid says he had not been able to produce such expansion experimentally, and did not think it took place in good cement. Whether it is true or not that these particles do afterwards absorb moisture to the detriment of the cement, it is still desirable to have the cement properly ground, and the German and Canadian manufacturers are paying special attention to this question.

The majority of English cements that we receive in Ontario are not properly ground. While on this point I would like to say that the spirit of our Canadian manufacturers as evinced in this matter of grinding is deserving of commendation—for they have done this in the face of the following facts: (1) the consumer—our architects and engineers—are willing to accept a much more coarsely ground cement than they are producing; (2) that the more coarsely ground cements stand a higher tensile stress than the finer ones when tested neat; (3) that the coarser a cement the higher its weight per striked bushel; and (4) that

*Paper by Mr. C. H. C. Wright, B. A., Sc., School of Practical Science, Toronto, read at the fifth annual convention of the Ontario Association of Architects.

the expense of grinding is very considerable. I would like to urge upon you the propriety of so writing your specifications as to induce the manufacturer to produce a better article instead of tempting him to do otherwise.

It is apparent then, that while they have been under a much greater expense in producing an article which they think a better one, and is as a matter of fact better, they have produced a cement which, when tested by you, has appeared worse than if they had not so improved it.

FINENESS OF GRINDING.

	Residue in percentage on sieve No. 100.	Residue in percentage on sieve No. 80.	Residue in percentage on sieve No. 50.
Averages of 180 determinations of German Cements of various brands	8.9	3.9	0.9
Averages of 210 determinations of Canadian Cements of various brands	10.5	3.9	1.7
Averages of 450 determinations of English Cements of various brands	23.7	16.3	9.56

The following might be quoted as instances of the grinding of Canadian Portlands:—

	Residue No. 100 sieve.	Residue No. 80 sieve.	Residue No. 50 sieve.
Star (Deseronto)	5.4	1.8	0.6
Sampson (Owen Sound)	13.9	7.4	3.7
E.P.C (Marlbank)	9.8	4.0	1.0
R.W. (Hull)	11.3	3.3	1.2

In the writer's opinion, the cement should completely pass the No. 50 sieve and leave a small residue on the No. 100 sieve. This, however, is out of the question, considering the present market, but we ought to refuse a cement if the residue on No. 50 is greater than 5%, and after every year or so it might be reduced until the desired end is reached.

I might say that the average requirements of the architect and engineer of Ontario is that the residue on a No. 50 sieve shall not exceed 10%, but I am equally certain that the cement would not be refused if it left a residue of 12 or 13%. There are specifications in this province calling for a cement with a less residue than 20%—in fact the text-book as set by this Association mentions 20%. It is time we were following the example set by our manufacturers, and encourage them to grind as we like and not as they please.

TENSILE STRENGTH.

The method of determining the tensile strength most commonly followed in Ontario is to mix a little water with the cement, then place it in a mould and leave it in the air for 24 hours, after which the briquette is placed in water and kept for six days; it is then broken and the strength determined. In a few cases (in Ontario), in addition to the above neat test, a sand test is made. Simple as the above seems, there are many conditions which affect the strength very materially. Among these may be mentioned:

1. The fineness of grinding.
2. The percentage of water used in gauging.
3. The thoroughness of the gauging.
4. The style of grip used in breaking the briquette.

In support of the fact that the fineness has a material effect upon the resulting tensile strength, I would quote the following results from a paper read before the British Institute of C. E., by Mr. Grant.

Quality of Cement.		Ult. ten. strength at 3 mo.				Ult. ten. strength at 6 mo.			
		Neat.	1 sand 1 cem.	2 sand 1 cem.	3 sand 1 cem.	Neat.	1 sand 1 cem.	2 sand 1 cem.	3 sand 1 cem.
Fineness, &c.	w't per bus.	Pds. sq. in.	Pds. sq. in.	Pds. sq. in.	Pds. sq. in.	Pds. sq. in.	Pds. sq. in.	Pds. sq. in.	Pds. sq. in.
Cement as received from manufacturer.	116	504	286	117	103	527	350	229	151
The same passed thro' a sieve of 1296 meshes per sq. in., which rejected 20 per cent.	102	457	324	212	143	492	424	281	173
The same passed thro' a sieve of 2500 meshes per sq. in., which rejected 30 per cent.	99	449	377	256	173	486	439	323	228

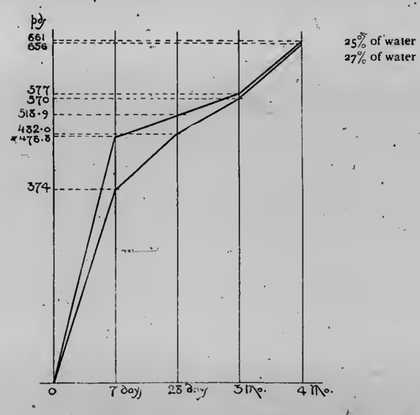
By referring to this table it will be seen that if gauged neat, coarse grinding increases the tensile strength, while if gauged with sand, coarse grinding decreases the ultimate tensile strength.

A. E. Carey, M. Inst. C. E., gives the following results gauged 3 sand to 1 of cement:

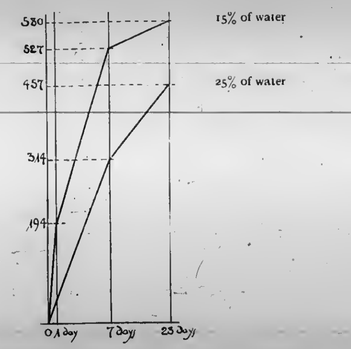
As ground with 9% residue.	Pds. per sq. in.
On a No. 50 sieve (2500 meshes per sq. inch)	220
With residue on 2500 sieve removed	304
" " 5625 " "	311
" " 32,257 " "	360

While in the longer tests the percentage of water used in gauging may have very little effect upon the tensile strength, yet for the ordinary 7 day or 28 day tests of neat cement, the amount of water used will alter the strength between wide limits. The less the amount of the water used and the firmer the cement is pressed into the moulds, the stronger the resulting briquettes, as the following tests made in the laboratory of the School of Practical Science will show.

The following diagram gives the record of the averages of 200 briquettes of Owen Sound Portland, gauged neat, one half being gauged with 22 per cent. (by weight) of water, and the other with 27. As will be noticed the difference between the two gaugings is very marked at 7 days, gradually growing less as far as the experiment lasted.



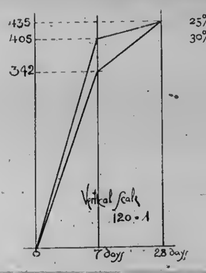
Sieve.	Residue in percentage by weight.
No. 100 (10,000 meshes to the sq. in.)	13.9
No. 80 (6400 " " ")	7.4
No. 50 (25,000 " " ")	3.7



The above diagram gives the averages of 50 briquettes of Hull Portland gauged with 15 and 25, 6 per cent. of water.

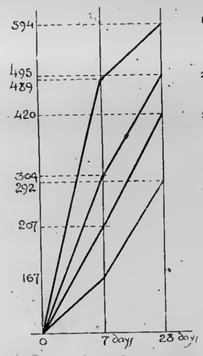
Sieve.	Residue in percentage by weight.
No. 100	41.3
No. 80	32.8
No. 50	22

It should be mentioned here that this series of tests was made some time ago, and that the grinding of this brand is much improved.



The above diagram gives the averages of 40 briquettes of Star (Deseronto) Portland, gauged with 25 and 30 per cent. of water. This sample was very fast setting so that the amount of water used is larger than in the two preceding cases.

Sieve.	Residue.
No. 100	6.1
No. 80	2.55
No. 50	1.225



The above diagram gives the averages of 80 briquettes of White's Portland gauged with 15.3 – 23.7 – 27.8 and 33.3 per cent. of water.

From all of these diagrams it is readily seen that the amount of water used has a very marked effect upon the tensile strength at the end of seven days, and that this difference gradually becomes less in time as far as the experiments are carried.

In making briquettes of neat cement not more than 1 or 2 should be attempted at once, for the water and cement must be thoroughly incorporated, and yet placed in the mould before any initial setting takes place.

From a paper prepared by G. F. Deacon for the British Inst. C. E., we get the following:

In discussing the personal errors in cement testing, Clifford Richardson, Ass. Am. Soc. C. E., gives the results of the following tests made under his supervision. A batch of cement mortar (2 to 1) sufficient to make 45 briquettes was mixed by one individual and divided into three equal portions. The mortar was then handed over to three persons (⅓ to each) to be placed into the moulds. Observer A was unskilled in making briquettes; observer B had considerable experience, but no extended practice but endeavored to follow C, who has been engaged for years in making briquettes. A filled his 15 moulds and had mortar left, B crowded his into 14 moulds, while C just filled 15. The briquettes were treated exactly alike by the same dividual after the gauging, with the following results:

AGE OF BRIQUETTES.	Round Top Cement.			Antietam Cement.		
	A	B	C	A	B	C
7 dy.	64	127	138	47	91	58
28 dy.	122	196	255	139	189	171
3 mo.	175	315	399	147	201	204
6 mo.	258	345	363	150	214	221
12 mo.	340	365	411	146	219	230

That the style of the grip used in breaking the briquettes has a very decided effect is well established by the following table, taken from the report of a sub-committee of the commission of French government engineers. The increase in tensile strength due to the rubber cushioning will also be noted:

TABLE SHOWING COMPARATIVE REGULARITY AND STRENGTH OF FRACTURE OF NEAT CEMENT BRIQUETTES BROKEN WITH JAWS OF GRIPS UNPROTECTED AND CUSHIONED WITH RUBBER.

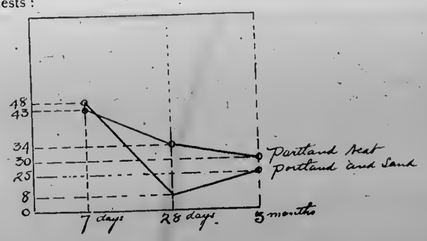
UNPROTECTED.				CUSHIONED WITH RUBBER.			
Eccentricity of Fracture.	Sectional Area* of Fracture in sq. inches.	Resistance per** sq. inch of Minimum Section in pounds.	Resistance per sq. inch of Fracture in pounds.	Eccentricity of Fracture.	Sectional Area of Fracture in sq. inches.	Resistance per sq. in. of Minimum Section, in pounds.	Resistance of sq. inch of Fracture in pounds.
+7.5	.937	426	352	−6.0	.850	496	455
+0.5	.796	398	386	+1.5	.791	461	448
−5.0	.867	461	412	−2.0	.806	489	470
+3.0	.875	475	452	−1.5	.797	504	488
+1.5	.785	447	441	+2.5	.830	496	464
−1.0	.800	412	382	−3.0	.830	518	483
0	.792	291	283	+1.0	.789	447	439
+4.5	.836	511	414	−1.5	.781	496	483
+5.5	.883	418	412	+3.5	.875	518	493
+4.0	.875	511	448	−0.5	.792	455	441
+1.0	.789	331	328	+1.0	.790	410	431
−5.0	.852	475	433	−3.5	.837	496	461
−6.0	.867	426	380	−3.0	.799	454	592
−1.5	.800	362	375	+1.0	.815	419	398
+8.0	.892	489	426	−2.0	.797	447	432
+1.5	.795	454	441	−4.5	.823	483	452
+2.5	.813	418	447	−1.5	.797	475	461
−6.0	.824	496	467	+3.5	.831	475	441
+2.5	.813	432	414	−1.5	.761	390	398

*In computing this area the air bubbles have been taken into account.
**The Minimum Section is exactly .775 sq. inch.

AVERAGES OF 384 TESTS OF PORTLAND CEMENT AND PORTLAND CEMENT CONCRETE, PLACED IN SITU AT VARIOUS INTERVALS OF TIME.

Number of minutes between mixing and moulding.	0	5	10	15	20	25	30	35	40	45	50	55	60	70	80	90	100	110	120
144 briquettes of neat cement and cement and Oporto gravel tested. Neat at—7 days.			263		262		258		257		258		261	258	253	242	251	249	23
Concrete—14 days.																			

The following table gives the losses in per cent. due to the retempering of cement and is the average of a large number of tests:



The conclusion of the committee was that they consider the use of rubber cushioning tends to regulate the position of the fracture and the ultimate strength.

Similar tests by American engineers might be quoted, but this is not necessary. Mr. Jno. Gartland found from a large range of tests that where only 50 per cent. of the briquettes broke across the least cross section with the unprotected grip, 90% broke across the least section while using rubber cushioning with the grip designed by Mr. W. R. Cook, representative of Messrs. Riehle Bros. This is the form of grip used in the School of Science.

In this connection might be mentioned a series of tests in the school laboratory on the effect of cushioning. 50 briquettes were broken in sets of five, and in each case the cushioning was increased, with the result that the tensile strength increased, as given below:

	Pds. per sq. inch
1 set, average	328.8
2 " "	344.3
3 " "	344.3
4 " "	355.6
5 " "	363.
6 " "	369.5
7 " "	395.2
8 " "	393.3
9 " "	396.2
10 " "	405.7

It is apparent, then, that the resulting tensile strength will depend very materially upon the apparatus used, the method adopted and the person employed to perform the experiment. There cannot, therefore, be the same uniformity in specifications on this point as on that of sifting, but much might be done with this end in view. We have already seen in the results quoted variations in the tensile strength at the end of seven days (tested neat) of from 500 pds. per sq. in. to 200, and that these differences may be due entirely to the method of handling. Hence the mere statement that the tensile strength was found to be 345 pds. is meaningless unless we know the method of handling.

In the annual report of the City Engineer, Toronto, for 1893, there is a table giving the tensile strength (tested neat) on seven days of 23 different brands of Portland cement. The average strength of these brands is about 236 pds. per sq. in., the maximum being 350 and the minimum 140. The report for 1890 explains the method adopted. On the other hand, the specification for the drill hall at Toronto calls for a cement to stand a tensile strain of 450 pds. per sq. inch.

Of these two methods the second will, perhaps, give more uniform results, while the former requires less time, and where a large amount of testing is necessary, time forms an important factor. It would, however, be better for all to adopt some intermediate method.

3. SOUNDNESS.—Mr. Faija advocates the use of an apparatus called a "steamer," and which, he claims, will reveal any "blowey" tendency in cement. The test consists in keeping pats of cement in water at a temperature of from 110 degs. to 120 degs. Fahr. for two days.

In a paper prepared for the Engineers' Congress at Chicago, two years ago, Mr. Gary gave in detail the standard methods of testing cements in Germany. All hot tests are discarded there, for the reason, he says, that they are misleading. The American Society of Civil Engineers do not recommend an accelerated test, while the Canadian Society of Civil Engineers recommend Faija's hot test. The fact that many cases of unsoundness in cement are not discoverable by the ordinary short time tests, is well known, and as the hot tests are on the safe side, it might be well for the O. A. A. to follow the suggestions of the Can. Soc. C. E.

SPECIFIC GRAVITY OR WEIGHT.—In the process of manufacture, it is very important that the cement be properly burnt (semi-vitrified). Now, as an underburnt cement is light, it follows that the relative weight forms a ready means of determining whether the burning has been properly done. It has therefore been customary in specifications to state that the cement shall have a definite weight per striked bushel, 112 to 115 pds. However, it would be better to specify that the specific gravity shall be above a certain standard, as the determination of the specific gravity is by no means as uncertain as that of weight. The weight per bushel is unsatisfactory, as it is affected by the following:—1. The size of the measure adopted; 2. The distance the cement falls into the measure; 3. The freedom with which it falls; 4. The looseness or amount of separation between the grains; 5. Any disturbance in the way of a jar while the measure is being filled.

In proof of the above, we may give the following quotation from "Notes on Building Construction," prepared by the Council on Education, South Kensington:—"Method of Weighing"—"In order that the cement may be accurately weighed, great care must be taken in filling the measure. This may be done by allowing the dry cement to run down into the measure by a board or shoot, inclined at an angle of 45 degs., any superfluity being carefully struck off by a light straight-edge. A vessel with holes in it is sometimes used for filling instead of the inclined shoot. An accurate method is to fill the measure through a sieve of about 1-16th inch mesh, held a short distance above it, or the cement may be poured through a hopper placed about two feet above the measure. A drawing of the hopper is sometimes given in connection with the specifications." It is thus apparent that the weight per striked bushel is liable to vary and must differ considerably with different persons and even with different determinations of the same person. The specific gravity, on the other hand, is a definite quantity not effected by voids and its determination liable to but a slight personal error of the observer.

It will be seen, then, how desirable it is that this property of cement, namely, its relative weight, should be determined from its specific gravity rather than from its weight per striked bushel.

The following is the result of a series of tests of Beams 4" × 6" made of Portland cement and kept under water for one year. The first set were gauged neat, while the second consisted of two parts of crushed granite, such as used in the manufacture of granolithic sidewalks, to one of Portland cement:

I.

Span in inches.	Section b h	Modulus of Rupture in pds. per sq. in.
36	4" × 5.9"	526
18	4 × 5.9	426
18	4 × 5.9	594
9	4 × 5.9	542
9	4 × 5.9	361
9	4 × 5.9	518

II.

36	4 × 6	1088
18	4 × 6	1107
18	4 × 6	1007
9	4 × 6	1125
9	4 × 6	1130
9	4 × 6	1111

Compressive strength of two cubes of neat cement one year old:

Height.	Area exposed to crushing.	Crushing strength in pds. per square in.
5"	5 × 4.9	3878
5"	5 × 4.8	3877

THE ACCIDENT AT THE MONTREAL STREET RAILWAY BUILDING.

MONTREAL, Jan. 23rd, 1895.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—In the January number of the CANADIAN ARCHITECT AND BUILDER, there appears a letter signed by E. C. Hopkins, relative to Mr. Lacroix's signature being attached to a report on the collapse of the Montreal Street Railway building, which was prepared by me for the Provincial Government, as follows:—

"It may perhaps be somewhat of a surprise to you, as it certainly has been to Mr. Lacroix and myself, to find his name attached to a report which, as he states in his letter to me, given below, he did not sign, and was no party to; and further, which arrives at conclusions he has not yet gone into or expressed any opinion upon.

What object was to be gained by tacking the 'City Building Inspector's name to the report, without his knowledge, is left for those doing so to explain, if possible."

In explanation of the same I beg to draw your attention to the fact that the report in question was prepared solely by myself, that Mr. Lacroix never was asked to sign the report—in fact, never saw it. We visited the building together, took the bricks and mortar from the wall, and were present at the test at the McGill University Laboratory. After that I was specially requested to prepare a report giving the weights concentrated on the wall where it was supposed to have failed, which I did. Neither the report nor the copy bears Mr. Lacroix's signature, so it was as much a surprise to me as to any one else to find the Building Inspector's name added to my report. As Mr. Hopkins wishes to know "what object was to be gained by attaching the City Building Inspector's name to the report without his knowledge is left for those doing so to explain if possible," perhaps the CANADIAN ARCHITECT AND BUILDER will give the explanation, and by so doing will prove that I at least had nothing whatever to do with it.

Yours truly,

W. McLEA WALBANK.

[It lies with the correspondent of the ARCHITECT AND BUILDER to explain the addition of Mr. P. Lacroix's signature to a report published in the December issue of the CANADIAN ARCHITECT AND BUILDER, and submitted by Mr. W. McLea Walbank, architect, of this city, on behalf of the Provincial Government in the coroner's enquete, of the accident which happened to the Montreal Street Railway Co.'s building. The correspondent of the ARCHITECT AND BUILDER having applied to Mr. Walbank for a copy of his report for publication, the last named referred him to his clerk, who gave him a rough draft of the report and which they together corrected to agree with the original. Mr. Lacroix having examined the collapsed building jointly with Mr. Walbank and the fact of him having also signed a letter sent to the Queen's Attorney and prepared by Mr. Walbank suggesting the proceedings that should be adopted for conducting the tests of the building material employed in that building, led the clerk to confuse the two documents, the letter of suggestions and the final report of Mr. Walbank, and so one was taken for the other, and the name of Mr. P. Lacroix, Building Inspector, added to the report without Mr. Walbank's knowledge, or without any bad faith or intention whatever on the part of either Mr. Walbank's clerk or the ARCHITECT AND BUILDER's correspondent.]

Send for a copy of the CANADIAN CONTRACTORS' HAND-BOOK. Price, to subscribers, $1.00.

ELECTRICITY FOR ARCHITECTS.*

By John Langton, Toronto.

THE engineer or architect will find that, though the quantities dealt with in electrical work may be new to him, the ideas involved are largely the same as he is already familiar with in other branches of physical science. There is a common impression to the contrary, and this no doubt is partly due to the peculiar names of the practical electrical units: volt, ampere, &c.

These are merely arbritary names, agreed upon by international convention, to shortly express compound units, and so avoid the repetition of cumbersome phrases. It is, for instance, as if it were agreed to call the ordinary British unit of fluid pressure a Newton, so that we might say shortly, but with perfect definiteness, 75 Newtons, instead of 75 pounds pressure per square inch above the atmosphere. Electrical units are in this manner named after eminent men of science. The Volt, after Volta, the discoverer of the galvanic battery; the Ohm, after Ohm, the discoverer of Ohm's law; the Ampere and Culomb, after the French physicists of the same names; the Farad, after Faraday, the Henry after Joseph Henry, and the Watt, the unit of power, appropriately named after James Watt.

In the common commercial uses for electricity for light and power, which the architect has ordinarily dealt with, the main ideas and phenomena present close analogies to the familiar facts of the pressure and the flow of water—so much so that the readiest way of getting a very fair general idea of commercial electricity is to consider the facts concerning it as being illustrated by the similar facts of hydraulics.

I will endeavor briefly to present this analogy, but I must ask you to remember that it is of course nothing but an analogy. I do not mean to imply that an electric current is in any sense a flow of a material fluid, merely that the results are very much as if it were a kind of fluid.

Referring to Table 1:—The 1st column gives the names of the electrical units which measure the four electrical quantities involved in ordinary light and power work. The 2nd column shows the letters by which they are symbolized in formulae. The 3rd column gives the electrical quantities which the units designate. The 4th column states the general ideas involved; and the last column the hydraulic quantities which are analogous to the electrical quantities in the 3rd column.

TABLE 1.

NAME OF ELECTRICAL UNIT.	SYMBOL.	ELECTRICAL QUANTITY.	IDEA.	ANALOGOUS HYDRAULIC QUANTITY.
Volt.	E	Dif. of Potential. Electromotive force (E. M. F.)	Pressure.	Head or pressure of water.
Ohm.	R	Resistance.	Wasteful Resistance.	Friction of pipes and channels.
Ampere.	C	Current.	Rate of Flow.	Flow per second.
Watt.	W	Power.	Rate of doing work.	Power.
			746 Watts = 1 Horse Power.	

OHM'S LAW.

Current = Pressure ÷ Resistance.

$$\text{or Amperes} = \frac{\text{Volts}}{\text{Ohms}}$$

$$\text{In Symbols, } C = \frac{E}{R}$$

$$\text{or, } R = \frac{E}{C}$$

$$\text{or, } E = CR$$

ELECTRICAL POWER.—(Kilowatt = 1000 Watts)

Watts = Volts × Amperes.

In Symbols, $W = EC$

$$\text{or, } W = C^2R$$

$$\text{or, } W = \frac{E^2}{R}$$

As the flow of water is due to difference of level or head, so is a current of electricity due to a difference of electric potential. And in both cases the amount of the flow through some path provided for it, is dependent—1st, on the head or pressure which causes it; and 2nd, on the frictional resistance which the provided path opposes to that flow, and in both cases the work expended in overcoming this resistance appears as heat. With the same resistance, the greater the pressure the greater the flow. With the same pressure, the greater the resistance the less the flow.

In electrical work, the relation between the pressure, the resistance and the current is a very simple one, and is expressed by Ohm's Law, which is that "The current is equal to the pressure divided by the resistance," or that the current is equal to the ratio of the pressure to the resistance. This is a definite numerical statement that the number of the amperes is equal to the number of the volts divided by the number of the ohms. For instance, 100 volts applied to the ends of a wire whose resistance is 50 ohms, will produce in the wire a current of 2 amperes. With 1000 volts and 500 ohms, the current would still be 2 amperes. And the same current of 2 amperes would be produced with 10 volts and 5 ohms.

Now as to the unit of power. In a fall of water, the weight of the water in pounds multiplied by the number of feet fall or head, is its energy—that is, its capacity for doing work—in foot pounds. And consequently, the rate at which this energy is developed, the rate of doing work, that is to say the *power* of the fall, is measured by the rate of flow multiplied by the head. In mechanical units 33,000 foot-pounds per minute is 1 horse power. Whether the flow is 33 pounds per minute under 1000 ft. head, or 1,000lbs. per minute under 33 ft. head, or 33,000 lbs. per minute under 1 foot head, the power in each case is the same, namely: 33,000 foot pounds per minute, or 1 horse power.

Similarly in electrical units, power is measured by the current multiplied by the E. M. F. The watts equal the volts multiplied by the amperes. 1000 volts and 10 amperes, 100 volts and 100 amperes, 10 volts and 1000 amperes, all give the same power, namely: 10,000 watts or 10 kilowatts.

Since it is the same thing that is measured in both cases,—power—there must be a definite numerical relation between the electrical and mechanical units, which is that 746 watts equals 1 horse power.

In buying electric power at a rate of, say, 4 cents per horse power hour, it is a very simple matter to calculate the cost of the current consumed.

* Paper read at the fifth annual convention of the Ontario Association of Architects.

Power circuits supply current at a constant pressure. 250 volts is one usual pressure. If the current used is 3 amperes, the watts are $3 \times 250 = 750$ watts; practically 1 horse power, and costing 4 cents per hour. On a 125 volt circuit, a 6 ampere current would mean 1 horse power. So that for a general rule, multiply together the average amperes, the volts and the hours. Divide the product by 746 and the quotient will be the horse power hours consumed.

The resistance of an electrical conductor is analogous to the hydraulic friction in pipes; but whilst the mechanical friction in pipes varies according to the most complicated rules, the resistance of conductors is fortunately governed by very simple laws. It depends only on the material, the area of cross section and the length of the conductor. And fortunately again a cheap metal, copper, is one of the best conductors. It is second only to silver, which is better still, but only by a small percentage. The resistance of iron is between 6 and 7 times that of copper. Copper is therefore universally used for wiring, and we need only consider the effects of area and length, which are that the resistance of a wire varies directly as the length and inversely as the area.

Suppose the resistance of a wire 1 foot long and of a certain cross-sectional area is 1 ohm; if 2 feet long it would be 2 ohms; if 10 feet, 10 ohms. Another wire of 10 times the sectional area and 1 foot long would be 1-10 of an ohm, or if 10 feet long, 1 ohm. There are plenty of published tables of the resistance per foot of copper wires, and by the aid of this simple relation between resistance, area and length, they may be extended to any actual case. The question of resistance is of direct concern to architects in the wiring of buildings, but its bearing will perhaps be plainer after considering as briefly as possible the three systems of lighting in general use:

I. The constant current system, which is generally used for lighting by arc lamps.

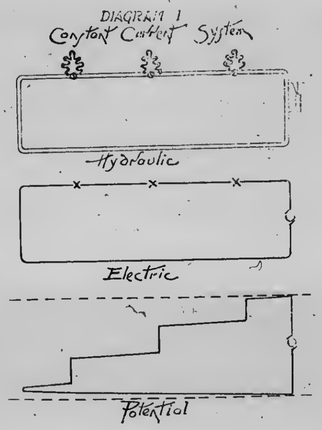
II. The constant potential direct current system, used for incandescent lamps and for motors.

III. The alternating current system, used for incandescent lamps.

These can all be very well illustrated by analogous hydraulic systems, and for this purpose I have prepared diagrams 1, 2 and 3.

Take first diagram 1—the constant current system. Here the pump represents the dynamo, which maintains a steady flow circulating round the

DIAGRAM 1
Constant Current System



main pipe. At intervals in the main pipe are stop cocks, and round each of them a by-pass consisting of a long pipe, which opposes a high frictional resistance to the flow, so that the pump must exert greater pressure to maintain the same steady flow. These by passes represent the lamps, in which the whole work done in forcing the current through them against their resistance, appears as heat, raising the temperature of the carbons to such a degree that they give out light. It is obvious that except for the constant resistance of the main pipe, a resistance which is made small, the work the pump must do increases directly with the number of the by-passes the flow must traverse; and, since the flow is constant, it follows that this increased work is due entirely to increased pressure.

Underneath the hydraulic diagram is that of the corresponding electric system, representing a dynamo and arc lamps. The amperes are the same no matter how many lamps are burning, but the dynamos must generate about 45 volts for each lamp burning.

Underneath this again, I have drawn a diagram of potentials, which shows graphically how the difference of potentials established by the action of the dynamo is consumed in different parts of the circuit. It is as if the dynamo were a pump raising water to a height, from which it flows down through the channels offered by the different parts of the circuit back to the pump, which again raises it to retrace the same course, maintaining a constant circulation.

Starting at the highest potential established by the dynamo, the potential gradient falls gently, owing to the slight consumption of volts required to overcome the small resistance of the main conductor. When it reaches the first lamp there is an abrupt fall, by the amount of the volts consumed in forcing the current through the high resistance of the lamp. Then follows a gentle grade to another abrupt fall at the next lamp; and so on to the last lamp, from which there is a last gentle grade back to the dynamo through the return wire.

When the same current passes through one lamp after another the lamps are said to be connected in series.

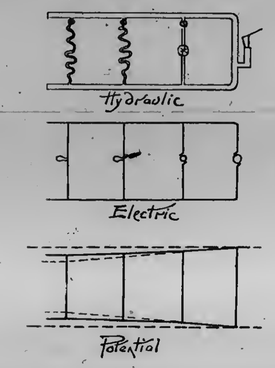
Turning to Diagram 2—the constant potential direct current system—the hydraulic diagram is an ordinary waterworks system, with the addition that all water used is discharged into a main return pipe which leads back to the pump, and from which the pump draws its supply.

The function of the pump is to maintain a constant difference of pressure between the mains. Each cross pipe from main to main takes whatever flow its frictional resistance will allow the main pressure to produce. And it is obvious that as more cross paths are opened, the increased work the dynamo must do, is due to the increased flow; the pressure remains constant.

In the electric diagram underneath, the high friction cross tubes are replaced by incandescent lamps, and the water motors by electric motors.

The potential diagram shows that the pressure in the mains cannot be quite constant, since there must be some fall of potential in the main conductors, and the amount of this fall is less when there are fewer lamps burning, i.e., when the total current is less. The potential gradient is

DIAGRAM II
Constant Potential Direct Current



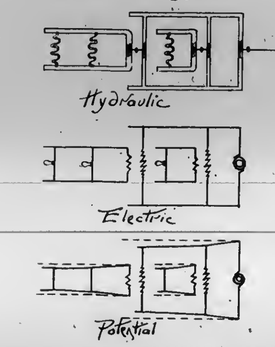
greatest near the dynamo where the conductor has to carry the total current, but the grade gets flatter and flatter as the current diminishes, by the amperes subtracted at each cross path. These potential gradients are repeated in the reverse order in the return wire.

The form of gradient drawn is that for a conductor of uniform size. But if the conductor is reduced at each cross path so that its area always bears the same proportion to the amperes carried, the potential gradient would be the same throughout, and a continuation of the first grade starting from the dynamo, as is indicated by dotted lines.

When lamps are connected side by side, so that each takes its own separate current, the lamps are said to be connected in parallel, or in multiple.

There remains the alternating current system shown by Diagram 3. The pump in Diagrams 1 and 2 produces a flow always in the same direction, representing a direct current of electricity. In Diagram 3 the pump is replaced by a movable piston in the main pipe, which being oscillated from one side to the other, produces a pressure first in one pipe and then in the other, with an accompanying back and forth flow which will vary in amount according to the number of cross paths open. This represents the primary circuit, to which the lamps are *not* connected. The object of an alternating system is to save in the cost of main conductors by transmitting power with a small current at a very high pressure. But for convenient and safe use, this power must be transformed into a larger current at a lower pressure, in a secondary circuit to which the lamps are connected. It is the peculiarity of the alternating system, that this can be done with very little loss and without any moving mechanism. The actual means by which this is effected in the "transformers" or "converters," are beyond the scope of this paper, but a simple mechanical contrivance in the hydraulic system will give us analogous results. A sliding piston in the small primary cross pipe and another piston in the large secondary pipe are connected by a bar pivoted in the middle, so that the two pistons oscillate together and move equal distances. If the area of the secondary piston is, say 10 times that of the primary, a secondary pressure 1-10 that of the primary will balance the the contrivance, whilst a secondary flow of 10 times the primary is produced by any oscillation.

DIAGRAM III
Alternating Current System



The electric diagram shows the alternator and primary circuit, feeding two separate secondary circuits through two transformers.

The potential diagram for both primary and secondaries is similar to diagram 2.

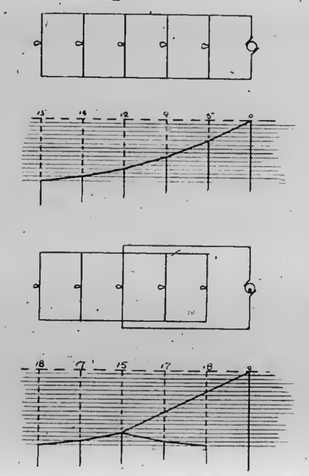
I may say parenthetically that the hydraulic analogy goes still further. The effects of the inertia of water represent excellently those of the electric quantity, self-induction, whilst, if the pipes are made elastic, the results would be very similar to those due to electric capacity. But as inductance and capacity are inappreciable in such work as an architect will ordinarily have to deal with, I have not considered them in this paper.

In wiring for incandescent lamps the object is to maintain as nearly as possible a constant difference of potential between the terminals of the lamps. But when, at different times, there are are at different points on the same line, different numbers of lamps burning, it is impossible that the volts at all points should be always the same. And the question is, what variation is permissible?

An incandescent lamp is simply a carbon wire of high resistance, which the current passing through it heats to incandescence. But the resistance of the carbon decreases as the temperature increases. Therefore a rise or fall in the volts causes more than a proportionate rise or fall in the amperes, and the consequent heat and temperature. Also, the light given out increases much more rapidly than the temperature. Roughly speaking a variation of 1% from the rated volts of the lamp, up or down causes a variation of 5% in the light. And it is informally agreed that 2% total variation in volts at any lamp constitutes good and satisfactory regulation. This variation is of course reckoned between the maximum and minimum load—not between full load and no load. If a group of lamps is fed by a wire direct from the constant volts of the source of supply, and the lamps in the group are always all turned on or off together, the drop of volts in the wire may be any amount, and yet because it will be always the same, there will be no variation in the volts when the lamps are burning.

But besides minimizing the variation in the volts at any one lamp, it is desirable that the lamps in the same building should all get about the same volts, so that the same class of lamp may be used interchangeably throughout the building. This is the object of the feeder system of indoor wiring, in which feeder wires carry the current to convenient points in the main wires to which the lamps are connected. Diagram 4 shows graphically the effect on the distribution of volts.

Diagram IV



The consolidation of experience in wiring, into practical rules, embodying safe practice as regards danger from fire, has been performed by the Fire Underwriters Associations. Their rules and regulations are published, and give in detail the minimum standard of safe wiring. The wiring must be at least as good as the rules prescribe, to avoid trouble with fire insurance. Among other things the rules prescribe the greatest amperes different sized wires may carry, and here is a point where they are not necessarily a sufficient standard to guide the architect. The Underwriter's aim is a single one, safety from fire; the architect has an additional aim, good and unvarying light; and our previous considerations concerning the resistance of wires, will show how these objects are not simultaneously attained.

The work spent in forcing a current through a wire generates heat in the wire, and the degree the temperature will rise to depends upon the relation between the rate at which the heat is generated and the rate at which it is got rid of. Now the rate at which heat is generated, is the rate at which work is spent in forcing the current through the resistance of the wire; i.e., it is the watts spent in the wire. And from Table 1, watts = (amperes)^2 × ohms. But we have seen that a long thick wire and a short thin wire may have exactly the same ohms resistance. With the same current the heat generated is the same in both. How about the resulting temperature? In the long wire the heat generated is spread over a greater length. The heat generated per foot run is less, and, the long wire being thicker, it also presents greater surface per foot run for cooling by radiation, convection or conduction. Obviously the short thin wire gets much the hotter. The safe carrying capacity of wires, both exposed and cased, laid down in the Underwriters' rules, is really a statement of the heat generated per foot that the wires can get rid of without becoming dangerously warm. This is independent of the length of the wire. The heat generated per foot remains the same, but the longer the wire, the greater the total heat and the greater the total volts lost in forcing the same amperes through the resistance of the greater length. But the total drop in volts is what the architect must limit in order to get good and steady light. He must therefore be guided by the total resistance, and the ampere capacity of the Underwriters' rules is useful to him only as setting the inferior limit to which he may reduce the size of the wires.

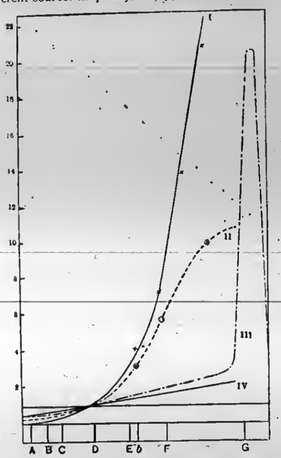
With regard to the different classes of wiring—exposed wiring on cleats or knobs is best for factories, but for domestic work it is only suitable in stores or houses where hanging kerosene lamps, or exposed gas pipes

stapled to the walls and ceilings, would be the alternatives. What is called concealed work, in which rubber covered wires are run between floor and ceiling, and brought out only where brackets or hanging fixtures are to be placed, is probably the most suitable for the ordinary run of dwellings. Where once in, there is little liability of its being disturbed. But in larger buildings, warehouses, stores and such like, where there are likely to be changes in partitioning off the space, and in the distribution of the lights, to suit different tenants, or the same tenant at different times, wires run in mouldings are by far the most convenient. They are not only most readily accessible for changes of wiring, but the wiring is much less liable to damage by workmen in other trades making repairs. The principal objection is the unsightliness of lines of mouldings straggling all over the ceiling to wherever a lamp is needed. But moulding work has frequently many advantages of convenience to recommend it. Architects, I believe, are always looking for a "motive" in design. Mouldings can be made of any section, and perhaps they might be used to panel off the ceiling in some decorative pattern, suitable to any probable distribution of lights, giving a wide choice of paths for wiring and points for outlets. But this touches the artistic side of architecture, which is beyond my province. The best class of wiring is interior conduit work, in which buildings are piped with strong non-metallic, waterproof and poorly combustible tubing, and wires subsequently drawn into. This is particularly suitable to such work as the best class of office buildings. And where it would be too expensive to carry throughout a building, it may sometimes be used for the main lines to centres of distribution

When incandescent electric lights were first introduced they were distributed on wall brackets and hanging fixtures in the same manner as gas jets, as if this were the natural arrangement of lights, instead of having originated in the necessity of keeping gas jets within reach for ease in lighting, and in keeping them away from walls and ceilings for fear of fire. This force of habit for some time prevented, and in a measure still prevents full advantage being taken of the possibilities offered by electric lights for getting better illumination with the same amount of light. For a desk light or a reading light we cannot do better than replace the shaded oil lamp or gas drop light by a shaded electric lamp, but for the general illumination of a room the incandescent light can, in general, do much better. The illumination we perceive depends not only on the amount of light reflected from an object, but also on the amount of the reflected light the eye takes in, and with lights a little above the level of the eye, we are always partially dazzled by them, and our perception of surrounding objects is indistinct compared with what it would be if the lights were out of sight. To get the best illumination for the quantity of light, a room should be lighted as a picture is lighted for exhibition. Electric lamps high up near the ceiling remove the dazzling effect and at the same time give a more generally diffused light, especially if there are light tinted walls and ceilings to reflect the light without much loss.

For lighting large rooms, arc lamps are used to a considerable extent on the continent of Europe, constructed so that they throw all their light on a white or light tinted ceiling, the room being thus lighted entirely by reflection from the ceiling. The result is a diffused light as shadowless as diffused daylight.

Now with regard to uses of arc and incandescent lights. Diagram V is copied from one by Prof. Nichols, of Cornell, embodying the results of experiments made by him, and is instructive in illustrating the difference of light from different sources in quality, as opposed to quantity.



This diagram represents the brightness of different parts of the spectra of the electric arc, clear daylight and clouded daylight, in comparison with the same colours in the spectrum of an incandescent lamp. The brightness of the latter is taken as the standard in all parts of the spectrum, and is represented in the diagram by the horizontal line at the height 1. The other spectra are reduced to the same brightness at the yellow line D, and their brightness in other regions of the spectrum is shown by curves.

Curve I represents daylight on a cloudless summer day.

Curve II represents daylight under a densely clouded sky.

Curve III shows the light from an electric arc.

Curve IV is from the lime light.

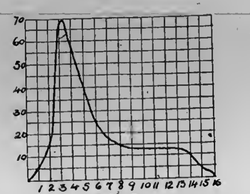
The abrupt rise and almost immediate descent again of curve III indicates a narrow but very bright band of light in the violet end of the arc spectrum, which accounts for the value of the arc light in photography, and also explains the predominant bluish tinge of its light.

The curves show how far all artificial illuminants fall short of equalling the quality of clear daylight, which latter must always be our standard of perfect white light. Even the light of a very dull day is a better all round light than an arc light or lime light of equal general brightness.

Lights are usually rated by candle power, and this is gauged by the relative blackness of shadows thrown on a white ground. Candle power therefore merely measures the ability to distinguish between black and white. For this purpose the yellow rays are much the most effective; but the blue and violet rays are the most useful for showing the distinction between colors, that is, for bringing out the colors of natural objects. And this being so, the curves show that the incandescent lamp gives us the most of that kind of light wanted, for reading or writing, whilst the arc light gives a closer approach to the effect of daylight upon colors. In addition to positive utility, the feeling of suitability has a value. The incandescent lamp, with its warm yellowish red glow, gives a cheerful and cosy air to a small room, where an arc lamp would be simply garish. In a large hall or store, to which the idea of cosiness is inappropriate, the same light that makes a small room cheerful may give only an impression of dullness, whilst the arc light would give an agreeable effect of brilliancy. Of two large stores side by side, one lighted by arcs and the other by incandescents, the arc lit store has in general a more attractive air of being brilliantly lighted, although, measured by candle power, its actual illumination may be decidedly inferior.

Diagram VI is a curve of current consumed in one trip of an electric elevator. The time in seconds is measured horizontally, and the amperes vertically. This is a diagram from an actual elevator, running 250 feet per minute in a three-storey building. I have taken several such diagrams from different elevators and they all have the same general form as the one shown. I have chosen this one of an elevator having a short run, in order to better bring out the effect on the current consumption of frequent stops. The peak at the beginning of the curve shows the large current required to start the car and accelerate it to full speed, in comparison with the small current needed—from 7th to 14th, second in diagram—to keep the car in motion after speed has been attained. Nevertheless, even in this unfavorable case, the curve shows the very small cost of power per trip.

Diagram VI



Area of Curve 500 Ampere seconds at 250 Volts

Price of Power 6¢ per H.P. Hour

$\frac{250 \times 300 \times 6}{746 \times 60 \times 60} = \frac{1}{6}$ (nearly)

Power Cost 1/6¢ per trip

For the diagram given the cost is only ½ cents per full trip one way, at the rate charged in Toronto for very intermittent use of current, which is 50% higher than the regular Toronto meter rate for power supplied to an elevator in constant use.

Hitherto the application of electricity to architecture has owed little to architects. Trade competition has forced in electric power to take the place of power from other sources which had been already applied to elevators, pumps, ventilating fans, &c.; but beyond this little has been done. The convenience of electric power has certainly led to the extension of mechanical ventilation, with its steady displacement of a fixed volume of air per minute, independent of the degree of dryness or temperature which makes ventilation by natural draught so variable. In ventilation architects have been fairly quick to utilize the opportunity afforded them. But in the larger problems of architecture, the possibilities of applying electricity seem to have received little or no attention. An illustration of what I mean is what might conceivably, though not probably, be the effect of cheap electric power in modifying the design of dwelling houses. If it were desirable to use elevators it would not be very difficult to devise perfectly safe methods of operating them without trained attendance, and a constantly used elevator would have almost as great an effect in modifying house planning as the substitution of stairs for ladders. Supposing such a use of elevators were practicable; whether it would be desirable, whether it would really add to the comforts and conveniences of life, nobody can say so well as the architect, who alone is trained to appreciate at their proper value all points bearing on such a question. And that is the point I wish to bring out by the illustration. Whether in the future electricity is to play any part in modifying architecture; whether it be of any real assistance to the architect in dealing with the particular problems of his profession, depends principally on the architect himself. The electrical engineer must co-operate in devising working details, but if the applications of electricity to architecture are ever to be more than superficial, the initiative must come from within, not from without.

ILLUSTRATIONS.

SKETCHES IN ITALY—BY ARNOLD FINDLEY, MONTREAL.

COMPETITIVE DESIGN FOR A MASONIC TEMPLE, MONTREAL.—J. R. RHIND, ARCHITECT—AWARDED SECOND POSITION.

CHURCH OF ST. GREGORY, OSHAWA.—POST & HOLMES, ARCHITECTS, TORONTO.

DETAILS OF STORE FOR R. SIMPSON, TORONTO.—EDMUND BURKE, ARCHITECT.

TORONTO BUILDERS' EXCHANGE.

The following are the officers elect for 1895: Board of Directors—George Oakley, president; John Aldridge, 1st vice-president; Wm. Park, 2nd vice-president; David Williams, treasurer; Wm. Peats, Thos. Cannon, Jr., James Crang, Wm. Booth, Henry Martin, Fred'k. Wakefield, Henry Lucas, James Isaac.

THE WEATHERING OF BUILDING STONE.*

The slow decay of everything exposed to the weather has become a proverb, and from the earliest times men have moralized on the "gnawing tooth of time," as though time were some relentless monster devouring slowly man and all his products; but of late years geologists have begun to make some enquiries as to the monster, and to find out somewhat exactly what time's gnawing tooth really is. The question is one of great importance to the student of geology, for the weathering and wearing away of the solid rock and the building up of its materials in new places are among the most significant factors in the ceaseless round of change by which mountains and valleys and plains are carved and re-modelled on the earth's surface. To the geologist no structure is permanent, the "everlasting hills" do not last forever; in fact the destructive forces are most actively at work where the mountain lifts its head so boldly, as if to defy the elements.

The "tooth of time," when examined a little carefully, turns out, as so many bugbears do, to consist of very simple and innocent elements. Air, water, change of temperature; these three factors alone or in combination, with traces of a few common acids, are the effective forces in the weathering of the rocks of the geologist and of the stone of the architect. The effects produced by these agencies may be purely mechanical, or purely chemical, or more often a mixture of both.

In climates like our own, where the extremes of heat and cold may run from 100° in summer to 15° or 20° below zero in winter, the effect of mere change of temperature may be important in its disintegrating action on building stone. The rise of temperature, when sunshine falls upon the wall of a building, is imparted to the outer layers of particles of the blocks of building stone and expands them, granite having been found to expand .000004825 inch per foot for each degree Fahrenheit, marble .000005668, sandstone .000009532.

Since stone is a poor conductor of heat the surface will expand more rapidly than the interior, and there will be a tendency to form minute cracks and to chip off the surface of the stone. It is said that the south side of stone buildings, exposed to great changes by the coming and going of sunshine, begins to roughen and disintegrate sooner than the north side in New York and other American cities. The ill effects of change of temperature will, of course, be more apparent in the case of stone like granite, made up of minerals differing in their rate of expansion by heat. This is most strikingly shown in case of fire, when granite, though stronger and more compact than sandstone or limestone under ordinary circumstances, crumbles far more easily in the intense heat.

Another injurious effect of change of temperature is to be found in the loosening of the joints between the blocks of stone in a building. Supposing the stone to have been laid in summer, all the blocks will occupy less space in the cold of winter, and minute fissures will tend to form in the cement or between it and the stone. These fissures admit water and make the starting point for other changes.

Change of temperature alone is, however, not a rapid agent in disintegration. It is the presence of water that gives it efficiency as a destroyer in climates like ours in winter where freezing and thawing occur in rapid succession. When water freezes it expands with an almost irresistible force, which has been estimated at 138 tons per square foot at 2° below freezing, and is quite sufficient to rend the strongest rock. All the tiny fissures and crevices of a block of building stone exposed to rain or melting snow become filled with water, which may afterwards freeze, wedging off fragments. Another thaw followed by another frost pushes the parts still farther asunder until the stone splits and crumbles. Stone buildings of many kinds illustrate this action on the sides exposed to storms. It is very well seen on many New York brown stone houses, where the porous Connecticut sandstone has been sawn and set on its edge, and after a few years scales so as to be quite unsightly.

The action of frost depends very largely on the porosity of any stone exposed to its influence. A compact massive stone like granite or many limestones is little affected, while porous limestones, and especially sandstones, are very quickly injured in exposed positions. In this respect the capacity of a stone to absorb water is of great importance, and one may say with Sterry Hunt that, other things being equal, "the value of a stone for building purposes is inversely as its porosity or absorbing power." N. H. Winchell gives in a report of the Geological and Natural History of Michigan (Vol. I, p. 197, etc.), a table showing that massive crystalline stones, like granites, syenites and gabbros, absorb very little water, generally much less than one per cent.; dolomites absorb a little more, and dolomitic limestones still more, up to 3 or 4 per cent. Limestones absorb rather less, while sandstones absorb very much more, the lowest amount in his table being three per cent., and the highest 12.69 per cent. Sterry Hunt found that Potsdam sandstones from Canada absorbed from 0.50 to 3.26 per cent., Medina sandstones from Canada 3.31 to 4.04 per cent., and subcarboniferous sandstone from Ohio 9.59 to 10.22 per cent. Silurian limestones and dolomites from Canada examined by him absorbed from 0.11 to 5.55, while Tertiary limestones from Caen, France, absorbed from 15 to 16.05 per cent. of moisture.

As a general rule a stone absorbing 10 per cent. of water crumbles rapidly in our winters, and should not be employed where carving or a fine finish of any kind is exposed to the weather.

Thus far the purely mechanical side of weathering has been discussed. Let us now turn to the chemical side. The air consists of about four parts of nitrogen and one of oxygen, with varying amounts of watery vapor, a little carbonic acid and traces of ammonia and other nitrogen compounds. In cities it may also carry soot and traces of some common chemical compounds, such as sulphur dioxide, sulphurous and sulphuric acids, hydrochloric acid, nitrous and nitric acids.

Rain water is more or less strongly charged with oxygen, carbonic acid and other substances found in the air. The nitrogen of the air is inert and the oxygen and other substances are active only in the presence of water, so that very dry air has little or no effect in weathering. In very dry climates like that of Egypt monuments of stone may be ground off by driving desert sand acting as a sand blast, but are scarcely affected in other respects after 4000 or 6000 years exposure to the weather. How differently a damp climate affects the same stone may be seen only too well in the Egyptian obelisks transported to London, Paris and New York. It is well known that in the last city the granite scaled so rapidly that the obelisk had to be coated with paraffine to preserve it at all.

The action of oxygen as a weathering agent is important in respect to a few minerals only. Certain sulphides, especially the brassy yellow mineral iron pyrites, are changed by oxygen in the presence of moisture into sulphates and finally into oxides. Granites, marbles and other crystalline rocks containing these minerals, may be weakened by their weathering out, and are stained an ugly brown by the hydrous oxide formed, so as to be quite disfigured. This change is less important in the sandstones, though even then the change of colors may be disagreeable. Many stones used in the Parliament Buildings at Ottawa illustrate this, the dark brown smear having sometimes run down on to the blocks below. Stones rich in magnetite, such as diabase, sometimes used as black granite, may be noted on in a different way. The mineral magnetite consists of the sesquioxide of iron combined with the monoxide. The latter portion may weather into hydrous sesquioxide, giving brown stains, and sometimes causing the rock to crumble. A similar effect, though less important, has been observed in some massive rocks containing large amounts of silicates rich in iron, hornblende or augite.

Water charged with carbonic acid is a very efficient weathering agent, and has some action on most minerals, except quartz. In the granite of the Thousand Islands large blocks of quartzite are sometimes found, and as a rule the quartzite projects sharply an inch or so above the granite, showing the amount of weathering and degradation since the time some thousands of years ago when all was planed smooth by glaciers.

In the case of granite and other massive crystalline rocks this weathering consists in the change of the felspar into clayey substances and of the mica and hornblende into impure clay, oxides of iron, etc. The quartz grains are loosened in this way and are washed off by rain action, leaving fresh surfaces exposed. Without the help of frost it is probable that this variety of weathering would go on very slowly. Granite monuments in our cemeteries seem but little affected even after standing a number of years, though they gradually lose their polish and grow rough.

Limestones are more easily attacked. If pure they are slowly dissolved, but keep a tolerably smooth surface. If impure, as they generally are, the particles of sand and clay are insoluble and form a crust on the surface. With this the soot of city atmospheres combines to change the original color into a dingy black. Limestones with large fossils soon become unsightly on dressed surfaces from the projection of the fossils. Marbles or crystalline limestones are very readily acted on. A study of marble tombstones in our cemeteries shows that even a few years exposure removes the polish, except on parts that are protected. Every marble slab which I have examined, bearing a date of twenty years or more ago, has completely lost its polish on all exposed parts, has turned grey in color and is so friable that one can easily rub off particles with the finger. It is quite evident that marble is entirely unsuited for outdoor use in the climate of Toronto.

Sandstones differ greatly among themselves in their liability to weather, hard quartzitic ones being almost unattacked, while porous, loose textured sandstones crumble sometimes very rapidly. These differences depend chiefly on the character and amount of the cement which holds the particles together. A clayey cement is the worst, since it readily absorbs moisture and is crumbled by the action of frost. Such sandstones are seductively easy to work, so that builders are tempted to use them for carvings, but often the storms of a single winter will round the edges and spoil the sharpness of such carvings, particularly on exposed corners of buildings.

A calcareous or lime cement, though better than clay, is comparatively easily dissolved by rain water charged with carbonic acid, and still more easily by water containing traces of sulphurous or sulphuric acid, such as may frequently be found in the air of cities. Carbonate of iron is another, though rarer cement, which is easily soluble. The red anhydrous oxide of iron resists solution very well; the brown hydrous is less resistant. The most permanent cement of all is a siliceous one, which is practically unaffected by rain charged with any ordinary solvent; but unluckily such sandstones are so hard to work and usually of such poor colors that builders rarely employ them.

A rather fine grained grey sandstone frequently used in our cemeteries, has turned darker grey, but resists weathering often admirably. Horizontal slabs fifty years old are not at all friable and still retain their inscriptions, though somewhat encrusted with dirt and lichens. A yellowish sandstone has not stood as well, and after thirty-five years in one instance has weathered so as to be quite illegible.

The presence of clay spots in sandstones is most injurious to the appearance, since they weather out and leave ugly holes, sometimes not standing even a single winter. The filling of the holes with powdered sandstone and shellac renders the stone presentable, but only for a short time. Still worse is the presence of clayey layers between the laminae either of sandstone or limestone. The clay rapidly weathers out, spoiling the dressed face of the stone and in time weakening the whole wall.

The hardening of certain limestones and sandstones after quarrying is an interesting effect of the action of the air, though not properly included under weathering. It appears to be due to the drying out of the quarry water with which the stone was soaked. As it drys out, all the substances which it held in solution, such as lime and silica, are deposited, hardening the surface of the block. If once this hardened skin is removed, however, no amount of wetting with pure water will renew it.

Thus far we have considered the action of the weather in decomposing and dissolving part or all of the constituents of a building stone, injuring its strength and durability; but there is another action of some importance to the architect as an artist, that is the slow change of color which most varieties of stone undergo after taking their place in a building. This may be called the mellowing touch of time as contrasted with his gnawing tooth, and from the artistic side an architect's work, like a rich wine, may ripen and improve with years.

Most of these color changes are the result of slow oxidation. Some dark grey or bluish limestones, like those of Kingston, contain bituminous matter from the multitude of fossil organisms that died to form these beds of rock. This color is slowly lost by oxidation and the surface of the stone gradually reaches the true color of the limestone, a pale grey, sometimes even suggesting marble. As a general rule such changes of color are due to oxidation of iron compounds from the monoxide, which is green or black as a rule, to the sesquioxide, which is yellow or brown or red. The general effect then is to change the color from cool greenish greys to warmer yellows or browns. An old marble statue, cold white in the beginning, becomes yellowed like old ivory with the lapse of time; but this change may be due partly to the action of dust and soot in cities. Many whitish or grey limestones yellow in a somewhat similar way. Grey or greenish sandstones generally take on a yellow or brown tone in time. In many cases this change of color is a distinct improvement, especially where stones of different colors which do not quite harmonize have been used together.

Of course in cities burning much soft coal, color is of no importance, since all colors are presently shrouded in an impartial pall of sooty grey or dingy black.

In towns burning mostly hard coal, like our own Toronto, with its usually clear skies and clean atmosphere, the color scheme and the changes which time will give rise to should be carefully considered, more so than they are at present.

In choosing a building stone which has not been thoroughly tested by use one may very easily make mistakes. The color, the texture, the power to resist crushing strain, as the stone comes from the quarry, may all be greatly modified by weathering. The amount of moisture which the stone will absorb, the chemical constitution and the mineral composition, as shown under the microscope, all afford data by which to judge of its lasting qualities; but perhaps the best test of all is to examine the neighborhood of the quarry and see what effect weathering has had upon loose blocks or exposed ledges of similar stone. In any case, architects in choosing stone for buildings intended to be of a lasting and monumental character, should take every means possible to determine the durability of the material they are working with.

*Paper by Prof. Coleman, School of Practical Science, Toronto, read at the fifth annual convention of the Ontario Association of Architects.

NO TEUTONIC ART.

THE art we call Teutonic is really Byzantine. The tribes which were planted on the various frontiers of the empire, and were largely in its service, were all directly indebted to Byzantium for their art. Hence while we find the same art, with slight local differences, among the Goths of the Crimea, the Lombards in Italy, the Burgundians in Austria and Switzerland, the Alemani on the Rhine, the Merovingians in Gaul, the Angles and Saxons in Britain, the Visigoths in Spain, the Vandals in Africa, and the early Scandinavians in Denmark and Scandinavia. The cloissoné jewelry, the interlaced dragon patterns, etc., all of which have such a common likeness, have an equally common likeness with the work which we can trace to the Queen of Bosporus, and, as Lindenschmidt was never tired of preaching, there is no Teutonic art. The art of all the Teutonic tribes who founded the modern States of Europe was in reality the art of Byzantium, and this was so in later times also. The art of the Carlovingian Empire, and of the later Anglo-Saxons, was the art of the exarchate of Ravenna, just as the art of Southeastern Europe, as preserved in the churches of Kief, was the direct daughter of Constantinople.—Sir Henry Howarth, in The Antiquary.

So far from stencilled effects in wallpaper losing their popularity they are unquestionably gaining ground, and those who admire them most are those whose taste is best cultivated. The design of a wallpaper based on stencils is as artistic and effective as any, provided, of course, that proper care is taken in the selection of colours.

A writer on painting states that the ochre best suited for the purposes of the house-painter will show an analysis about as follows: Hydrated oxide of iron 45 per cent., Silica 35 per cent., Alumina 20 per cent.

Yellow is the Chinese imperial color, not to be desecrated by common use. Imperial buildings are roofed with yellow tiles. The Pekin Gazette is issued in a yellow cover; the national flag has a yellow ground; and the Emperor's own robe is of yellow silk, embroideerd with a gold five-clawed dragon.

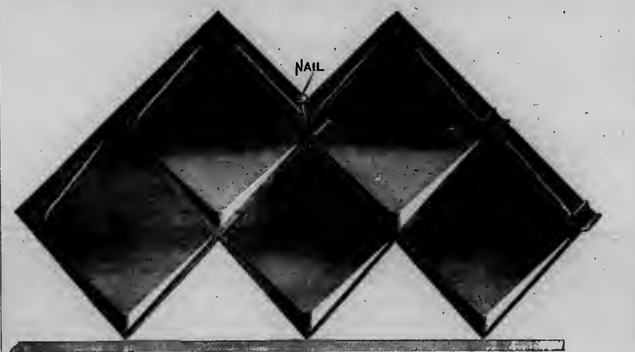
WM. J. HYNES,
Contractor and Plasterer.
Relief Decorations in Plaster, Staff or Papier-Mache.
97 Winchester Street.
Shop, Esplanade, foot of Jarvis Street.
Telephone 3474.

EQUAL TO ANY ● SUPERIOR TO MOST
EXCELLED BY NONE

WE MANUFACTURE
Metal Sidings — Corrugated Iron
Metal Shingles — Metal Building Fronts
Metal Ceilings
Special attention paid to Architects' designs.
Send for new Catalogue.
THE PEDLAR METAL ROOFING CO.
In answering mention this paper. OSHAWA, ONT.

ARCHITECTS and ENGINEERS
APPLY TO
THE NEW COLOR PROCESS CO.
214 ST. JAMES ST., MONTREAL,
for Instantaneous Reproductions in Colors of Drawings and Plans
WILL SAVE YOU
MONEY — Copies on Manilla Paper 4c. per sq. foot.
LABOR — No recoloring by hand.
TIME — We print without the aid of the sun.
ERRORS — We give exact facsimiles.
TRACING CLOTH — We print direct from originals on paper.
DISSATISFACTION — We guarantee uniformly perfect work.
Originals sent from a distance returned with copies same day as received.

TO ARCHITECTS, BUILDERS AND CONTRACTORS
We are prepared to furnish from our quarries in New Brunswick
BROWN AND OLIVE
FREE STONE
of the finest quality and of any dimension.
Samples forwarded free and quotations, given on receipt of inquiry
Correspondence solicited.
WM. HOOD & SON 19 Richmond Sq. MONTREAL.



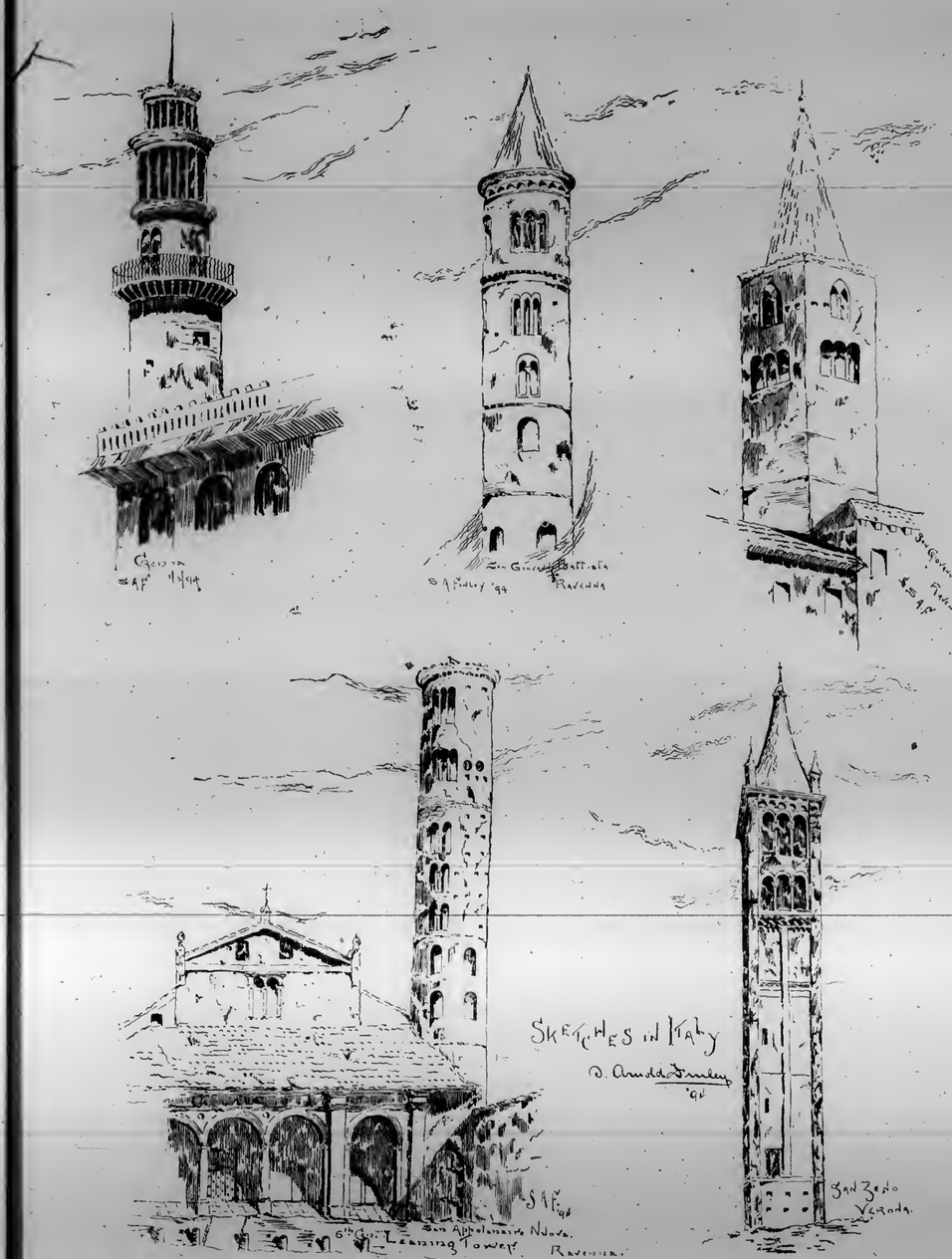
DIAMOND TILES

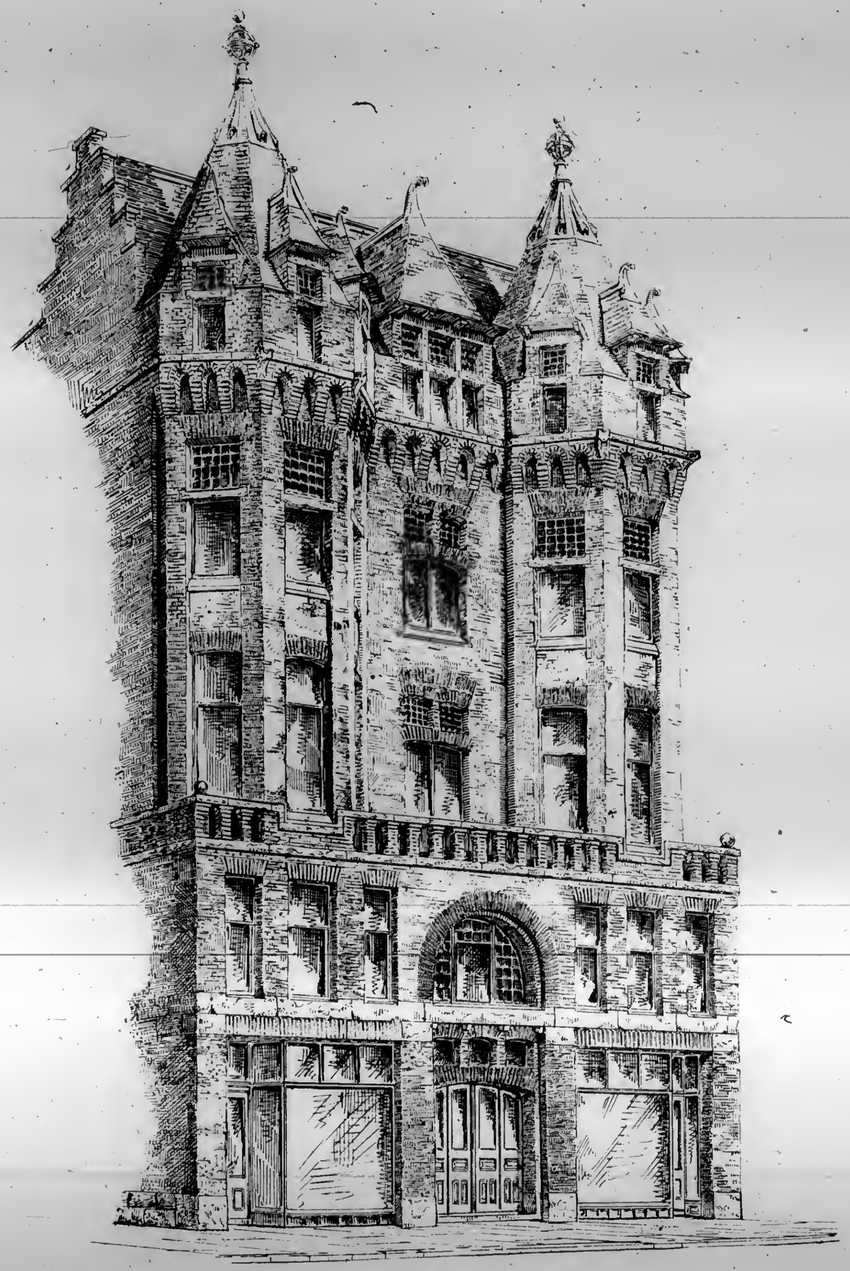
"Empire" Patent Shingles
Warranted Rust-Proof.

CORRUGATED IRON
V CRIMPED AND PRESSED
STANDING SEAM ROOFING
For all classes of buildings.
Hayes' Patent Steel Lath
WRITE FOR PRICES.
Eastlake Patent Shingles

METALLIC ROOFING CO., LIMITED.
MANUFACTURERS
82 Yonge Street ..... TORONTO

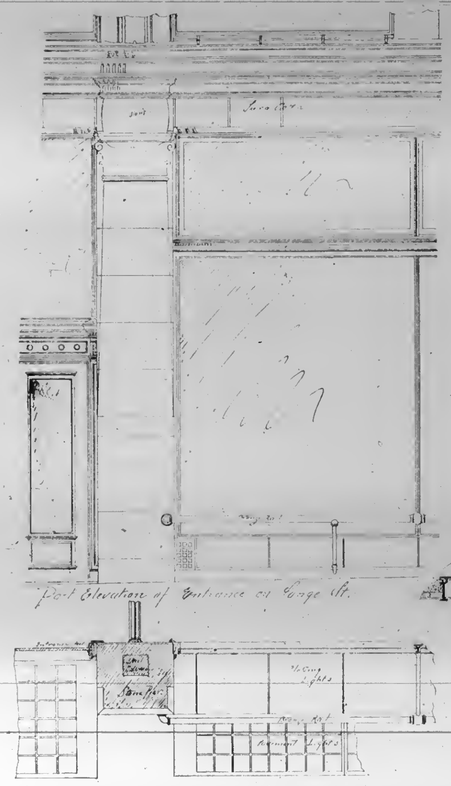
Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers



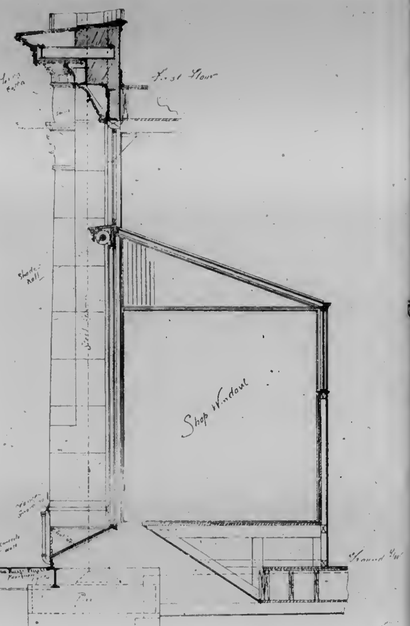


COMPETITIVE DESIGN FOR MASONIC TEMPLE, MONTREAL.

J. R. RHIND, ARCHITECT—AWARDED SECOND PLACE.



Part Elevation of Entrance on Yonge St.



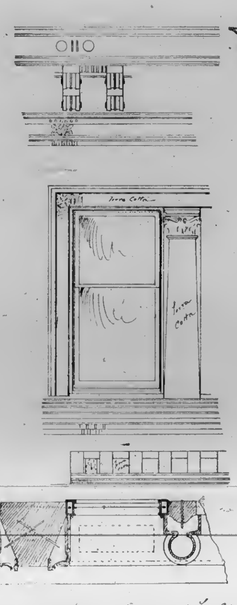
Section of Centre Shop Windows on Yonge St

Stores Building cor Yonge and Queen Sts
for R Simpson Esq Toronto.
Edmund Burke Architect.

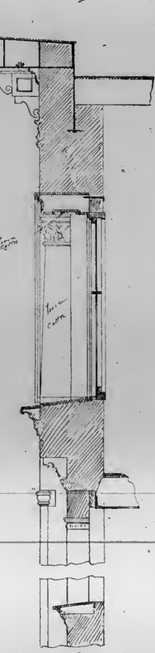
Part Plan of Ground Floor Showing Entrance and Shop Windows Adjoining.

Stores Building cor Yonge and Queen Sts
for R Simpson Esq Toronto.
Edmund Burke Architect.

Section of 1st and 2nd Floor Wdws



Plan and Elevation of Top Storey



Section of Top Storey.

CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—NO. 3. MARCH, 1895 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS, AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2259.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 10th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

D. B. DICK	Toronto.
W. A. EDWARDS	Hamilton.
F. J. ALEXANDER	Ottawa.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON — Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

A. F. DUNLOP	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
L. Z. GAUTHIER	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. MCLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.
JOHN ALDRIDGE, 1st Vice-President.
WM. PARK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JAS. CRANG.
WM. PEARS.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
H. MARTIN.
THOS. CANNON, Jr.
JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this Journal is mailed each week to persons mentioned in the CONTRACT RECORD'S reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

THE building season of 1895, about to open, promises to be one of much greater activity in Ontario at least than that of 1894. The recent extensive fires will create a considerable local demand for labor and material in Toronto. This will apply in a lesser degree to London, Halifax and other places. The number and extent of new building enterprises seem also to be on a more promising scale than last year. We therefore bespeak for architects, builders and supply firms the enjoyment of more satisfactory conditions than those which have fallen to their lot of late.

EVER since the Ontario Legislative buildings rose to public view, there has been but one opinion expressed by capable judges concerning their outward appearance, viz., that it displays not a single interesting feature. Occupation of the legislative chamber has demonstrated the fact that its acoustic properties are also of the worst possible character. A daily paper affirms that "The members can't hear each other on the floor of the House, the press is at a great disadvantage for the same reason, while as far as the visitors in the galleries are concerned they might as well be at a pantomime." It seems pertinent to enquire what advantage has accrued to any Canadian interest from the employment of an American architect in the erection of these buildings over the heads of capable home talent.

IN the paper on "English Methods," by Mr. Frank Baker, A.R.I.B.A., presented to the O.A.A. at its last meeting and printed in the present number, the author says: "The system of carrying all soil pipes on the outside of outside walls is a good one, and though it is said that our severe climate prevents us from adopting this principle here, it is likely that we will come to it in some form eventually. Perhaps a well ventilated brick flue might be constructed to contain these pipes, but something ought to be done to get them outside of the building." We are heartily in accord with this view. In spite of all the precautions that can be exercised, there exists an element of danger to the inmates of a dwelling in which the drainage system forms part of the interior construction of the building. The method of carrying drains outside the walls of dwellings has been followed to a considerable degree of late, and it would add materially to the security of human life if means could be devised whereby the soil pipe would likewise be relegated to the outside of the building.

ABOUT two years ago the Council of London, Eng., decided to abandon the system of submitting to tender the public works of the municipality, and to have them carried out under the immediate supervision of its own officials. By this means it was claimed there would be saved to the citizens the contractors' enormous profits. The experiment, which has been watched with world-wide interest by municipal bodies and public contractors, seems to have proved a dismal failure. In the case of several costly public improvements carried out under the new method, the cost is shown to have exceeded the estimate of the city officials by 20 per cent., or in round figures £7,200. A quarter of a million pounds has been invested in buildings and contracting plant, which will be practically lost should a return

to the former system be found advisable, as seems probable. Sir John Hutton, chairman of the Works Department, expresses the opinion that the workmen may not be disposed to do as good work for the Council as for a contractor. It will be remembered that not long ago the City Council of Toronto tried the same experiment, and with the same result. In both cases, the desire to curry favor with the trades unions seems to have been the actuating motive.

A RECENT and instructive experience with a steam heating plant is reported in connection with one of the Toronto public school buildings. Last summer the Bolton avenue school, a two-storey building, was enlarged to contain sixteen class rooms, instead of twelve. This was done by adding a third storey, making an increase of fifty per cent. in the space to be heated. The apparatus formerly consisted of one boiler and plain coils of steam pipes—the usual pressure of steam running at six to eight pounds gauge—and all worked well. For the new storey the old mains and returns were enlarged where necessary, and new extensions put in, with cast iron radiators. With the advent of cold weather it was found impossible to make the apparatus do its work, as the water backed out of the boiler into the returns before sufficient pressure could be obtained to make a circulation. Up to this time there had never been a check valve on the return connection with the boiler, and Mr. Bishop, Superintendent of Buildings and architect for the School Board, was of the opinion that to provide one would overcome the difficulty. The contractor for alterations to the plant and others having extended experience with steam apparatus differed from him, thinking this would have no appreciable effect and that another boiler of the same capacity as the one in use would be found necessary. The check valve was put in at a cost of about twenty-five dollars, and the system worked as perfectly as ever, satisfactorily warming the whole building even during the extremely cold weather which prevailed at times during the past winter. The amount of fuel consumed is about fifteen per cent. more than formerly, with a corresponding increase in the steam pressure required. An additional boiler would have cost nearly one thousand dollars, with an annual cost of at least one hundred dollars more for fuel than the present arrangement. In the building referred to there are 268,000 cubic feet of space with 2,200 sq. feet of window glass. The heating is entirely by direct radiation and the boiler heating surface is one-tenth the radiating surface, a proportion allowed for ordinary buildings by Baldwin, the eminent authority on steam heating. These facts show a rather wide difference of opinion among people who ought to know the requirements, and that the subject of apparatus for heating or ventilating is one with which architects should be thoroughly familiar.

BUILDING CONSTRUCTION IN ITS RELATION TO FIRE PROTECTION.

THE large fire which caused such destruction to buildings in one of the principal parts of Toronto last month, made reasonably clear that the series of conflagrations by which Toronto has been visited of late were due to incendiarism. It can hardly be conceived in the light of the immunity which the city enjoyed for so many years, that three such conflagrations should take place within so short a period from accidental causes. It has been the subject of comment that in each instance the fires originated in buildings situated in the very heart of the business district of the city, where there was a reasonable certainty of their being rebuilt. It is to be hoped that the reward of $1,000 offered by the Underwriters' Association for the conviction of the incendiaries will have the desired result.

The rapid destruction of Mr. Robert Simpson's new departmental store building, an illustration of which appeared in the January number of the CANADIAN ARCHITECT AND BUILDER, and which was among the first of the buildings erected on the modern iron construction principle, not only demonstrated the insufficiency of the city's fire equipment, but what is more important, the fact, that so long as the prevailing methods of building are allowed to continue, the most effective fire extinguishing appliances will be of little avail in preventing the spread of fire when once it shall have obtained hold upon a building. If a merchant wants a building put up with the greatest amount of floor space and with street fronts almost entirely of plate glass, his architect may advise him of the danger to which it will be exposed from fire, and that it will also be a menace to the safety of surrounding buildings, but if the proprietor refuse to go to the expense of making the building fire-proof and be willing to assume the risk of having it destroyed, the architect can do no other than carry out his wishes. It is here that the law should step in and prevent the erection of structures of such a character. Since the recent fire, a clause has been discovered in the existing building by-law of the city, limiting the floor areas of buildings and providing other safeguards against fire. Strange to say, this clause has been more honoured in the breach than in the observance. It reads as follows :

"No block of warehouses or storehouses or other buildings (except churches, public halls and opera houses) shall contain more than forty squares of building on the ground floor thereof, including internal and external and half the party walls belonging thereto, unless such building be separated and divided by party walls into divisions of not more than forty squares of building as aforesaid, unless the permission of the City Council shall be first obtained. No block of warehouse or other buildings shall communicate with any other block of warehouses or other buildings through a party wall, nor shall any stable communicate with any other stable through a party wall, unless the door case and sill of every such communication be of stone or wood covered with tin, and unless there be to every such communication a door of two thicknesses of wood covered on both sides with tin. No timber bond or lintel shall be laid into the brick work of any wall in any such building nearer than eighteen inches to the opening of such communication, unless the door case and sill of every such communication be of stone or of wood cased with tin."

The committee, consisting of Messrs. H. B. Gordon, W. L. Symons, W. R. Gregg, Edmund Burke, D. B. Dick, B. Jarvis, J. A. Pearson, Mark Hall, E. J. Lennox and Geo. Miller, appointed by the Ontario Association of Architects to recommend to the City Council needed amendments to the city building by-law, have lost no time in dealing with the subject. Since their appointment the committee have held eight meetings, at which the building ordinaces of London, Eng., New York, Chicago, St. Louis and a number of other cities, have been carefully considered, together with other data bearing on the subject in hand. As the result of their deliberations the committee have framed a by-law which will be recommended to the City Council at an early date. In view, however, of the unusual circumstances at present prevailing in the city, and the urgent necessity for immediate legislation to prevent the erection of buildings constructed in a manner similar to those recently destroyed, the committee have recommended that the following provisions be at once incorporated into the existing by-law :

FIRE-PROOF BUILDINGS.—Every building hereafter erected, which belongs to the public building class or the hotel class, the highest occupied floor of which exceeds 50 feet in height from the average ground line ; and every building hereafter erected belonging to any other class, the highest occupied floor of which exceeds 70 feet in height from the average ground line, shall be built fire-proof ; that is to say :

It shall be constructed with walls of brick, stone or terra-cotta, or other hard, incombustible materials. No wooden beams, lintels, bond timber or wood strips shall be built in walls.

The floors and roofs shall be constructed of brick or terra-cotta arches or other hard, incombustible material, and the supporting beams shall be of steel or iron, all properly cased with non-combustible material.

The stairs and staircase landings shall be built of hard, incombustible materials.

No woodwork or other inflammable material shall be used, excepting the floor boards, the doors and windows and their frames, and the trims, casings and interior finish, when filled solid at the back with fire-proof material. The exposed parts of all constructional steel and iron work, supporting walls, floors, roof or stairs, shall be efficiently protected with at least 2 inches of porous terra-cotta ; or, where such is not feasible, with wire lath and plastering of sufficient thickness.

No existing non-fire-proof building shall be converted to the purposes of a building of the public building or hotel classes, the highest occupied floor of which exceeds 50 feet from the average ground line, and no existing non-fireproof building shall be increased in height to exceed the limits set forth in this section for new buildings of the same class.

But nothing in this section shall prevent the erection of what are known as grain elevators as usual y constructed, provided they are erected on the water front in isolated localities, and under such conditions as the Inspector of Buildings may deem prudent.

ELEVATORS.—Where elevators are enclosed in shafts, all the enclosing walls must be built of brick or terra-cotta or other incombustible material.

In all buildings of the manufactory class that are more than 2 stories in height above basement, and in all buildings of the store and warehouse class that are more than 3 stories in height above basement, the elevators must be enclosed in shafts built of brick or terra-cotta, and extending at least 3 feet above roof, and covered with a light glass sky light or easily broken covering ; and all the doorways opening into such shafts shall be closed by iron doors, or else by doors of two thicknesses of solid boards covered all over with asbestos and sheet metal.

Where elevator shafts cannot conveniently run to top story and from thence out to roof, the top of shaft must be covered with a fire-proof ceiling.

Where elevators are open, the guide posts and corner posts must be of iron, and any inclosing screens must be of incombustible material. No woodwork of any kind, other than strips on cage guide posts, shall be carried from floor to floor.

FLOOR AREA.—No building hereafter erected (except public audience rooms) shall have on any floor thereof more than 4,000 square feet of floor area undivided by division walls. Nor shall the undivided floor area of any floor in any existing building (except public audience rooms) be increased so as to contain more than 4,000 square feet.

Division walls to divide the floor area of a building into spaces of not more than 4,000 square feet must be of stone, brick or terra-cotta.

Door or other openings through division walls must not exceed in their united width one-third the length of wall.

All openings through division or party walls shall have tight-fitting doors and frames of iron ; or else, if of wood, constructed of two thicknesses of solid boards, and covered with asbestos and sheet metal.

Each section of floor area divided from the rest of building by division walls and fire-resisting doors shall have a separate stair and exit to street.

All fire-proof buildings, built as described for fire-proof buildings under section ..... of this by-law, shall be exempt from the restrictions as to floor area.

PROTECTING STRUCTURAL IRON WORK.—All metal columns and beams supporting walls, except first floor and basement columns on street fronts shall be efficiently protected by non-combustible materials.

There is a misconception on the part of the public as to what constitutes a fire-proof building. The opinion is held that buildings such as the Simpson and McKinnon buildings recently destroyed, constructed with iron supports, were intended to be fire-proof. This is altogether an error. It was perfectly well understood by the architects of these buildings that the safety of these structures was in no way enhanced, but rather endangered, by the use of an unprotected iron frame work. The advantage sought to be gained by the use of this method of construction was rather in the direction of securing larger floor and light areas. As was pointed out in an article on this subject in the CANADIAN ARCHITECT AND BUILDER for January, iron should not be used for the support of a building unless covered with fire proof material such as porous terra-cotta, and it is hoped that the proposed new building ordinance of the city will render this imperative.

A provision which would to a considerable extent enhance the safety of buildings from injury by fire originating on adjoining premises, would be one which would compel the owners of business buildings to protect with iron shutters the windows in the rear walls abutting on adjoining property. Two of the greatest sources of danger are windows and elevator shafts. The windows are broken by the heat, thus setting in motion currents of air by which the flames from burning buildings adjoining are sucked in through the openings, carrying with them destruction to the interior of the building. It is too much to require owners of office and other business buildings to disfigure them by placing iron shutters on the windows of the principal street elevations, but no such objection could be urged as regards the protection of windows on rear walls.

Yet another valuable protection, to our mind, would be moveable iron floors in elevator shafts, which should be employed at night to shut off each flat of the building. One of the recommendations of the committee of the O. A. A. is, that such shafts should be lined with fire-proof material and should have fire-proof doors at the entrances on each flat ; that the shaft should extend three feet above the roof and be covered with glass, which would be easily broken by heat. This provision is a wise one as far as it goes, its object being to confine the fire to the shaft and prevent its spread laterally throughout the building. There is danger, however, that combustible material would be carried through the top of the shaft to the roof of the building and to building's adjoining. Such a provision as we have mentioned would act as a more complete safeguard, tending to prevent the fire from extending beyond a single flat where, thus confined, it could effectually be dealt with by the firemen.

Some attention should be given to the construction of floors in a manner that would offer greater resistance to fire. The plastering of ceilings is quite a protection to the under side of the floor, and if floors were lined with asbestos or laid in mortar, a much longer time would be required for them to burn out.

ONTARIO LAND SURVEYORS.

THE annual meeting of the Ontario Land Surveyors' Association held in Toronto a fortnight ago, was one of much interest. Papers were read on "Good Streets," by H. J. Brown, of Berlin, Ont ; "Highway Bridges," by Peter S. Gibson, of Willowdale, Ont., and on "Mining," by J. D. Evans, of Trenton, Ont. The proceedings terminated as usual with a banquet. The following gentlemen were nominated for the Council of Management, the election to be by ballot of all the members of the society in the Province :—P. S. Gibson, Willowdale ; Jas. Dickson, Reeve of Fenelon Falls ; A. Nieven, F. B. Speight, Toronto ; Geo. Ross, Welland ; J. D. Evans, Trenton ; Wm. M. Davis, Woodstock ; Harry Brown, Toronto ; T. H. Jones, Brantford, and F. S. Foster, Toronto ; Auditors, H. B. Proudfoot and W. A. Brown, Toronto.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

MASTER PLUMBERS' ASSOCIATION OF MONTREAL.

THE Master Plumbers' Association held their first annual banquet at the Queen's Hotel on Monday, the 25th February. Over a hundred and fifty guests sat down at the tables, and amongst those who occupied seats of honor on the right and left of the President, Mr. Joseph Lamarche, were Acting Mayor Leclerc ; Aldermen Beausoleil, Hurtubise, Grothé and Jacques ; ex-Alderman Clendinneng ; Mr. J. E. Doré, Sanitary Engineer ; Messrs. T. J. Clark, Jas. Robertson, W. Robertson and Lieut.-Col. Massey. The first toast proposed by the President was that of Her Majesty the Queen, after which Mr. John Date proposed The Right Hon. the Earl of Aberdeen. The next, The President of the United States, was responded to by ex-Alderman Clendinneng.

The corporation of Montreal having been honored, Alderman Beausoleil, the Chairman of the Health Committee, was the first to respond. "If plumbing work is well done," he said, "it is a public boon, but if badly done it is a public menace." As member of the Health Committee he had great pleasure in assisting at the passage of the Sanitary By-Law recently passed.

Acting Mayor Leclerc addressed a few words of greeting to the Association, and then came one of the happiest speeches of the evening, from Mr. J. W. Hughes, who gave "Our Guests" Mr. S. C. Stevenson, Secretary of the Council of Arts and Manufactures, also spoke, and entered into details concerning the work of the Council of Arts and Manufactures, in so far as the plumbing trade is concerned. Mr. McLaren and Lieut.-Col. Massey also spoke, as did ex-Ald. Clendinneng, wishing success to the Association Songs and recitations then became the order of the evening.

The Committee deserving credit for this most successful banquet was composed of Messrs. Joseph Lamarche, J. C. Jacotel, Joseph Thibault, W. A. Stephenson and Fred. Hortan.

THE PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The report of the examiners on the examination for admission as students and members of the above Association held in Quebec in January last, and recommending that Messrs. E. B. Staveley, D. O. Turgeon and Louis Bélanger be accepted as student associates, and Mr. Cagetan Dufort as member, was adopted at the last Council meeting of the Association, held on the 12th March.

The Committee appointed by the Association to revise the Montreal building by-laws, as requested by the Fire Committee of this city, have completed their task, and the new by-laws, as drawn up by the Association, are now in the hands of the civic authorities. The work has been found very onerous, the Committee having held semi-weekly meetings for the purpose for the last ten months. The by-law comprises one hundred and forty-one type-written pages of foolscap size.

At the request of the Ontario Association of Architects several members of this Association are preparing to send drawings for their approaching exhibition. All drawings will have to be delivered at the store of Messrs. W. Scott & Sons, 1739 Notre Dame street, not later than the 1st April at noon.

MONTREAL STREET RAILWAY BUILDING.

The Grand Jurors of the Court of Assize have brought in a verdict of "Not Guilty" in the case of Messrs. E. C. Hopkins, A. Gravel and Foreman McLaughlin, accused of criminal negligence in connection with the Street Railway building. Mr. G. T. Hammond, architect, of Cleveland, Ohio, has now charge of the building, the interior of which he intends to completely tear down, and have rebuilt ready for occupancy by the end of next autumn.

CUSTOMS DUTY ON ARCHITECTURAL PLANS.

IN order to insure uniformity in the collection of duty on architects' plans imported into Canada for use in the erection of buildings therein, the Controller of Customs has, under the provisions of sub-section 2 of section 65 of the Customs Act, determined the value of duty of such plans to be as follows :

Each set of original drawings or single set of blue prints of same, if brought into Canada as a substitute for the original drawings, 2 per cent. of the estimated cost of the building to be erected thereon.

Same, if accompanied by details, 3 per cent. of such estimated cost.

Details, or blue print of same, if imported separately, 1 per cent. of the estimated cost of such detail.

When additional sets of blue prints of the same set of drawings are imported, such additional sets of blue prints are to be valued for duty at $5 per set in addition to the value of the original drawings, or first set of blue prints imported in lieu thereof, as above.

AT the recent annual meeting of the Toronto Radiator Mfg. Co., the reports presented by the Secretary and Manager, Mr. John Taylor, were of a most satisfactory character. The Company have established agencies as follows : Canada—Montreal, Que. ; Quebec, Que. ; St. John, N.B. ; Hamilton, Ont. ; Winnipeg, Man. ; Victoria, B. C. ; Foreign—London, Eng. ; Edinburgh, Scotland ; Glasgow, Scotland ; Belfast, Ireland ; Antwerp, Belgium ; Hamburg and Berlin, Germany ; Auckland, N. Z. The directors and officers of the Company were re-elected as follows :—Joseph Wright, President ; David Carlisle, Vice-President ; F. W. Doty ; John M. Taylor, Secretary-Treasurer and General Manager.

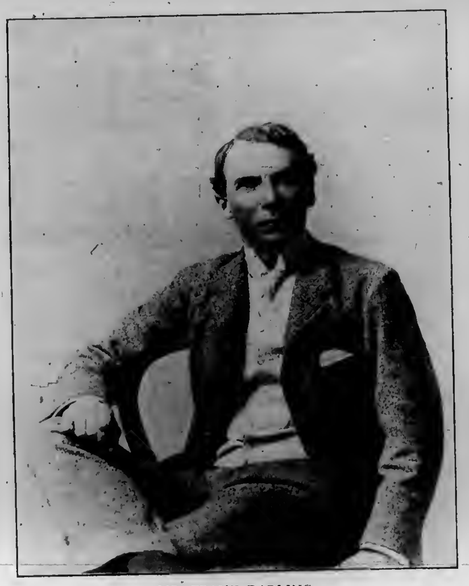
ILLUSTRATIONS.

PORTA DELL PALLIO.—SKETCH BY EUSTACE G. BIRD.

THIS gate built in 1520 A.D. is the west entrance to the city of Verona, in Northern Italy, and is an instance of San Micheli's wonderful ingenuity and taste in the mode of displaying pure and beautiful architecture with the requisites called for in fortifications. San Micheli devoted himself with great ardour to the practice of military architecture. The genius of this architect was of a very high order; his works are conspicuous for excellent construction as they are for convenience, unity, harmony, and simplicity, which threw into shade the minor abuses occasionally found in them—and our advice to the student would be to study his works with diligence.

"STOKESAY CASTLE"—THE GATEHOUSE.

Stokesay is an almost unique specimen of a mansion of the thirteenth century, fortified subsequently to the erection of the domestic portion of it. It combines in itself associations not only of the peaceful daily life of its inmates, but of that eventful time when this border land was the scene of forays and bloodshed, and happily preserved with very little alteration through the chances and changes which have levelled so many other similar structures of that early date. It presents many features of curious interest for the architect, the archæologist and historian, and the artist finds a gem of color and combination with a perfect setting.



MR. FRANK DARLING,
President of the Ontario Association of Architects.

The castle is situated on the left bank of the Onny, in the County of Shropshire, and within ten miles of the famous and better known stronghold of Ludlow. To the east rises a steep hill, on the summit of which can be traced the remains of a British camp—its sides clothed with firs; to the west a corresponding cliff, the lower slopes covered with hollies of great age and the ridge of rugged limestone. This was the site selected for the home of one of those lords of the Marches, who in the time of the first Edward held this border land under the stern feudal rule, and who had frequently to repel the attacks of the as yet unconquered Welsh.

The first objects which arrest attention on first seeing the Castle are the gatehouse and the moat; the latter surrounds the whole building and has a depth of about six feet and an average breadth of twenty-two feet. It is now used as a garden, and was once much deeper, being fed from a small stream coming down from the neighboring hills. The gatehouse, which has probably replaced the original drawbridge, is a fine example of a Tudor "black and white" building. Its timbers hoary with age, and stained by the rains of 300 years, have toned a silvery gray and are still in excellent preservation, and in many parts are richly carved, but in one or two instances have been cut away for new work of an order that is more useful than ornamental; and in cutting some of the main timbers, when the ugly chimney was erected to a more modern kitchen range, that side of the gatehouse has sunk, and the whole of the lower half was replastered upon the timbers which correspond with the other side. Over the ample archway which runs through the centre are displayed on the arch beam "The Rose" in a shield with lion paws as supporters, and flanked with rude carving foliated in low relief. On the opposite side, corresponding, are the figures of Adam and Eve, the serpent and the forbidden fruit. Two quaint figures surmount the pilasters—a man and a woman in dress of the fashion of the times—probably the founder and his wife, while at each corner of the house are massive oaken corbels, the carving being very bold and masterly, each of the four being of a different design, the one I have shown being the most perfect. The timber work of the upper story has been much cut away for windows, but the blank plaster panels have not been filled with timber strutts, but left purposely blank, either to be filled with ornamental plaster or as window spaces that were not required, and afterwards lath and plastered.

In the last century this gatehouse was often the resort of an outlaw, who successfully eluded capture by secreting himself in a small room entered by a trap door, but there is nothing of special interest in the interior, as it has been much modernized and is now occupied by a caretaker.

A door of great size, made ball-proof by two layers of oak plank laid over each other at right angles and clamped with large headed iron nails, and pierced for firearms, remains as a relic of the civil wars. The hinges and other iron work appear to be of earlier date, and were probably taken from other parts of the castle.

Crossing the court-yard we have the heart-shaped tower, unique in itself; on the left a banqueting hall with its chased beams and windows of early English tracery; the priests' rooms and deep well in the North tower, having an overhanging half timber story over the moat. The solar is a splendidly panelled room with a grand fire place, and there are some good carved square pews in the church close by that reminds one of an elaborate horse-box.

From the date of Domesday to 1241, with the exception of two intervals of forfeiture, the de Lacys held this and other manors. About 1115 the de Says were enfeoffed at Stoke by de Lacy—hence the name Stoke Say. Their ancestor, Picot de Sai, or Sez, a place in Normandy, fought at Hastings under William 1st. Five of the family are mentioned in connection with the manor. In 1240 the line of de Lacy died, when it passed through a daughter to John de Verdon, who died in 1274; then to Lawrence de Ludlow, again to the Verdons, Mainwarings and Cravens. Sir W. Croft was slain here in 1645. It now belongs to Dent Allcroft, Esq., who lives near.

After the civil war, Stokesay was ordered to be "slighted," or rendered incapable of defence, but in this instance only the battlements of the northern tower were removed and the rest left intact. It was at one time used as outbuildings to the neighboring farm house. Lord Craven carried out necessary repairs for its preservation, and Mr. Allcroft at considerable expense has just put it into an excellent state of repair, but has allowed nothing to be removed or destroyed, and thus is handed down to us a relic of the past, little known by architects, except in the immediate counties, so I trust this slight description will prove of interest to our brethren across the pond.—ED. SWALES.

RESIDENCE AT VANCOUVER, B. C., FOR CAPT. R. ARCHIBALD.
—R. MACKAY FRIPP, F.R.I.B.A., ARCHITECT.

Valuable stone quarries are reported to have been discovered at St. Raymond, Que.

THE LONDON COMPETITION.

WE desire to draw attention to the unfairness of the conditions under which competitive plans are invited for the re-building of Dundas street Methodist church, London, Ont. These conditions are as follows:

"The trustees do not bind themselves to accept any plan, but should they select one, and desire to use the same without employing the architect of such plan, he shall provide all necessary specifications and working drawings for the sum of $400—four hundred dollars.

"First drawings and estimates to be delivered to the Secretary in London on or before the 21st day of March, 1895, and completed specifications and working drawings to be ready for inspection and use of contractors on or before the 11th day of April, 1895.

"The architect to state in writing what percentage on his estimate he will charge to personally superintend the erection and completion of the work, and should the trustees engage him for such service, then the aforesaid $400 will not be paid for plans, it being agreed that the percentage named by the architect includes plans, specifications and superintendence of the work.

"Architects preparing plans will please withhold their names from said plans, and instead of name put thereon a distinctive mark, advising us under separate sealed cover what mark they will use.

"Kindly advise if you will submit plans.

Among the principal objections to these conditions, the following may be cited: (1) They do not guarantee that the best plans will be accepted; (2) Only one per cent. is offered for working plans and specifications, instead of 2½ per cent.; (3) Cheap work is invited by requesting architects to state *what they will charge* for doing the work where there is only one possible percentage which can be charged by respectable architects. We cannot see how any self-respecting architect can consent to enter a competition under such conditions as these.

TORONTO BUILDERS' EXCHANGE.

IN recognition of his valuable services as President of the Exchange, Mr. William Pears was recently presented with the following address: "In accordance with the unanimous vote of the Builders' Exchange, as expressed at the annual meeting held on January 21st, it is requested that you accept the accompanying cigar-case as a slight expression of the friendship and good feeling entertained towards you by your fellow-members. During your two terms of office as president of the Exchange, no effort was wanting on your part to promote the efficiency and usefulness of this association, and it is hoped that the accompanying memento may express in some degree the appreciation of your fellow-members. With best wishes for the welfare of yourself and family, we remain, yours truly, John B. Vick, Geo. Oakley, C. S. Boon, on behalf of the Exchange."

PERSONAL.

Mr. R. Mackay Fripp, F. R. I. B. A., of Vancouver, B. C., passed through Toronto last month en route for Europe.

Mr. Geo A. Clare, of the firm of Clare Bros., of Preston, Ont., has been honored with the Conservative nomination for the House of Commons, for the South Riding of Waterloo, Ont.

Mr. W. W. Summers, one of the oldest contractors in Hamilton, and well known in Masonic circles, died in that city last month. Mr. Summers was born in Hadleigh, Essex county, England, on January 2, 1822. He came to Hamilton in 1854 to superintend the erection of the Anglo-American Hotel, now the Wesleyan Ladies' College.

Intelligence comes from British Columbia of the death at the Jubilee Hospital in Victoria, of Mr. Frederick Toms, the well-known Ottawa contractor. Mr. Toms was attacked by bronchial pneumonia soon after his arrival on the coast, whither he went for the purpose of erecting the new Government building at Victoria. When the gravity of his condition became apparent he abandoned his contract, which was taken over by Messrs. Elford & Smith, of Victoria. Mr. Toms was a native of Newfoundland, and had been engaged on a number of very important works, making his headquarters at Ottawa, where his interment took place.

The news of the death of Mr. N. B. Dick, architect, which occurred at his home in Toronto, last week, came as a sad surprise to his many acquaintances. His death resulted from consumption induced by a severe cold contracted a year ago. Mr. Norman Bethune Dick was born in Toronto in April, 1860, and was the son of the late captain James Dick. He began his architectural education in the office of Messrs. Smith & Gemmell, of Toronto, and after leaving them went to Cleveland and spent considerable time there and in some neighboring cities. On his return to Canada he settled temporarily in Kingston, but subsequently went to St. John, New Brunswick, where the great fire afforded a splendid opening for one in his profession. He commenced practice in Toronto in 1879, and soon enjoyed a quiet but good and steady business, and in 1890 formed a partnership with Mr. A. Frank Wickson. Among the buildings erected by Mr. Dick were the Granite Rink, the Victoria Club House and Rink on Huron street, the Academy of Music, on King street. Mr. Dick was ardently interested in yachting, and has held the position of rear commodore in the Royal Canadian Yacht Club; he was one of the owners of the racing yacht "Zelma." He was one of the original members of the Toronto Architectural Guild, which preceded the formation of the Ontario Association of Architects.

The large Portland cement works erected by the C.P.R. at Vancouver, B.C., have been put in operation under the management of Mr. S. Warsup, late Assistant Superintendent of Messrs. Francis, Sons & Co., of London, Eng. These works have a capacity of 600 barrels per week. All necessary ingredients are obtained in the Province, limestone being procured from Texada Island and clay from Wharnock.

STAFF.

By W. J. HYNES.

THERE is probably none of the various departments necessary to the completion of our buildings so neglected and misunderstood as plastering. Amongst the many branches of the trade that require a better understanding on the part of architects, is staff.

Staff is a compound principally of plaster of Paris in which a large amount of strong fibre has been incorporated before setting, rendering the resulting cast very strong so that it will stand much rough usage; it may be sawed, nailed and handled much the same as wood. For many years English and European decorators have used similar compositions. Fibrous plaster, plaster and canvas, and like compounds have been used extensively in interiors. They have met with favor because artistic light in weight, easily secured and lasting.

Staff was first used as a temporary decorative material in the Paris Exhibition, where its use was confined to foliations and statuary. The success attending it there led to its adoption at the World's Fair, as the cheapest and best material for mouldings, reliefs, statuary columns—in fact the entire covering of all buildings, inside and outside, was staff, except the larger plain surfaces which were lathed and plastered.

To its use may be largely attributed the architectural and artistic success of the Fair. For the first time in their experience, architects found themselves free to design with practically no limitations. That this liberty was not abused, we have their work as evidence.

As at present composed, staff should not be used for any exterior work, unless for temporary purposes. Plaster of Paris, its principal component part, will not stand the action of frost, nor weather, unless protected by paint or other insoluble washes. At the World's Fair its use on exteriors was justified by the requirements, and the fact that it stood so well the winter of 1892-'93 is greatly in its favor, but there is nothing to justify its application outside on permanent structures.

These objections do not hold against its use on interior work. All that is necessary is a proper understanding of the material and its manner of application. To this end it must be understood that staff work is always cast in moulds. These moulds are made from different materials, as required by the character of the work to be reproduced. A free architectural design will require wood moulds for plain mouldings; plaster-piece-moulds for more intricate designs; white foliations and plastic designs are best reproduced by gelatine moulds which give a faithful copy of the modeller's work to the minutest detail, with all the necessary under-cuts and treatment.

When staff is being cast from the moulds the plaster composition is poured into them in a fluid state, and before this sets the fibre is incorporated. The cast, which results, is very strong, the fibre holding the various parts together even after fracture; it requires a saw to cut it, and nails can be driven into it freely. This admits of it being fixed by nails and screws to the joist, studs, brackets and grounds prepared by the carpenter, and the result is security such as cannot be obtained by the old lath and plaster work. As a covering for wood or iron work there is much to commend this material. Settlements and shrinkage cannot dislodge it when securely nailed. If not fire proof, it certainly is not inflammable, and is also a very poor conductor of heat. These qualities have led to many forms of plaster board, grooved plaster slabs, and other compounds similar to staff for lathing. Sections from three to four feet square are also made for ceiling covering, either plain or decorated, and can be panelled with mouldings or finished plain as may be desired. A staff cornice for an ordinary room does not compel the designer to confine himself to the outline of the angle; the thickness of material is not a consideration; it allows the greatest liberty. It is needless to enlarge upon the possibilities. The World's Columbian Exhibition furnished an object lesson that ought to be remembered.

Staff, like all other materials, has its place, and good sense will dictate its use; it is a covering and decorating material stronger and more lasting than plastering. In addition to this it is most suitable for decorating wood-work, running ornaments, capitals for columns, panels for pilasters, terminals for exposed construction trusses, brackets—in fact any decorations required.

One of the strongest recommendations this material has is its low cost. While the first cost of models in plaster are equal to carving in wood, staff reproductions are cheap; if enough are required from one design, a very low price can be secured.

The facility with which staff can be reproduced in almost any size or design, the faithfulness with which the artist modeller's treatment can be duplicated, are factors that will in time work a great change in the architectural treatment of interiors. Relief work and mouldings will replace the flat surfaces which are now so common. The architect will have an opportunity of stamping his individuality upon interiors, instead of this work being left as now to the modern decorator and his wall paper. A building may have a permanent character all its own, interiorly as well as exteriorly, and not to be subject to whimsical changes of style. This will call for careful study of interior architecture and cannot fail to have a good effect.

PAPER ON "ENGLISH METHODS."*

By Frank Baker, A. R. I. B. A.

The subject of my paper "English Methods," is obviously one which it would be impossible to go deeply into, in a small paper but a short resumè of some of the most striking "methods" may not prove interesting.

The absence of extremes in the climate of England, of the brilliant sunlight, and severe heat or cold, and the continual dull or semi-dull atmosphere, impresses us at once with the impossibility of getting a sparkling or brilliant effect in exteriors, no matter what materials are used, and the architects many centuries ago as now, have wisely decided that there is no use attempting to get an effect such as is seen in America, or France or Italy, in the English climate.

Some venturesome architects of later years, have attempted to relieve the admitted monotonous appearance of the cities and towns, by erecting buildings of terra-cotta and brick, both combined in bright colors, and by working in lighter styles, as Spanish Renaissance, Florentine, Flemish, etc.; the former, however, soon lose their lustre, and the weathering of the latter, presently made apparent their unsuitability to the climate, so that the man who abides by tradition, achieves the greatest success in the long run.

An illustration of this was given in the recent competition for the completion of the South Kensington Museum, at London, when amongst the eight designs submitted by selected architects (four selected by the Government and four by the R. I. B. A.), one was sent under the motto "English Tradition," illustrating a building of excellent plan, but with a cut stone exterior, of the heaviest possible character, much more suitable for a jail or bank than for a museum of the nature of the S. K. M., and the ludicrous effect of this building in juxtaposition with the present building, on Exhibition road, (designed in light Italian Renaissance style, and constructed of brick and terra cotta) the Natural History Museum and the Imperial Institute, can easily be imagined. It was not accepted.

Surrounding existing conditions were entirely ignored by this competitor, who apparently had well in mind the effect of climatic influence, yet had the expert in the cases of the above mentioned buildings selected designs in keeping with the climate, the design of "English Tradition" would undoubtedly have been a close competitor, as with one exception the other designs were to my mind quite unsuited to the English climate. Thus it is that the successful buildings are those of strong substantial design, emblematical of the climate, and we all know how eminently successful many of them are.

The foregoing has led up to the importance of considerably surrounding conditions in designing, a question of course of first importance, and yet frequently ignored; many instances of the success of adopting it, and of the failure by neglect of it, could be sighted, but one occurs to me which will illustrate the latter. An architect having under way a city building of importance in London, observed when his building was showing well above the hoarding, that preparations for rebuilding were being commenced in the adjoining premises. He very courteously on discovering the identity of the architect, wrote to him offering to send him a set of plans of his building, so that the neighboring architect might govern himself, in finally deciding upon his exterior, materials, skyline, etc., etc. This gentleman unwisely returned a reply that he had already determined upon his design, and he did not contemplate altering it. The result, as might be expected, was an anomaly; the last built building being of less importance, like its architect, was completely overpowered, where a little care and judgment, might have made an harmonious whole. English method in the use of materials, both with regard to appearance and construction, requires little comment; its excellence in each direction, and more especially the latter, is or should be well known.

Color as applied to interiors, is like all exteriors, usually very quiet, probably another effect of the climate; of brilliance and sparkle, there is none; the grandeur of the weather stone, or the rich glow of the oak, black with age, is more to be noticed than lavash coloring or gilt, so much seen in the neighboring Republic, France. Go from the parish church to the Cathedral, from the Mansion House to the College Halls of Oxford, from even the most brilliant theatre, to St. George's Hall, Liverpool, and color will be found used only in a quiet way.

Of planning I have nothing to say, except that in almost every case, as it should be, the elevation is made of minor importance to the plan. Of "English Methods" in construction, there are many to comment upon, and some perhaps to criticize. Foundations are nearly always of cement concrete, and in most if not all cases, the concrete is continued about 8" thick under the whole building; whether basements are excavated or not, the ground beneath the floors is covered. Damp proof courses of asphalt or slate, are built into the foundation walls, below the point on which any wood-work rests. Dry areas with heavy retaining walls are constructed around all buildings so that no foundation walls come against the earth, and these are carefully drained. Perhaps one of the most noticeable instance of the use of concrete as a foundation, is under the Victoria Tower of the Imperial Institute, where the masonry starts from a block of concrete 40 ft. square and 18 ft. thick. Coke breeze concrete is largely used for the construction of fire proof floors, staircases, etc., and from its lightness is much to be commended, and might be used in this country with good results.

The grandeur of English stone work is typical of the country. Here is no sham, no paving slabs on edge, every stone laid carefully on its natural bed, and where backing of brick is used, it is generally indicated on the face, as in one large public building constructed of Portland stone, where the architect has caused two courses of brick to be carried around under the main cornice, and on noticing this the observer is not surprised to see that the interior courts are walled with brick, and realizes at once the nature of the building. Stone hanging staircases, worthy but difficult of imitation, are frequently to be seen, cornices and ornament which would naturally be stone, are stone, not copper or iron painted in imitation. Finally, enough cannot be said of the beauty and durability of stone groined roofs of which so many are seen. In such things is the secret of England's supremacy, and when will our capitalists learn the advantage to the country, to themselves and their posterity to be gained by investing sufficient money to guarantee the substantial and lasting character of their buildings.

Wood, as applied to heavy construction and joinery, is used regardless of expense; when applied to roof trusses, etc., the timbers are always of far larger scantling than calculation shows to be necessary, but the Englishman says 'we will be on the safe side," and doubles it, and none but good results can arise from this, though there may be an apparent waste of material. The idea of our slow burning or mill construction is, I suppose, taken from the construction of the floors in the average country residence in England, as they are constructed on the same principle.

Of steel or iron construction as applied to architecture, this is to be said, that if the building is of any importance an engineer is called in to assist the architect, and if the building is of minor importance, it were better that the engineer had been called in, or the metal left out, for English architects do not profess to be engineers, and what we consider of first importance here is entirely of secondary moment there.

In sanitary science the Englishman now, as always, sets us an example from which much can be learned. The system of carrying all soil pipes on the outside of outside walls is a good one, and though it is said that our severe climate prevents our adopting this principle here, it is likely that we will come to it in some form eventually. Perhaps a well ventilated brick flue might be constructed to contain these pipes, but something ought to be done to get them outside of the building.

The disconnecting chamber is another excellent device used by English architects. A chamber about 3 ft. cube is placed in the ground in close proximity to the building, and into this the main drain and all connections are brought. The main pipe is halved from where it enters the chamber to where it leaves it, and the cement bottom is sloped up to the sides from the top of the lower half which forms a trough. At the outlet of this pipe has a double trap with a cleaning eye, and at all angles a cleaning eye is placed. The disconnecting chamber has an air-tight cover, and is constructed of solid masonry. Ventilation pipes are taken from it, clear above the buildings. Sink wastes, and main water pipes are made to discharge in the open; the pipe is severed, and discharges on a grating, covering a trap leading to the pipe which connects it with the disconnecting chamber; the latter in the case of a sink is always a grease trap.

Lavatories are, when the money to be expended allows, luxuriously fitted up, second to none which I have seen in any country, and in this respect, the lavatories for the public use placed beneath the pavements in many of the principal squares in London are not far behind. New York and Paris have much to learn in this way.

The heating of public and private buildings has of late years been receiving more attention from English architects. The old open fireplace is found inadequate, or the hardy Saxons are losing their strength, but perfection or even semi-perfection which we Americans have achieved in this respect, has not yet been reached by the Britisher at home.

Great perfection is reached in the ventilation of large theatres and rooms of assembly, however; in the modern theatre the top gallery has just as pleasant an atmosphere as the pit.

In the preparing of drawings the thorough methods of the English are again evident. More care in drawing and correctness of scale, with a smaller number of figures and notes is a feature. Some architects prepare working drawings at one sixth scale, the object being to prevent mechanics roughly scaling off with a foot rule and forcing them to use a proper scale, which gives them the exact dimension. Full size details are all carefully drawn and inked in on good paper and on small sheets if possible, none of the unwieldly rolls of full size details, so common here, are ever seen in England. Half inch or inch scale details, of all facades are always provided. Perspective drawings are beautifully finished and care is taken to have surrounding conditions accurately drawn. Each working drawing bears the reference number of the job, the drawing number and date of making, and a book is kept in the office with a memorandum of when and by whom each drawing is taken away. Sun prints are used a little, but not universally. Specifications are written and quantities estimated by a "Quantity Surveyor" for whose payment provision is made by the contractor.

Of professional practice in England, it is at once apparent that the profession is on a sound and excellent footing. The R. I. B. A. has done much good work, and its examinations offer a test of knowledge which is eagerly sought. The exertions of the late Mr. Street, combined with those of the Royal Institute, have done much to adjust the former trouble with competitions. Some fifteen hundred architects signed a memorial, promising to abstain from entering any competition, unless a professional adjudicator was appointed. The result of this was at once seen and the young practitioner has since had a better chance of becoming established in practice. Surely with our Association, it would be easy for us to arrive at this result, and I trust before long to see something of the sort done, and every architect must see that the final result will be for his own good and the good of the profession. Another evil which threatens to upset the profession in Canada, if not remedied, though not so apparent in England, is that of cutting rates of commission. Members of the R. I. B. A. sign a declaration

*Paper read at the fifth annual convention of the Ontario Association of Architects.

not to cut rates, and Toronto has a Guild which, it is reported, requires a similar qualification for membership. This, however, governs only a few, and a movement which will cover the whole field is sadly needed. What is an architect to do, when one would be or erstwhile client, after another says, "Well, I should like to have you do my work, but Mr. —— offers to do it for one and one half per cent., and unless you can meet that I will employ him?" In England capitalists realize that it is false economy to employ a cheap rate architect, and fortunately many of our capitalists do the same, but the evil is a full fledged one and will be difficult to correct.

In addition to the Royal Institute, London has an Architectural Association, and those students who are members of this have an opportunity of visiting works of importance, in company with competent lecturers, and many other advantages in preparing themselves for practice.

In conclusion, I cannot do better than to recommend every architectural student to include in his career a course of study in England of English methods; very few of them have been mentioned in this meagre paper.

POINTS ON ACOUSTICS.*

By David Gunn Baxter.

Acoustics, the science of sound and hearing, it is to be regretted, is but dimly understood. We are groping around in the dark, following a will-o'-the-wisp that we seem seldom able to catch, and when we do catch it, it appears more by chance than by a previous certainty of scientific fact.

Instead of using acoustical science as the primary basis in constructing the design of a public speaking place, we too often leave it to a mere secondary place, letting it take care of itself, and apologizing for bad acoustics by an artistically proportioned or decorated interior.

In this paper I shall not delve into theory, but rather glean over some of the principal points in practice. In designing a church, theatre or public hall, the first consideration should be proportion, length and breadth, with galleries, to seat our required audience, and proportionate height of ceiling to accommodate all. Saunders' experiments give as a result that an ordinary speaker, in the open air on a still day, may be heard distinctly 92 feet in front, 75 on each side and 31 behind. Wren, however, claims less—his observations giving 50 feet in front, 30 on each side and 20 behind. It will thus be seen that the circumscribed area will seat, roughly, about 1000 people. This area being enclosed, and galleries inserted, as many as 2000 persons might be accommodated; and allowing for conduction and retention of the sound waves, we might increase the area to accommodate 4000 or more.

Large buildings may roughly be divided into two classes—1st, those in which the audience hears by direct radiation only, such as theatres or music halls, when high shallow rooms are advisible; 2nd, those in which the audience hears by conducted radiation, such as cathedrals or other large churches without galleries, when long low buildings are best. In either construction it is bad policy to have the auditorium contain any more air than is absolutely necessary. The more air there be, the more vocal exertion necessary to set it in vibration, and for ventilation have good quick circulation, preferably from the speaker to the rear, or what is still better, use the "plenum" system, which is exceptionally good, on account of the heavier sound wave produced in the slightly condensed air.

In designing an auditorium to seat a given number of persons, a certain floor area is required, but how to divide this required area into main floor and galleries, to come within a proper proportioned width and length, and what shall be the contour and height of ceiling, are indeed vexed questions, calling for a great deal of personal observation and ingenuity; bounded by no iron rules, governed by few fixed laws, affected by the restrictions of site and finances, these limitations, together with the whims and caprices of the proprietors, makes the problem to the architect indeed a difficult one.

For lecture and school rooms a height of 2, depth of 3 and breadth of 4, has proven extremely satisfactory, the speaker being on the longest axis. For small churches, court or other rooms, where the speaker is on the shortest axis, a height of 1, width of 2 and depth of 3, has proven good.

On account of the nodal points established by the columns in nave and aisle churches, a length of 4 to 5, width of 2, and height of 1 to 1¼, works well; this is for cubical contents, but on account of the lower ceiling in the aisles, the nave ceiling may be greatly increased in height over the above proportions. On account of limitations of site, no definite rules can be given for theatres; generally speaking a height of 3, breadth of 4 and length of 5, is satisfactory. Many successful Chicago theatres are of this proportion.

In all buildings for public speaking, except perhaps cathedral churches, floors should be constructed on the isaconstic curve plan, straight slopes being as bad for sighting as a level floor, and if anything, worse for the passage of the sound curves.

Ceilings greatly affect sound; where flat, they should never join the walls at right angles, but in sweeping curves or coves, and are best lightly panelled; skylights, if introduced, should have a sash at the ceiling line to cut off the contained air, which, starting in a sympathetic vibration of its own, would cause an echo, or if not, would form an eddy, much to the detriment of the free passage of the sound. If possible, it is well to bring down the ceiling on a regular curve or jogging slope, as low as possible above and behind the speaker. This considerably reduces the volume of air to be set in motion, eliminates all chance of echo caused by the eddying of sound vibrations at this point, and directs the waves out into the hall. In theatres, a line should be drawn from the top of the procenium arch to the top of head room over the highest gallery at the rear wall, and the ceiling kept on this line—of course not a straight slope; cut the ceiling up into steppings, coves and panels. This helps artistically, and also breaks up the continuous reverberation which would cause echo from the rear wall. It is also advisable to have theatre ceilings follow the curve of the proscenium arch for some little distance out, at least as far as the last box. Vaulted ceiling churches are exceptionally good for speaking in. The ceiling breaks up continuous vibration and the columns help to direct the sound forward, by forming nodal points on which the sound curves turn.

Walls have no mean part to play in the acoustical properties of rooms. They should always be broken with slightly projecting pilasters or shallow recesses. In theatres it is advisable to draw in the walls at the boxes, at an angle of say 45 degrees or even longer; this contraction at the proscenium, together with the sloping ceiling, gives the interior a speaking trumpet or funnel shape, which is extremely easy to speak in. Like the expansion of the circles produced on still water by the dropping of a pebble, so also do sound waves expand as they recede from the speaker. In addition to this, all air space is cut off where it is not required and where lines of sight die out; the less air to be set in motion the easier it must be on the speaker.

Galleries are never good when of excessive projection; the greater the projection the higher they should be. The ceiling underneath and the floor below should on section be shaped like a wedge, not generally as is the case, small end out and big end in, but with wide end out and narrow end in, thus counteracting the absorption of sound by the soft clothing of the audience, and the gradual lessening of power in the sound as it recedes from its source. Besides, this shape is a great gain in structural strength, the only objection being, of course, ventilation, which is extremely hard to perfect in this construction, especially if the gallery be low.

The proper location for the choir in non-ritualistic churches is hard to arrive at, and varies with whims of the proprietors altogether too much. In front and below the preacher is not admissable for several reasons. They should not be behind him and on nearly the same level, for a great deal of effect is lost from the discourse by the preacher being surrounded by a halo of beaming femininity; therefore I incline to believe that a choir is better when raised up above the speaker's head and placed in a groined recess. This form raises up the volume of choir sound above the heads of the congregation, and there being a recess, the tendency would be for the sound to travel in a greater volume and farther ahead

In designing ritualistic churches, care should be taken that the chancel arch does not project more than a few inches on each side of the walls on the chancel side. If the chancel width be contracted very much at this point, the sound therefrom will be greatly muffled and appear flat and dead.

The orchestra in theatres should receive careful consideration. Around it resonant materials should be used, and the shape must be such that the sound will be directed up and out over the audience.

All buildings present obstacles and auxiliaries to the passage of sound and the direction of it properly over the audience. In designing, auxiliaries can often be introduced, but as they are of doubtful result—doubt, not only as to their proper working, but that they will not prove formidable obstructions—it is advisable to discard all experiments thereon and confine our attention to the elimination of as may obstacles as possible.

A great deal might be said about what materials are best to use on the surface of our work, and what are not. Thin pine boards in long lengths are exceedingly good; or in plaster work, I know of nothing better than 'Adamant,' on account of its extreme hardness and uniform elasticity. Any soft covering is never good, as it deadens sound by absorption. Walls and ceilings vibrate in unison with the vocal chords of the speaker, and any lining which is resonant and elastic enough to keep up a sympathetic vibration throughout the entire wall or ceiling length is only admissible for use, preference being given to such materials as are capable of sustaining or augmenting the vibrations. Again, in rooms where an echo is perceptible, while the room contains its full capacity of auditors, a judicious use of drapery or curtains will generally remove it. If these be not admissible, then some soft surface covering, over that part or surface which causes the trouble, will have the desired effect.

—In rooms where the acoustical properties are poor, to improve them resonant materials for walls and ceilings are usually good in result; often only a sounding board behind and above the speaker will have the desired effect, or it may be necessary to change the shape and contour of the walls and ceiling.

*Paper read before the Ontario Association of Architects.

PUBLICATIONS.

General Lord Wolseley makes a most important contribution to the literature of the China-Japan war in an article for the February Cosmopolitan.

Toronto Saturday Night has grown to be more than a society paper, as that term is generally understood. As a literary, artistic and social weekly, it occupies with credit an unique position amongst Canadian publications.

The 1895 Catalogue of the Toronto Steel Clad Bath Co. contains descriptions and illustrations of the various styles and sizes of baths manufactured by the Company, and numerous testimonials. The artistic appearance of the catalogue is worthy of mention.

There has reached our table in pamphlet form a copy of a paper on "Hudson Bay—Proposed Utilization of its Land and Water Resources," by Chas. Baillarge, architect and C. E., President of the Province of Quebec Association of Architects, read before the Literary and Historical Society of Quebec on the 7th inst. The paper sketches briefly the size, climate and resources of Hudson's Bay, and prognosticates that before the end of the century railway communication will have been established between Quebec and this northern territory by the extension of the Lake St. John and Temiscamingue roads. A colonization scheme for Hudson Bay is also outlined. The paper will well repay perusal.

A CHAPTER FROM MY NOTE BOOK.—BUILDING METHODS IN ROME. *

By M. B. Aylsworth.

This audience being composed of architects, the object of these cursory notes shall not be to treat of architectural styles, their origin, development or peculiarities, that subject having become threadbare. Familiarity may not necessarily have bred contempt in the minds of all, or any, but too much devotion to such study may have wrought some evil, which might here be hinted at.

Ancient architects designed the grandest and most beautiful of buildings, fitted in all parts for their intended purpose, using the best materials to be obtained and suited to the climate and other local conditions, without thinking of, or publishing the name or style of order. Classification has been the work of later students, many of whom have noted the peculiar or pleasing forms, while missing altogether the spirit of the designer.

Through superficial study of such classification the laity have become familiar with the names thus applied, and this little knowledge has endangered and retarded the development of true architecture from the Renaissance until now. The modern architect, expecting to be asked to name the style of his design, and not having the boldness to say he disregarded ancient styles, must adopt one of them, and probably disfigure the building by the incongruous or needless use of certain features, or their imitation in perishable material.

Without this supposed necessity, out of our modern requirements, resources and limitations might be evolved suitable, durable and pleasing buildings of a style that in succeeding ages might also be dignified by an appropriate name. As it is, how may this age expect to be known or described, when in turn it shall be referred to as ancient? Will there be any remains of it whatever 2,000 years hence?

Building methods, though always affecting the development of true style, have not always been so fully described as the finished form, and some of these methods, observed during a visit to the "Eternal City," will now be referred to.

During the early ages, known as the time of the kings, the building materials seem to have been wood and the volcanic rock of the neighborhood, called Tufa. Of the former nothing has survived, though Egyptian wood much older is plentiful. Of stone structures without mortar, there are portions of the walls of Romulus, the Mamertime prison, cloaca maxima, and other remains.

In later periods, probably through expeditions from the east, the properties of clay and cements became known. There are now, and have been for ages, extensive brick yards in the suburbs of the city, mostly the property of His Holiness the Pope. There is also in the vicinity a reddish clay called Pozzolani, which, mixed with common lime mortar, makes it hydraulic and very strong. The great strength of this mortar, after use in brickwork, further led to the use of concrete, out of which grew the peculiar Roman methods of walling and vaulting still in use. This was their own, and only invention, but was one of very great importance.

The Romans became a conquering nation, and amongst the spoils of war great numbers of beautiful columns and sculptures in the rich marbles, porphyry, alabaster, &c., were brought to Rome, with architects, sculptors and artizans as slaves to set them up. Through the use of these, applied to their rude buildings, arose the Roman style of applying architectural forms having no relation whatever to the construction of the building. From the interior use of these columns came the basilica, and finally the cathedral. The earliest dome covers the lower dungeon of the Mamertime prison. This is not a true arched vault, but is formed by the rapidly oversailing stone courses of the sides, until they meet to form the floor above. In this dungeon St. Peter caused water to spring out of the solid rock, so he might baptize his jailor. The spring is still flowing, whether St. Peter was ever in Rome or not. The cloaca maxima is probably of later construction, and is a circular tunnel of true arched stonework. All later vaulting is either of brick rims on edge and keyed, or brick simply bedded flat in cement, or they are formed entirely of concrete, in which gravel, broken stone or brick and even lumps of clay are used. Over church naves and similar structures, the form is semi-circular, but over ordinary rooms is elliptical, often very flat and thin, wasting no height. The haunches are always levelled up at the same time, and when all has set with the walls, it is like a solid stone. That grandest of domes the Pantheon, is merely the largest example of what was, and still is, in one form or other, the common ceiling of all ordinary rooms. It is a solid mass of concrete, tapering from a great thickness at the springing, to a comparatively thin shell at the top, and contrary to the general rule as domes are built, is flatter outside than inside. The walls of the building therefore, 20 ft. thick and also of concrete, have to sustain no outward thrust, though the span is 143 feet. These walls appear as if of well laid brickwork, an unusual sight in Rome, but this is merely for the most part a facing of brick, laid or built up along with and to retain the concrete until set. To form the better bond with the concrete, the inner brick are wedge shaped. This brick face was again covered with stucco and marble veneer, and finished with marble pilasters, cornices, balustrade and statuary, now all removed, though the massive stone portico remains, with its granite columns 40 feet high. The outside of the dome was covered with gilded tile, carried away some 1200 years ago and sometime since replaced by lead. The inside with its deeply coffered soffit, was enriched with heavy bronze plating, removed and recast, first into cannon and afterwards into the canopy, 90 feet high, over the high altar in St. Peters'. This great building has but one entrance and no windows yet is flooded with light from the circular opening in the centre of the top, 30 feet in diameter, though appearing from below not one third of that. Storm and sunshine falling through for 19 centuries, have wrought no more damage than would a single year in our climate and buildings.

Rome has no doubt passed through many building booms, and is still disfigured by many evidences of the last one, some years ago. Dozens, if not hundreds of large buildings, 4 to 7 stories high were erected, many of them still unfinished, though not perishing as they would here. These contain a great many rooms, usually surrounding a square central court, and in the case of chapels, have arcaded galleries from which the several lower stories are entered. The court is not roofed over, but is nicely paved and opposite the main entrance has always a fountain, cascade or grotto, with more or less sculpture and foliage about it, and the water flowing perpetually. The ground floor rooms opening to the street, which may be very wide or as narrow as 4 feet are rented for stores, workshops, tenements, stables, &c., the upper portions as hotels, flats, &c., and even in palaces, the second story is generally rented as tenements; the palace proper, with its higher ceilings and magnificent rooms, beginning with the third story.

In Italy no building operations have ever been carried on except by the state, the church or the nobility—the great unwashed being retainers or tenants, paying rent or not. The present nation is composed of a great many former principalities, duchies, &c., each with its royal family, and when united, some 25 years ago, from one of these was selected an hereditary king. In all these cases the title descends to all members of the family at their birth. Hence the frequent mention of princes and palaces. The only other buildings are monasteries, tombs and theatres—churches and chapels being nearly always an adjunct to the palace or monastery.

These buildings, which might be residence, museum, store or factory, are fireproof, and should be inexpensive, being constructed entirely of the commonest brickwork, with all ceilings flat vaulted in brick or concrete, the haunches levelled up to form floors of cement, tile, marble or mosaic. The mosaic floors in many museums and palaces of to day have been removed from the more ancient homes of the Caesars, and with their rich and everlasting colors blending like brushwork, no more beautiful or durable flooring can be imagined.

Balconies, theatre galleries, &c., are formed by very flat and thin arches of rudest brickwork, or of concrete, springing from light iron beams, projecting or supported. Pilasters, pedestals, brackets, cornices, &c., are also roughly formed in brickwork, the whole afterwards to be completed in stucco, adding also to their strength. After the raw brickwork has stood for a year or more to settle and season, may be for centuries, the frames are set in openings and the finishing commenced. These frames may be of pine or of marble, and may have marble or stucco architrave finish, oftener plastered jambs without casing, and never is any wood used for casings or base, floors, partitions or stairs. The effect of lines of moldings for casings, base and room cornices, in common buildings will be produced later by shading in distemper, as part of the decoration.

Though the roughest of pine is used for doors, sash and blinds, their joiner work is excellent. Inside and outside shutters are used, and casement sash in all cases. All are heavy, fit perfectly, and the hardware is of the best and most durable description. Doors of very great age may be seen, of cedar and walnut still in the raw state, with panels, 2 feet wide and without sign of shrinkage. They are not exposed to furnace heat, they are in a dry climate and uniform temperature. Large doors or gates entering the court are made in pairs, very heavy, and are thickly studded with large pyramidal headed wrought iron nails. Such doors always stand open during the day. Just at this door or passage is the office of the porter, a person always in demand, and indispensable to the stranger. In all royal palaces he is a most imposing and gorgeous flunkey, selected for his great stature, good looks and stock of ready information. He is robed in scarlet with gold lace and cocked hat, yet accepts a tip of half a lire or ten cents more thankfully than a dollar would be taken here.

Church doors are nearly always open, but are provided with a heavy padded leather hanging, to shut out street sounds and avoid the constant banging. A lower corner of this will be lifted aside by one of the beggars always at hand, who will very gratefully accept the smallest copper coin. Visitors walk about freely inspecting every part of the interior, while mass may be going on at any number of the altars, or they may be conducted by an entertaining sacristan, priest or monk to the more sacred or interesting places and objects; tip from 10 cents to a dollar.

The exterior of buildings, generally will receive a finish of stucco, grey or colored, or of marble or a combination of both, forming pilasters, brackets, balconies, cornices, &c., to represent cut stone. In Rome the object is not to deceive, but if it were it would be most thoroughly accomplished. In that climate everything is durable. The traveller going from Paris to Rome would suppose the latter to be built of stone, while going from Rome to Paris he would suspect the use of stucco, and would be mistaken in both instances. The new "Banco Romano," however, directly in front of my hotel, was being built of stone as if in Paris. The building was quite sound, even if the institution was rotten! Indeed this street, "Via Nationale," has been engineered on Napoleon's idea. It is a new street in an air line from the modern railway station just inside the walls, direct to the ancient heart of the city, cutting down hills, levelling up valleys; hiding ancient ruins and slicing off palaces, gardens, &c., doing much more damage, in the opinion of the antiquary, than can be made up for by the magnificence of this modern innovation.

Roofs are in many cases left flat, and finished in cement, the same as floors, often supporting a considerable depth of soil, with orange and other trees, gardens, pavilions, statuary, &c. Lead is used on domes and similar structures, but the almost universal roof covering, from the palace or basilica down to the farm outbuilding on 4 poles, is the common pan tile, laid to about a quarter pitch. Such roofs have wood and iron framing, and this is about the only timber used in buildings. In such cities fires are of very rare occurrence. Only in a basilica could great damage be done, while in ordinary buildings the roof might burn off without in the least disturbing the inmates below.

Coffered ceilings are to be found only in basilicas or other very large halls extending up to the roof, as when a court may be roofed over. In such cases very heavy masses of enriched wood or stucco moldings are used, colored and gilded, and the panels filled with fresco paintings. To see and study these comfortably mirrors are used. All interiors are more or less enriched with modelled stucco, gilding, glazed porcelain, mosaic, precious marbles and real or imitation fresco. America affords no opportunity of enjoying the glorious effects of fresco. Our buildings have many windows but scanty light. Roman buildings, such as churches, art galleries, &c., have no windows as prominent features, yet are flooded with light, and this is partly due to the reflecting properties of fresco. Where dust and smoke, flies and cobwebs are such disfiguring agents as with us, it is difficult to understand how those wonderful inspirations of the grand old masters can have been preserved so many centuries beautiful and perfect, while the great quantities of such work is incredible.

In our business and similar buildings large spaces are covered and built over by the use of iron columns and beams, whereas, the Roman builders use large square brick piers and elliptic arches, from which spring the vaulting. The brickwork is always covered. A very few recent examples of excellent pressed brickwork may be seen, but its foreign extraction and aspect are painfully apparent. Stores usually consist of one or more cavern like rooms, with arched opening toward the street, the plate glass of doors, etc., held by the slenderest lines of wood or metal, more like show case construction. Rome has, however, one large departmental store block, with light all around, of modern design, but of Roman construction. Stairs, when not marble or other stone, are built of brick and finished in stucco to look like marble or alabastar, with balustrade in same finish or of iron.

Rome having a church for each day in the year, and a few to spare, and all of the same faith, not much church building is now in progress, though perhaps not one of these can be said to be completed. Work may be going on continuously, as for instance the mosaic in St. Peters, or may be resumed at intervals of possibly a few centuries. They are mostly built in the manner described, of raw brick work, with barrel vaulted nave and transepts, with central dome, cross vaulted aisles and the whole buttressed by dome covered chapels. The interior, and especially the chapels, may have received the most extravagant finish and decoration, in numerous instances costing millions of dollars, while the exterior remains raw brickwork, apparently a ruin, though many have at some period had stucco or stone fronts added as a veneer, by Michael Angelo or others of the old masters.

St. Peter's dome consists of an inner and outer shell of brick and concrete, the ascent being between them by steps of brick formed on the inner shell, even the lantern being similar. The ball on top and supporting the cross, is of copper over an iron frame, and into it may ascend comfortably 12 men at the same time. The ascent to the main roof is by a brick paved spiral incline, so easy and roomy that in a similar ascent in the tower of St. Marks, Venice, Bonaparte and two of his officers rode their horses to the top. It has been stated in print that on the roof of St. Peter's is a village of several hundred workmen, with their families and even domestic animals, gardens, &c. This is not true, though there might be plenty of room. In the vatican palace adjoining there is ample room for the 600 Swiss guards still maintained by the Pontiff, besides other hundreds of his subjects still remaining faithful. In St. Peter's the great number of large altar pictures, once frescoes, have been carefully removed and pieced together again in frames, to enrich other churches and museums, while their places have been as gradually filled in with the same pictures reproduced in everlasting mosaic, of which the greatest production is carried on within the vatican. The great dome and its lantern are now also entirely lined with mosaic. The tombs of many of the popes in St. Peters are magnificent groups of sculpture, but Pius IX at his death directed that his body be laid in a lower chapel of St. Lorenzo, outside the walls of Rome and leading down into the catacombs. He desired no monument, but to be interred in the simplest manner, just facing the tomb of St. Stephen. His wishes were carried out, but are now being disobeyed in this manner. The whole interior of the large apartment is being lined with mosaic, in which is interwoven the coats of arms of all the Bishops in the world, a most elaborate work and costing over a million dollars. In speaking of the richness of these churches it is to be remembered that the interiors are referred to, and particularly their chapels and altars, where are to be found many of the masterpieces and richest gems, gathered into Rome during all ages and from all quarters of the globe.

The largest churches are generally basilica in form, with a great variety of columns, &c., from ancient temples. The most beautiful is St. Paul's, outside the walls. Its flooring and rows of immense columns are of highly polished marbles. The ceiling of the nave is in coffered, decorated and gilded panelling, while the triforium bears large medallions of the whole long list of Popes down to date. Here are also the most beautiful cloisters of the Roman church. Though stained glass is not usually a prominent feature there, this church sustained the loss of half a million dollars worth of it, caused by the explosion of a powder mill in the vicinity a few years ago. In St. Peter's are placed twelve beautiful columns from Solomon's temple, and from their form are modelled what are called easter candlesticks. The past and present, pagan and Christian, are so visibly blended everywhere there, that nothing need be doubted. Why spoil the charm? The citizens of Trastevere, a certain quarter of Rome, claim to be the pure and undefiled descendants of one of the prehistoric tribes. On certain opposite street corners are situated exact pairs of churches. Several churches are closed except on the festival of the patron saint. In the city are no less than 80 churches dedicated to Santa Marie.

There are now at least a dozen Protestant church communities, only one having a building deserving notice, the English church, a design by Mr. Street. These are but little known to the Romans, and probably few would know whether the term referred to Christian or pagan! though there is a Protestant cemetery also.

One ancient tomb, known to be 1900 years old, is a perfectly preserved pyramid of white marble, externally, at least, 116 feet high. The greatest of the Egyptian obelisks are set up in the various squares, the largest 104 feet high, or with its pedestal 153 feet, and first erected 34 centuries ago.

There is usually little or no provision for warming buildings, except that supplied by fire places, and as foreigners demand fires, stoves of the most useless character are set up in their rooms, and frequently may be seen small smoke pipes carried through the outer walls in rows at each story. The better houses of course have stationary cooking ranges and more or less plumbing. Instead of the American self-feeder may be seen specimens of what are known as Dutch stoves, very high and built of decorated, glazed porcelain. A fire started in one to-day might begin to warm through before next week. For warming the hands and for cooking purposes, the portable brasier is common. Hundreds of tenements have never had a fire in them for any purpose. A brasier of coals on a tripod, in the street serves to do the cooking for a neighborhood.

The fuel is generally charcoal, or mulberry twigs, cut off with the silk cocoons, dried, and sold in bundles like sheaves of grain. An amusing sight on a country road, is a load of these bundles, looking like a load of hay, moving along with no visible team or waggon, but on close inspection may be seen the slender legs of a donkey on whose back the load is bound.

Hot baths are not so frequently required in so clean a climate, and are an expensive luxury, demanded only by the foreigner. Hot tea or coffee is hardly known amongst people where wine is the common poor man's family beverage. It might be here remarked that the license system so requisite among better regulated people, like ourselves, is unknown in those benighted countries. Wine and oil, staple articles, and forming the stock of certain shops, are sold as freely as tea and butter with us. There is no saloon or hotel bar, no treating, and though everybody drinks there is absolutely no drunkenness.

Plumbing appliances are scarce and crude, water even not being supplied into all residences—in fact it is little used except by foreigners. On the other hand, there is most extravagant abundance for fountains and cascades, perpetually flowing, and mainly through the ancient aqueducts. There being no expensive pumping plant to maintain, there are no water rates. With no frontage tax, a prince may have a street front all around his house. There being no money in supplying water to citizens, and no further power being in demand for fleecing visitors, the aqueduct promoters retired in disgust and gave up the ghost some time ago. Happy citizens.

Neatly built and well kept public conveniences, attended by females, are to be found in all public squares, parks, &c. But one very frequent convenience for men only, and to which the fastidious foreigner does not soon become acclimated, is the immodest urinal. It is a V shaped vertical niche of polished marble, perhaps 6" deep, in the walls of buildings of any kind, on the street line, not so common on the principal streets, but generally just within the entrance to all minor streets. To the ordinary Roman it makes no difference how crowded may be the sidewalk, he exercises his privilege with a clear conscience. It is a most sanitary contrivance, being always exposed, and perpetually flushed by aqueduct water. In Naples a more offensive practice is commonly indulged in by numbers of men along the curb, any time after sunset—all filth of course being removed before sunrise and the pavement flushed.

Whatever may have been the case formerly, no city could have cleaner or better paved streets, lanes, squares, &c., than the Rome of to-day—the commonest pavement being a mosaic of small, square, fine grained stones, tooth shaped, and driven down level in coarse sand. They wear to a smooth slightly convexed surface and are easily removed or reset. Everywhere this is kept perfectly clean, and stands well the traffic which is seldom heavier than carriages or omnibuses. The sewerage system is as complete as in any modern city, the "cloaca maxima" of antiquity still serving as one of the trunk sewers, and all entering into the clay colored Tiber. At London the Thames embankment of granite is a great work, but equally so, and some higher, is that of white marble lining both banks of the Tiber, with its white marble classic balustrade and frequent steps down to boat landings. The railway merely enters the city and backs out again to the switch, burrowing diagonally under the walls into a fine large station facing a beautiful public square. No nuisance is permitted from smoke, whistles, dangerous tracks, unsightly sheds, &c. The railway there does not "own the earth," but is owned and well managed by the state. Facing the station on the other side of the square, are the extensive ruins of the Baths of Diocletian, out of which have been partitioned a monastery, hospital, college, museum, a large portion of the public square and two churches, one of which was the work of Michael Angelo, who utilized the ancient granite columns as they stood, 40 feet in height.

It seems strange in this age that any city should depend on defensive walls, yet such would seem to be the case with nearly all Mediterranean cities. It is hard to realize that these peacable, kind and courteous Italians, who became a free and united nation only 25 years ago, have scarcely ever known peace during the past 25 centuries.

In all the Mediterranean countries nearly every elevation of rock, hill or mountain has its pinnacle of ruined castle, fortress or monastery. In certain cases these have continued to be inhabited within their enclosing walls, which seem to have been built to keep the houses from falling over the cliff, but probably to make it interesting for a surprise party of the neighbors. As population increased, and spread out over the plain below, new and more extended walls were built, and thus grew up walled cities, nearly all retaining the monastery within the citadel on the highest point. In one place, Orvieto for instance, as approached by rail from either direction on the plain, nothing of the city can be seen but the ancient grey stone walls, crowning the escarpment of the rock, several hundred feet above. Leaving the train and station, instead of taking a cab or bus, the traveller enters the car of an inclined railway, or "funiculaire," and is shot up through the rock tunnel under the walls and landed in a public square, then taking a cab to his hotel. Here "no architect need apply," for though "all alive," there has been no new building done for 500 years. The object of a visit here is their wonderful old cathedral, an example of early Italian gothic, the west front of which is said to be the grandest polychrome in existence, and in the blaze of the setting sun is certainly a most gorgeous spectacle.

The oldest walls of Rome, built of Tufa, without mortar, enclosed a square on the Palatine Hill. Its founder, Romulus, was nurtured by a she wolf, in a cave, still shown in this same hill. A bronze image of the wolf, partly corroded away, was found at a later date in this cave, and is preserved in the Capitoline museum, in corroboration of the legend. In later times each of the seven hills was enclosed by its separate wall, and finally all became incorporated as a happy family, within one enclosure. Portions of the ancient walls still remain. The present walls, built of stone, concrete and brick, and dating back some fifteen centuries, are about 50 feet high, 12 miles in extent, and entered through 12 gates, a few others having been walled up. The population, said at certain periods to have been two and a half millions, is now

*Paper read at the fifth annual convention of the Ontario Association of Architects.

about 350,000, or double that of Toronto. Considerable of the area is at present without buildings showing above the surface, while on the campagna, outside the walls, and without the aid of the local improvement humbug, speculative builders have ventured largely and lost all.

It is difficult to explain how the ground level has varied so much at different periods, and how so much of art and architecture has been unearthed in recent times, but there the facts are apparent, and explanations must be made to fit. The pavement of the forum and "sacra via" are some 40 feet below the level of the streets surrounding the excavations. In many cases comparatively ancient buildings stand over others that form a sort of basement, and even others as sub-basement. In the grounds of the modern residence of a prominent photographer, one can descend through three stories of an ancient palace, and this portion of the city, until recently, had been for centuries a public common. Vast stores of ancient art have, at various times, been dug up, and no doubt many times more still remain buried, to recover which would necessitate the destruction of the present city. The work of excavation is for the present at an end, and so is this paper.

THE ÆSTHETIC UNITY OF THE FINE ARTS—MORE ESPECIALLY IN RELATION TO ARCHITECTURE.*

By Hamilton MacCarthy, R.C.A.

It is only necessary to preface my remarks by saying that I address you as an artist to artists, in the broadest and most catholic sense of the term: fellow-worshippers at the shrine of the beautiful in nature, who feel their dearest ambition is to capture a ray of her glory, and crystalize it into some form of art, which may reflect its refining influence for the good and happiness of mankind, and be an incentive to virtue and noble deeds!

In speaking of architecture, it is not merely in its constructive sense of building, but the conception and creation of such edifices as claim to possess elements of grace and beauty, dignity and attractiveness, which should elevate the soul of the beholder and be a joy forever.

God created man in his own image—body, soul and spirit—and the first mental activities the primitive creature put forth were to build his rude habitation, carve ornaments on the door sills, color them with rude pigments, and chant his dirge or war song. This imitative activity was the Genesis of the arts of design: painting, architecture and sculpture, together with poetry and music—making the five sister muses of form, proportion, color, melody and rythm—the media by and through which the good and beautiful commune with the soul of man and satisfy his intellectual cravings. And are not these faculties intimately connected and associated with each other in their highest aesthetic fulfillment by some hidden mystery, not yet revealed—the principle underlying each being one and the same?

An apt figure of the five sister arts, their intimate relationship and interdependence, suggests itself to the mind in the structure and vocal organs of the human body:

1st. The skeleton—that wonderful mechanical arrangement upon which all other parts depend, combining, as it does, economy, lightness, strength and ingenuity, suggesting the building or architecture:—

2ndly. The outer covering, i.e., the muscles, giving the contour of form beauty and motion, expressed in sculpture:—

3rdly. The color and texture of the features and the skin, represented in painting.—

4thly and 5thly. Speech and vocal sound; the organs of poetry and music. Here, then, is the perfect model, set up by the Divine Architect, the synthesis of the fine arts, comprehending or embracing color, texture, form, harmony, melody, rythm and proportion—a living expression of the beautiful in mind and matter.

In the language of the immortal bard: "What a piece of work is man!—how noble in reason! how infinite in faculties! in form and moving how express and admirable! in action how like an angel! In apprehension, how like a god!—the paragon of animals."

Before leaving the masterpiece of creation, as the type or ideal model of beauty, examine for a moment his component parts: The osseous structure called the skeleton, marvel of economy and strength for the burden imposed upon it; the cranium, with its dome and arching brow, exquisite precision of sutures that join the skull; the vertebrae, ribs, pelvis, condyles of the limb bones, with their perfect ball-socket joints. Here is fitness and utility, though not necessarily beauty; yet models for the builder and mechanician in this age of steel.

It is when we consider the myology or muscles that life and beauty are apparent, and both architect and sculptor have been inspired with the perfection of form for their models. The design of the Greek and Roman mouldings is evidently in spired from the profile of the face, mouth and chin; the gently expanding and tapering columns from the limbs; the groining of the ear, chiselling of nose and nostrils, have also influenced design in architectural forms. In woman, though less powerful than man in structure, the still more graceful curves of form present a veritable incarnation of unspeakable loveliness. Thus we see form in its highest type, which receives its consummation in its texture or outer covering, the skin, the human epidermis, as seen on the cheek of a beautiful woman, combining and blending, as the painter learns, every delicate and luscious tint with the bloom and down of touch—a setting indeed for that incomparable jewel of all, the eye—the soul's window. In color and texture added to form, we reach the absolute—the highest æsthetic ideal of beauty. This trinity in unity, of color, texture, form (form including proportion), constitutes the essential and inseparable elements which the master builder has incorporated, and shows the relation and dependence of each upon the other, to express a perfect *ensemble*, each of the links being a *sine qua non* to the success of the whole; and without which neither the sculptor, painter, architect nor poet, can create his airy palaces or pourtray his themes of lore.

Bulwer well appreciated this unity in the elements of the beautiful in Claude Melnotte's description of the home to which he would take his bride could love fulfil its prayers.—"A palace lifting to eternal summers; its marble walls from out a glossy bower of coolest foliage; musical with birds, whose songs should syllable thy name. * * while the perfumed lights stole through the mists of alabaster lamps, and every air is heavy with the sighs of orange groves, and music from sweet lutes, and murmurs from low fountains that gush forth in the midst of roses!"

What is the principle in design that predominates in the human form and runs all through nature? It is a succession of curved lines of varying length, entirely free from harshness, producing to the senses a feeling of blending, melody, buoyancy and harmony.

Beauty's wave in human form,
In rose or lily, bird—
In womanhood transcends all things,
'Twas always so, I've heard!

'Twas so in ancient days, when Art
Sat graceful on her throne,
And gave her sons that curious line,
True artists love to own. —*Extract.*

*Paper read at the fifth annual convention of the Ontario Association of Architects.

The religion of the ancients required a habitation in which to worship their deities and store their *lares* and *penates*, and from the four walls of mud and wood, or brick or stone, grew the temple. Ornament, columns and capitals, were added; then the gable broke the monotony of the horizontal. Color followed. The beauty of texture was absent, till marble or an imitation filled the want. Still life was not there—human life. At length the sculptor's chisel and painter's brush filled the pediment with the deed of heroism, and enriched the walls with polychrome. Finally the temple became a work of symmetry, power and beauty; every member was studied with regard to optical value and refinement—carving, gildings and tinting drank in the glorious hues of the prism, which shone refulgent upon its harmonious proportions.

The life of action and deed of valour were implanted there in the metopes and friezes. The magnificent Quadriga and Acroterion statues adorned the angles. Caryatidae took the place of columns; finally the temple became clothed with the matchless genius of Phidias and Apelles—fit habitation indeed for the crowning glory within, the shrine of the god Zeus or Athene in Chryselephantine. Gold, ivory and precious stones; what would Homer have said had he seen these wonderful achievements in Art.

It was centuries before, he sang of the god:

"He said and nodded with his shadowy brows;
Waved on the immortal head the ambrosial locks,
And all Olympus trembled at his nod."

Remember, it was not the intrinsic value of the material that made the masterpiece. Its value lay in its incomparable embodiment of benign beauty and sublime expression. The genius of Phidias, appreciating the importance of aesthetic unity, at once saw that even marble failed, beautiful as it was, to fulfil the highest ideal of texture as representing the flesh, and so chose ivory—which of all material bears the closest resemblance to the human epidermis. White marble is beautiful when fresh from the chisel, but without great care soils and loses its appearance, till old age or time has turned it into the color of ivory, like the Venus de Milo in her hallowed shrine in the Louvre, or the memorials of old-gold hue such as are seen in Westminster Abbey, or the Elgin marbles from the Parthenon and now in the British museum—the latter cut 438 B.C.

The true artist or dilletanti, who has drank the nectar from those gods of form and beauty, Phidias, Myron, Scopas, Polycleitus, Praxiteles, and others of the age of Pericles, can only contemplate their works with wonder and fascination at the supreme mastery gained by these sculptors of the human form over their art, yet mingled with regret that so few examples have escaped the bands of the iconoclast and the ravages of war.

We who have worshipped at the feet of Hermes, Aphodite, the Discobolus, the Gladiator or the Illisus, or the other masterpieces that adorn the Parthenon, feel that this is not the occasion to enter upon the various merits of the works of those great artists. They have been of incalculable value to art and history. They tell the story of their age. We acknowledge them to be the absolute and immutable standards of physical beauty; the ideals for the artists and dilletanti of the world.

The pediment of sculpture expresses at once grandeur, power and life, and it is to be regretted that architects of the Victorian era have not been more inspired with the use and possibilities of statuary—the most profound and longest enduring form of Art—especially in connection with public buildings and monuments, in which the nation's history should be indelibly written.

And how have we of the 18th and 19th centuries treated the classic orders? These forms of architecture have been largely used for public buildings, both in Great Britain and America, but what relation have they borne to their ancient prototypes? Where are the sculptured pediment, frieze and metopes of beauty and action, once instinct with life and imagery?—the tinted walls and colored story? They have departed; the sheen of the rainbow has gone from the classic mouldings; texture of marble, mosaics, encaustic and polychrome, all, omitted; Phidias and Apelles are banished; the temple has fallen. The diadem has been torn from her brow, the jewel from her breast—the robe of beauty replaced by sackcloth and ashes. The skeleton alone, in dingy grav or blackened stone, is all that remains to us moderns to help us to imagine we are beholding a noble Greek or Roman columniar edifice, and to enthuse about. Surely an anachronism in art!

With the extravagance and luxury of Imperial Rome, the purity and beauty of Greek sculpture were lost, and with Rome's final destruction all art was extinguished, except that of the monks.

From the Byzantine and the Basilica evolved the Gothic, an entirely new departure. No doubt the minaret was the progenitor or archetype of the spire and tower; but the principle underlying this remarkable revolution from an æsthetic point of view was the overthrow of the rectangular in art. The temple, shorn of its sculpture and color, is heavy, uninteresting and depressing, and its minor ornaments, though chaste, are monotonous and severe.

Both in plan and elevation, the disposition of the masses of material in the Gothic, being modelled more after nature's ideal of form, is a blending of harmonious lines pleasing to the eye. There's nothing in nature suggestive of the rectangular. The luxuriant plant-life ornament of the early English; the clustered columns; trefoil tracery; graceful arches and groined chapels; those lofty spires seemed to break through the burden of earthly cares, and carry up with them like incense the prayers of the Christian in worship of the true God to the very feet of heaven. "Lift up your heads, oh ye gates! and the glory shall come in." This was the spiritual significance of the Gothic; and it became clothed with at least earthly glory.

Color and texture were added to form.—Marbles of every tint, mural paintings, mosaics, the sculptured niche and statues—everything that wealth and art could bestow to render the habitation of God a dream of heavenly beauty. "Gloria in Excelsis Deo."

In the revival of art and learning in Italy, sculpture and painting again took their place as a power in the world. Aesthetic unity and harmony of design were insured and rendered more potent by the fact that in so many instances, painting, sculpture and architecture were combined in the work of the same artist.

The Florentines were quick to appreciate and express their joy on the dawn of renewed artistic life. When Cimabue first taught the world to paint anew, Florence proclaimed a public holiday in honor of his masterpiece, for S. Maria Novello. Nicola Persano, Giotto, Brunellischi, Donatello, Della Robbia, Ghiberti and other architects, painters and sculptors—the progenitors of the Renaissance—brought their genius and devotion to bring about the fuller perfection which culminated in Raphael, Correggio, Da Vinci and Michael Angelo—the four pillars or archangels of that great epoch of art—and terminated in Celleni, Tintoretto, Titian and Paul Veronese, masterful exemplars of the mundane magnificence of Venice.

The Italian revival affected the purity of Hellenic form, but it accomplished something greater;—it pourtrayed not merely the perfection of sensuous beauty in the form, or sublime grandeur of the gods—the teachings of Christ were expressed in human sympathy and love, devotion and adoration, at the gift of God in his son, and the struggles and throes through which man is passing to attain eternal life. What a joyous note of hope,

of harmony, of sentiment, of love and adoration was theirs—Persano, Giotto, Donatello, Della Robbia, Ghiberti!

Religious faith was the stimulus which inspired their genius and devotion. How much is art indebted to these sculptors of the early Renaissance!

In the conception of a noble edifice, the architect has crossed the border line of a mere building—i.e., a huge cube with holes to admit light and entrance—and entered the domain of the painter and sculptor. Form, in its first stage, viz., the handling and arranging into harmony of the gross masses or masonry, so as to bring about the greatest effect of beauty and proportion; realizing a noble outline or form in the gross. The carver must now join him in decorative enrichments to make the work interesting and repay closer inspection—form in detail or abstract; still only ornament. The sculptor then takes him to a higher plane, with emblematic or symbolic figures, in *basso* or *alto relievo*, or round attached form in transition, in which the walls gently breathe the story or mind of the building, its history or purpose. No form of art is more profound, than these children of the mist emerging from fancy into reality—form in the first stage of statuary.

Every building of importance should be treated in this way, and would therefore be an object lesson and work of interest forever, not only to those who see it many times—perhaps every day of their lives—but also to the stranger; the most emphatic record of civic or national achievements, events or progress.

The Reformation gave the death knell to sculpture and ornamentation for a time in Protestant countries, till a church became bereft of all beauty. The Gothic was treated similarly to the Classic—shorn of its art—the shell only remaining, and all art suffered in consequence.

How sad it is to look upon our cathedrals in brick—not in form, but, alas,—in texture and color. It is only during the last quarter of this century that we are beginning to awake from this iconoclastic superstition and believe that we can worship God "in spirit and in truth," and at the same time beautify his house with tinted walls and stained glass, and other decorations.

Freedom and toleration are the spirit of the age, and the impulse in art is to discover something new and best adapted to our surroundings. In architecture we are in a state of transition, if not of chaos, and in danger of degenerating into confusion and ugliness. It is this critical stage that affords the opportunity for our architects to create a style that, while retaining all that is beautiful in the heritage of the past, will meet the requirements of the climate, and be distinctly national in character, ornament and expression.

Form is the first element of the beautiful in aesthetics, and influences everything we see and hear in nature and art, from the throat of a nightingale or a Patti, the melody of a Stradevarius, to the acoustics of a building, and should be the object of study from the lowest step to the highest pinnacle of a structure. In a wider sense it also affects the laying out of streets, parks, squares and gardens; the selection of a site, the raised plateau or eminence, grandeur upon which important edifices may be erected; the fountain, steps and terraced walk, with sculptured vases and ideal statuary, such as we see at the Crystal Palace, Versailles, the Tuilleries Gardens or in Edinburgh. All are form, perceptible to sight and touch, and instinct with life and power to give us joy and elevate our souls, improve our manners and relieve our daily burthens.

The modern Romanesque does not impress you with a sense of grandeur or beauty. Its basket-work ornament, unlike the longer and more graceful Gothic plant life, is indefinite and confusing, and with the horrible heads of animals called "grotesque," is barbarous. It no doubt originated in the early stages of inability to imitate life better. It is unfit for a woman to look upon, and should be banished from the front, or any part of a building where the lesson of beauty should be presented. There is a place for the conventional—but as little of it as possible. The lamp of truth in art has been extinguished so many times by wars and puritanism, that form still goes on crutches in the respect of carving and sculpture.

Foliage, fruit, flowers and other imitations of organic objects, should keep as close to nature as possible, to be of interest, due regard being paid to the nature of the material employed. Organic nature should be more largely drawn from for objects of ornament, and executed in the fulness of its natural beauty. The divine sculptor has furnished us with many noble and beautiful examples for imitation, to wit—the lion, the lion, the tiger, the horse, the ox, the ram, the hound, the deer and gazelle; the eagle, the swan, the dove and other birds; the dolphin, the nautilus, and other denizens of the deep. Many of these are symbolic; all are grand or beautiful, and as ornament in appropriate positions, would be of far greater interest than conventional scrolls, and serve to remind us of the wonders of nature.

The higher stages of sculpture proper, viz., figure subjects in relief and the statue, or group in the round form, may be termed the "lamp of life," and provision should be made for each of these forms in every building which claims to be a work of architecture. The relief has been described as the shibboleth or watchword of art, and has a philosophy peculiarly its own. It is specially adapted for emblematic figures, filling spaces in the architecture, and for special subjects in the history of the institution to which the building is dedicated, on the exterior or in positions where painting is undesirable.

The entrance and inner halls, vestibule and staircase, are suitable for natural or emblematic statuary, brackets for busts, and niches for statues of the genus loci, founder or benefactor, care being taken by the architect that light is provided at a suitable angle for both night and day.

The highest stage of sculpture has no necessary connection with a building, unless from local circumstances. It is reached in either the group or solitary figure, expressing an abstract motif, an emotion or passion, or any of the higher attributes of our being, or the elements of nature which may bear personification, or in national monuments where philanthropy, statesmanship or patriotism are commemorated.

The next important member of the æsthetic trinity is color, and when we consider the share this element occupies in the book of nature—how generously the Almighty has decked his creatures—whether our wondering upturned eyes gaze into the infinite azure of the brave o'erhanging firmament, fretted with golden fire; the jasper of the vasty deep; the carnation of the rose; the pallor or orange of the lily—each with its spiritual significance and relation to form and sound—we recognize at once the length and depth and breadth of his boundless generosity in this particular gift, and we marvel how it can be possible that in the 19th century, man should, even in his most joyous and festive moments, clo he himself in black from head to foot—a color that is always alluded to in terms of horror and associated with our worst enemy, and one that is the least seen in nature's kaleidescope.

Color is nature's life and light and joy-giver, and when its presence is withheld from us, our spirits are in like measure deppressed. To speak of her riches requires the rhapsody of the poet; to comprehend her glory, the eye and wings of the eagle, to carry us to the floor of heaven. The painter is privileged to penetrate her hidden mysteries and capture the fleeting subtleties of her ever-changing moods.

In architecture, the scheme of color decoration should receive the most careful consideration, and be in relation and conjunction with the carving and ornament in form. In all important buildings spaces should be provided in the halls, staircase and ceilings, arches and domes, for special frescoes by artists of ability, affording opportunity for tableaux of prominent incidents or scenes in the life of the country, in alliance with the objects of the building. By this means the skill of our eminent painters could be utilized for the education, happiness and intellectual enjoyment of the people. Stained glass, mosaic, furnishing and lighting, should all be included in the one scheme of design, and require the same mind and care in their use—the cardinal virtue of all decoration being strictly observed, viz., the securing of cluster and space, and repose, so essential in art.

In order to effect a complete aesthetic harmony, texture—its substance, or rather, material—has to be considered, which, of course, is involved so largely in color that the one can hardly be discussed without the other, bearing, as it does, the same relation to form as form does to sound. The ancients saw the importance of producing color and texture, and where costly marbles could not be procured, the artificial substitute approaching as nearly as possible to the semi-transparent beauty of marble was provided. Stone is the next best material, especially for carving, but cannot be relied upon to stand climatic influences, besides not fulfilling the highest aesthetic requirements. Brick, as it has been used, is an abomination, but we are glad to see improvements taking place in its manufacture. Greater size and neutrality of color, combined with a soft or egg-shell glaze, may render it much more acceptable. Under this head I may mention a material which, now existing, but not in general use, having all the beauty of texture and colors of marble, is not affected by climate.

In the brief remarks the present opportunity has afforded me, I have endeavored to show the important place *Form* occupies in the elements of the beautiful, especially in its pre-eminent phases of architecture and sculpture, and the influence it must have upon the dignity and attractiveness of a city of learning, art and culture, and as the medium of expression of a nation illustrious in noble deeds and beneficence; yet I feel the fringe only of the subject has been approached.

Before concluding this paper, I venture to call attention to two or three matters seriously affecting the beauty of our city, and which constitute an outrage to good taste and common sense:

1st. The dangerous and unsightly trolley, telephone and electric light poles, wires, &c., which should never have been erected in a city like Toronto.

2nd. The want of public squares, tastefully laid out. The objectionable mode of taxing lawns at the side of residences.

3rd. The disposition to build up our principal corners to an angle instead of to an octagon or circus.

4th. We are now erecting municipal buildings of a costly character, and if the system of building without regard to beauty is allowed to continue, the view as you ascend Bay street will be narrowed, and the Court House dwarfed by some enterprising merchants. Such a course would be worse than a blunder, and should not be allowed to take place at any price.

Many other points in connection with the aesthetic welfare of our city demand immediate attention. What is required to prevent future mistakes, and perhaps rectify past errors, is the appointment of some central authority, such as a City Architect or Minister of Public Works, to prevent the erection of unsightly buildings, and preserve important open places as gardens. Such a person or board of control should be appointed for their known taste and abilities, and they should be backed up by an association of dilletanti, both professional and lay, who would carefully guard the aesthetic interests of the city, and render it the pride of her inhabitants, the admiration of its visitors and the envy of other cities.

Brethren in Art—As the genii and guardians of the beautiful, in all that concerns the artistic progress of your country, and the cities in which you dwell, you are called upon to devote your talents, your love and your watchfulness to her service; to bind yourselves together in the Brotherhood of Art, for her defence; for the vanquishment of the Philistine and the Philistian; for the prevention of errors and incongruities, outrages to taste and beauty, frequently occurring, and which now threaten irreparable injury to the few remaining places of interest in this city; that you apply your genius to the development of a distinctly Canadian Architecture, suitable to the conditions of the country, and upon which shall be implanted in sculpture and painting, the romance and lore of her history, the valour of her sons, the beauty of her daughters and the industry and resources of her people, together with the picturesque grandeur of your scenery and skies—notes of harmony and patriotism, which shall shed lustre upon your country, inspire the poet, the musician and the historian, and earn for yourselves a niche in the eternal temple of fame.

DISCUSSION.

The President said he felt we all must have greatly enjoyed Mr. MacCarthy's admirable paper. He thought the range of subject matter in the papers read at the present convention showed the great scope of the architectural profession.

Mr. Aylsworth said no doubt the members were being educated as architects and artists, but something further was needed. He would ask, are the people at large being educated as fast as they might be to a higher degree of artistic taste? Until there prevailed a sentiment of patriotism among the people it was useless to look for the production of grand public buildings, nor without a national religious feeling could be expected noble temples such as were to be found in other lands. In his reading he had come across an extract which he would like to read. It would have been a source of great satisfaction could he have told the Convention that it emanated from the City Council of Toronto, but truth compelled him to say that it came from the archives of the city of Florence, and it was some 600 years old. It would explain to a certain extent how the durable and magnificent buildings which delighted the eye of the traveller in older lands than our own, came into existence. It was the decision of what in our days would be called the Council, after the destruction of one of the Florentine churches:

"Whereas, it is of the highest interest to a people of illustrious origin, so to proceed in their affairs that men may perceive from their external works that their designs were at once wise and magnanimous; it is therefore ordered that Arnolfo, Architect of our Commune, prepare a model or design for the rebuilding of Santa Reparta, with such supreme and lavish magnificence that neither the industry nor the capacity of man shall be able to devise anything more grand or more beautiful; inasmuch as the most judicious in this city have pronounced the opinion in public and private conferences that no work of the commune should be undertaken unless the design be to make it correspondent with a heart which is of the greatest nature, because composed of the spirit of many citizens united together in one single will."

CORRESPONDENCE.

Letters are invited for this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

EFFECT OF AMERICAN DRAINAGE WORKS ON CANADIAN INTERESTS.

QUEBEC, March 3rd, 1895.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—When I wrote you in January last, as to my surprise that our Dominion Parliament had allowed a franchise to be given by Congress without its consent, to rob our Canadian head waters of some 3½ per cent. to supplement the requirements of the Chicago drainage works on their way towards the Gulf of Mexico, I did not think that our winking at such a thing would embolden another company to so soon petition the United States Senate for an act of incorporation, with a $100,000,000 capital, to again tap the lakes in one or more than one point for commercial purposes, running towards the Hudson and New York en route for the Atlantic.

Such, however, is the case. The bill is before the U. S. Senate, and will of course go through like the Chicago bill, if no stand be taken against its becoming law.

I showed how the present capacity of the Chicago outflow towards the Mississippi is, or will be, when the drainage works are completed in 1896, not less than 1-30 or 3⅓ per cent. of the feed waters of the St. Lawrence, and how this percentage may in a few years be increased to 10, if Chicago continues to grow as it has done during the past few years.

Now each of the proposed canals of the "American Maritime Canal Co." may take, not only 10 per cent. or twenty, of our waters, but even thirty, and three such tappings would suffice to withdraw the whole of the water at present flowing over Niagara from Erie to Ontario—reducing the St. Lawrence below Niagara to the drainage of the valley of the Ontario and the water brought down by the Ottawa, the St. Maurice and other tributaries.

It may be, sir, that, as interested in Quebec, I am cutting my own throat in calling attention to this matter, as the less the flow the less the depth in Lake St. Peter, the better the excuse for ocean vessels not going to Montreal, and remaining here where we have the advantage of tide waters to cover the deficiency twice in every twenty-four hours; but, sir, I take a broader view of this matter, and look to the interests of Canada in general, of the Dominion at large, and I can conceive nothing more cool than for our neighbors beyond the line of 49, thus to attempt to rob us of our God-given patrimony, with our engineers, our legislature, looking on in utter indifference to an act of spoliation which certainly has no parallel among civilized nations.

C. BAILLARGÉ,
Member C. Ass. C. E., City Engineer, Quebec.

DEPARTMENTAL STORE BUILDINGS.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—The attempts which are being made to stem the tide of modern progress in the direction of large departmental stores will be in vain, but in one way these stores as built or altered become a menace to the safety of the surrounding community, which should not be tolerated, and which it is in the power of the community to control.

Owing to the extensive floor areas demanded for attractive display or for easy supervision, and the heaps of inflammable goods and fixtures, they are peculiarly liable to a sort of galloping consumption which seems to be epidemic in Toronto this winter.

The destruction of the new Simpson building and the attendant losses to surrounding owners, besides the expense to the city generally, is not only to be lamented, but becomes an outrage that ought to be resented, because unnecessary and preventible.

In all municipal building regulations the danger of large undivided floor areas is recognized and prohibited. Our own building by-laws require brick party walls at certain distances, limiting the floor areas, but these commercial barons do not readily submit to such wholesome restriction. They build or alter their airy castles to suit their own ideas of trade, their helpless neighbors, including the municipal burghers, meekly submitting just as to the warlike barons of old.

Now in no other class of buildings should these regulations be more strictly enforced. Let there be frequent party walls running from basement to roof, though having ample openings for display and circulation, readily closed by sliding or rolling fireproof doors. This need be no hardship, and trade would easily accommodate itself to such a requirement. Besides this, no building above the reach of water by the ordinary appliances should be permitted, unless fire-proof or fire-resisting throughout. The slight additional cost would be little enough penalty for erecting such tasteless structures, so unsymmetrical, in our streets, and so damaging to their more modest competitors.

The Simpson building was the best representative of its class in the city, a style of temple expressly designed to meet the demands of the modern mammon worshipper—the greatest display in the slenderest building. The architect deserves credit for the triumph obtained for his employer—a strong building with the minimum of space occupied by supports, and faultless in exterior detail.

But such a building is neither fire-proof nor fire-resisting; it assists the spread of the flames, it is dangerous to firemen, to inmates and to surrounding property. The new building was not only an unbroken space, but the walls of the older portions were removed to extend the view. What happened here is most likely to happen at different points in the city. Such a fire may prove a great advertisement to the large store, but no such good luck to the neighboring small fry, who are more likely to be injured by its competition and ruined by its destruction.

In all probability the phoenix will rise, a greater menace than before. If there were no remedy there might be some virtue in a calm resignation; or even if there were only the expensive method of fire-proofing, the choice of the cheaper method might be excusable. But there are a number of building methods, inexpensive, yet far superior to that now becoming so popular. The party wall of the Buntin Reid building, in stopping our second great fire, gave proof of its utility and economy. Floors and roofs might quite easily be made fire-proof at a moderate cost in more than one manner.

For the present a hint only is thrown out, but in a later issue may be given some description, showing that we need not suffer so extensively from fire if we choose to resist it.

Yours, &c.,
M. B. AYLESWORTH.

TORONTO MASTER PLUMBERS' ASSOCIATION.

FOLLOWING are the officers elect of the above Association for the ensuing year: President, Thos. Cook; first vice-president, W. J. Burroughes; second vice-president, Geo. Guest; secretary, J. K. Alison; treasurer, A. Fiddes; sergeant-at-arms, Walter J. Garratt. A Sanitary Committee was appointed; likewise a Committee to endeavor to secure a reduction of the license fee from $10 to $1 per annum.

Ontario Association of Architects

IT is intended, as agreed at the recent Convention of the Association, to give a diploma to students who have already passed and to those who will hereafter pass the final examination of the Association.

In order that a design may be obtained suitable for the purpose and worthy of the Association, members and students are asked to offer drawings. They should be prepared for photographic reproduction. The design to occupy a space 8 inches vertical by 14 inches horizontal, with a three inch margin all round in addition. The verbal matter is to be as follows:—

THE ONTARIO ASSOCIATION OF ARCHITECTS.

This is to certify that—. . . . . .

has passed the qualifying examinations required by the Ontario Architects' Act and is entitled to be enrolled as a member of the Ontario Association of Architects, and thereafter to practice as an architect in the Province of Ontario.

Dated at Toronto this day of 18

. . . . . : . *President.*
. . . . . *Registrar.*

There must be space at the bottom for the seal of the Association, which is 2½ inches in diameter, to be set on the left of the signatures of the President and Registrar.

Drawings are requested to be sent to W. A. Langton, Registrar, Canada Life Building, Toronto, not later than May 1st next.

NORWICH

Folded Paper Floor Deafener

PATENTED

Advantages:
CHEAPNESS,
CLEANLINESS,
EVENNESS,
LIGHTNESS OF WEIGHT AND RAPIDITY WITH WHICH IT MAY BE HANDLED

For Sheeting and Deafening in Houses, Offices, Buildings, etc. Insulating Cold Storage Warehouses, Refrigerators and Ice Houses.

OUR new **Patent Folded Paper Floor Deafener** is the most practical and common sense DEAFENER ever placed between double floors, on account of its peculiar construction forming air chambers, which makes the best deafener known. It is just coming into use and has already been tested by a number of Architects, from whom a number of testimonials were sent unsolicited on our part.

If you have an opportunity to use a deafener, we trust you will give this a trial, as we can assure you it will be no experiment if used properly. Our regular Carpet Lining will not answer for this purpose, so be sure the deafener is used, and not the Carpet Lining, in contracts where our DEAFENER is called for.

It is put up in rolls of 450 square feet, each 36 inches wide, and can be supplied at the factory or bought from our agents at one cent per square foot.

Any other information you may wish in regard to the material will be gladly furnished upon application to

S. A. LAZIER & SONS - Belleville, Ont.

Sole Manufacturers for Canada

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

Roofers.

ROBT. RENNIE, SR., 100 Gerrard St. East. ROBT. RENNIE, JR., 378 Berkeley St.

R. RENNIE & SON,

TERRA COTTA TILE, SLATE ROOFERS, ETC.

Every description of Roofing Slate always on hand. Galvanized Iron Ridges, Valleys and Flashings supplied.

Douglas Bros.,

SLATE, TILE AND METAL ROOFERS.

Sheet Metal Work, Metallic Ceilings, Skylights, etc.

124 Adelaide Street West, - TORONTO.
Telephone 560.

138 Bank Street, - - OTTAWA.

- - TUCKER & DILLON - -

Slate, Tile and Metal Roofers

SHEET METAL CORNICE WORKERS
CEILING WORK A SPECIALTY

78 ADELAIDE ST. W. - - TORONTO.
Telephone 2585.

Send for a copy of the CANADIAN CONTRACTOR'S HAND-BOOK. Price, $1.50; to subscribers, $1.00.

WILLIAM J. HYNES

Contractor and Plasterer

97 WINCHESTER ST. TORONTO
Telephone 3414.

Modeller and Manufacturer of Architectural and Decorative Ornaments in Fibrous Plaster and Staff.

PANELLED CEILINGS, GALLERY FRONTS, CORNICES, FRIEZES, CENTRE FLOWERS, BRACKETS, CAPITALS, BOSSES, &c., in stock or made to detail.

Works: Esplanade St. East, foot of Jarvis St.

G. DUTHIE & SONS,

Terra Cotta Tile, Slate and Felt Roofers,

Cor. Widmer and Adelaide Sts., - TORONTO.

GALVANIZED IRON FURNISHINGS SUPPLIED.

Telephone 1936.

H. WILLIAMS & CO.,

23 Toronto St. TORONTO.

ROOFERS

With Slate, Felt and Gravel; also Williams' Flat Slate Roof—the best. We lay ROCK ASPHALT on cellar bottoms, floors and walks—the best material for this work.

W. D. HUTSON,

56 Cecil Street, TORONTO.

Slate and Terra Cotta Roofing,

ALSO FELT AND GRAVEL ROOFING.

Materials always on hand.

STEWART & KILLACKEY,

Felt and Slate Roofers,

Dealers in Felt, Pitch, Tar, Sheathing Paper, Carpet Paper, and all kinds of Building Paper.

Office, 27 Toronto St., cor. Adelaide, TORONTO.
Estimates furnished. Telephone No. 698.

Blinds · Blinds · Blinds

SLIDING BLINDS, ENGLISH VENETIAN BLINDS, FOLDING BLINDS, OUTSIDE BLINDS, SHUTTERS.

SEND FOR PRICES... **SEAMAN, KENT & CO.,** Northcote Avenue, cor. Queen St. W., **TORONTO**

LEWIS SKAIFE, New York Life Building, Montreal Agent.

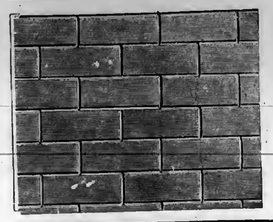
Royal Cement Plaster

Rightfully the king of all plasters.
Only absolutely perfect natural plastering material.
Your house plastered with it will be warmer in winter and cooler in summer.
As freezing does not affect it after once set, can be safely used during the winter.
Literally harder and more dense than rock, therefore impenetrable to rats, vermin and disease germs.

Costs but little more than mortar work.
Enables a building to be occupied almost immediately, saving weeks.
Manufactured so accurately that skilled labor not necessary to insure perfect work.
Easily applied by any mechanic and produces a wall hard, strong and thoroughly fire-proof.
Not a patent material made from plaster paris, glue, acids and other unhealthy compounds.
Thoroughly pure and perfect in its natural state, absolutely no ingredients used in its manufacture.

Prices made for delivery at any point.
Liberal inducements offered and satisfaction guaranteed.
All of our material is positively perfect, otherwise no payment expected.
Security, protection and profit assured our agents and customers in every respect.
This material works easy under the trowel and is slow setting, thereby preventing all waste.
Entire avoidance of cracks, bulges and other customary defects by its use.
ROYAL in name, **CEMENT** by nature, **PLASTER** its purpose.

B. L. NOWELL & CO., MONTREAL
AGENTS



TO ARCHITECTS AND BUILDERS

WE ARE PREPARED TO FURNISH

Galvanized and Painted Steel Shingles

SIDING, &c.

SHEET METAL SPECIALTIES **THE COLLINS MFG. CO.**
68 Esplanade West, TORONTO

E. F. DARTNELL

180 St. James Street
MONTREAL

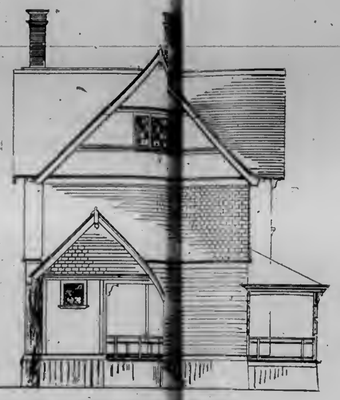
REPRESENTING

The Grafton Stone Co. . . .	BUFF AND BLUE OHIO SANDSTONE, including Block Stone, Sawed Caps, Sills, Steps, Ashlar, Flagging, &c.
The Potsdam Red Sandstone Co.	BLOCK STONE, FLAGGING, &c. Prices quoted from specification or blue print for finished work in cut stone, delivered ready to put into building.
The Crown Pressed Brick Co.	FINE PRESSED and COMMON BRICKS. Every pattern of red brick made to order.
American Mineral Wool Co. . .	MINERAL WOOL, and MINERAL WOOL SECTIONAL COVERING, for insulating purposes, &c.
Aluminite Cement Plaster Co.	NATURAL CEMENT. The best plastering material in the world.

CORRESPONDENCE INVITED. SAMPLES AND PARTICULARS ON APPLICATION.

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

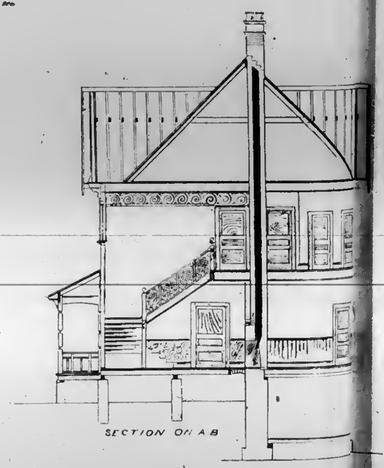
WEST ELEVATION



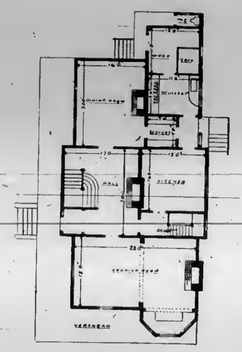
NORTH ELEVATION

EAST ELEVATION

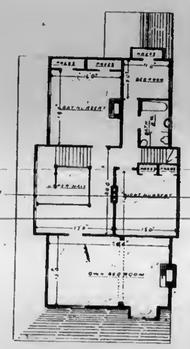
FRONT ELEVATION



SECTION ON A B



GROUND FLOOR PLAN

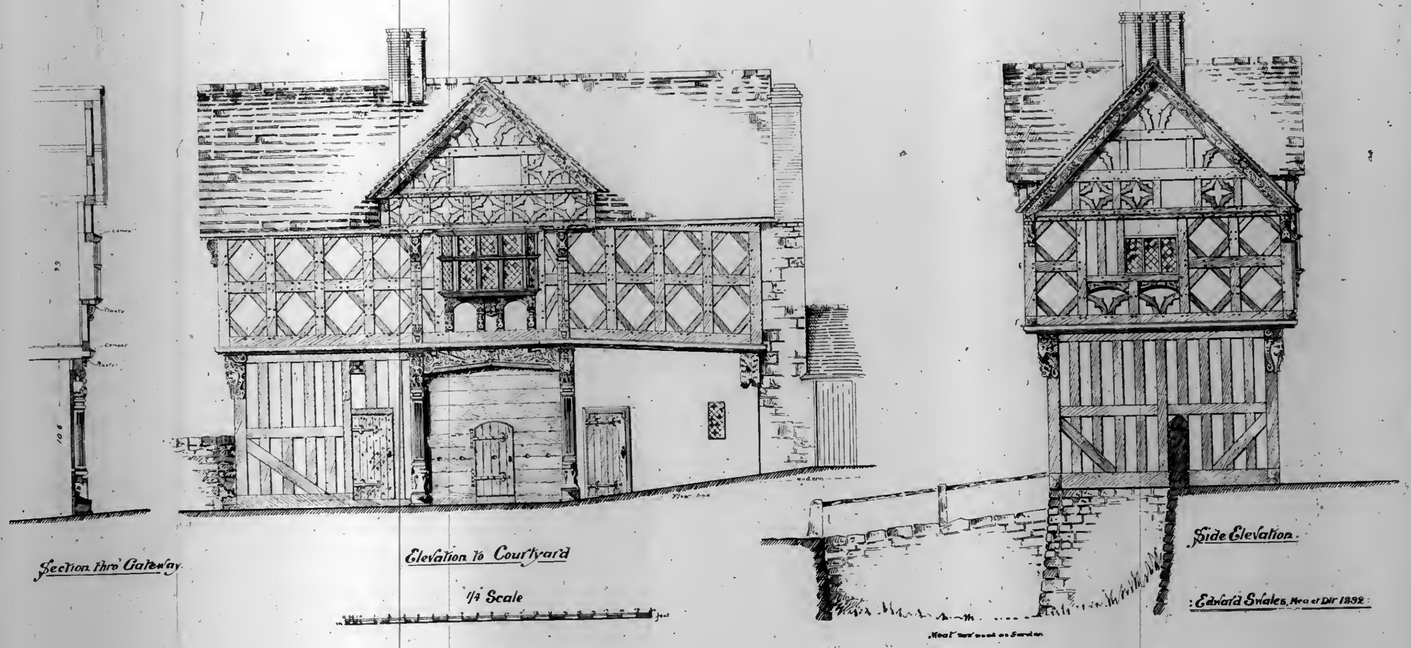


FIRST FLOOR PLAN

RESIDENCE AT VANCOUVER, B.C., FOR CAPTAIN R. ARCHIBALD.

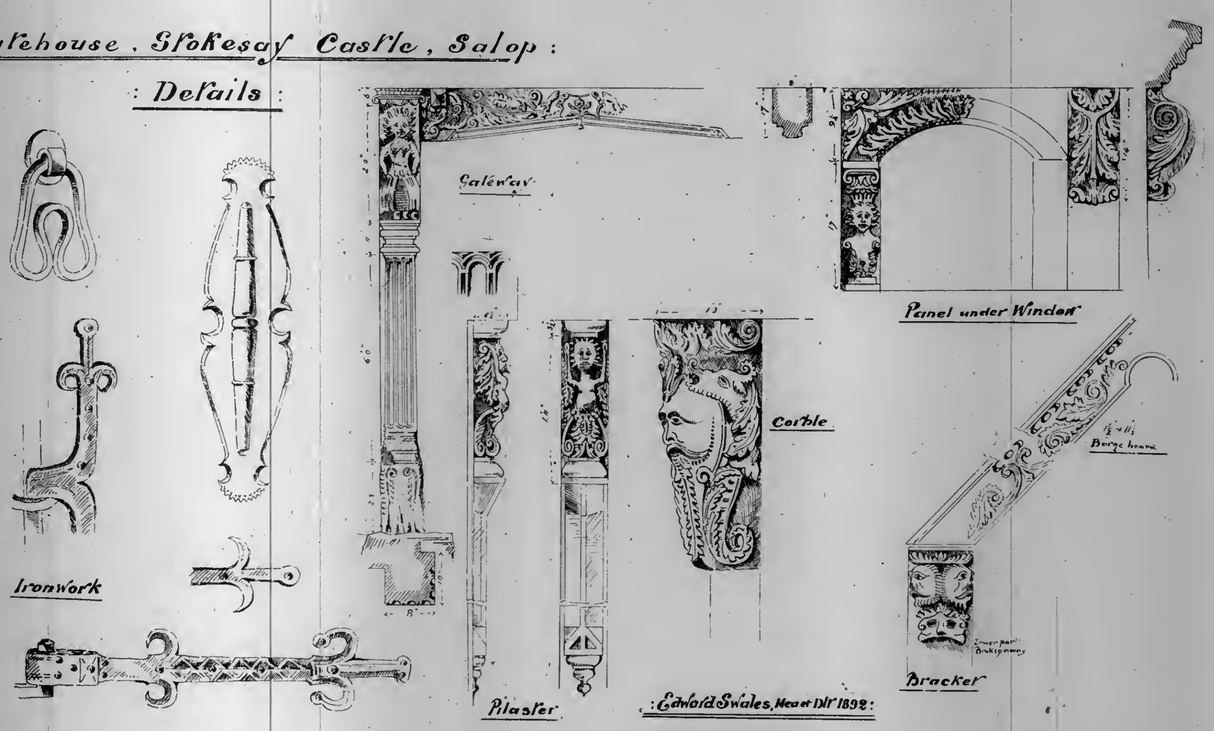
R. MACKAY FRIPP, F.R.A., ARCHITECT, VANCOUVER.

Gatehouse, Stokesay Castle, Salop



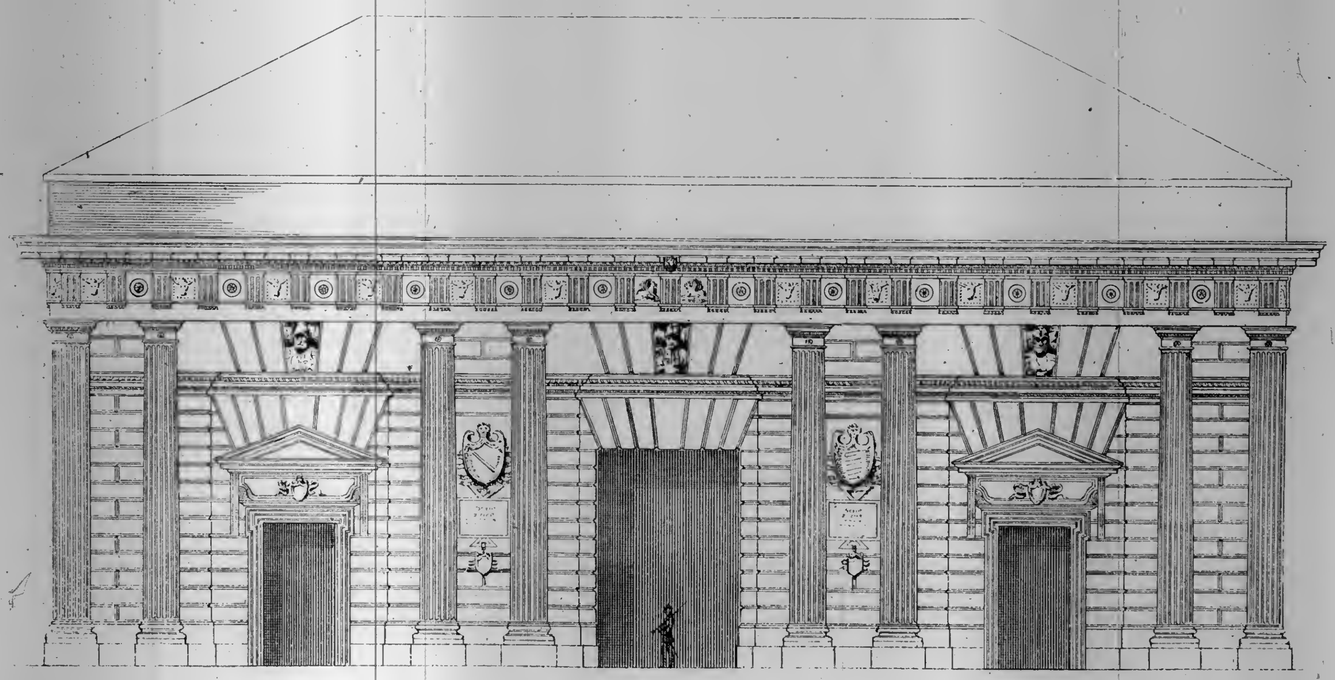
Gatehouse, Stokesay Castle, Salop:

Details:



PORTA DELL PALLIO OF THE WALLS OF VERONA · ITALY · BY SAN MICHELI · 1520 A·D·

ELEVATION OF APPROACH · MEASURED & DRAWN ON SPOT BY EUSTACE G. BIRD ARCHT.



CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—NO. 4. APRIL, 1895 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2259.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

D. B. DICK	Toronto.
W. A. EDWARDS	Hamilton.
F. J. ALEXANDER	Ottawa.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

A. F. DUNLOP	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
L. Z. GAUTHIER	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. MCLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.
JOHN ALDRIDGE, 1st Vice-President.
WM. PARK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JAS. CRANG.
WM. PEARS.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
H. MARTIN.
THOS. CANNON, Jr.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this Journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

THE Master Plumbers' Association of Toronto have petitioned the City Council to amend in several important particulars the plumbing by-law of the city. They ask that the license fee be reduced from $10 to $1 per year; that a qualifying examination must be passed by every person to whom a license is granted; that a permit to construct or reconstruct the drainage system of any building shall issue to the master plumber only. The City Engineer recommends the Council to refuse to reduce the license fee, to grant the petition for a qualifying examination, and in lieu of granting an exclusive permit to the plumber, to so amend the by-law as to prohibit the laying of tile drains under dwellings, and to substitute therefor iron pipes, to be put in and connected with the drains outside the house by the licensed plumbers only, which would enable the plumber's work to be inspected and a certificate issued independent of the drain layers, which, at present, is one of the difficulties of carrying out the existing plumbing by-law. It is hoped that the Council will see the wisdom of adopting these and other required amendments to the by-law. The master plumbers have suffered the injustice of being compelled to pay a license fee of $10 per year for the privilege of doing business in competition with carpenters, tinsmiths, and everybody else who might see fit to take out a plumber's license, as the by-law does not provide that applicants for license must undergo examination. The absence of such a provision has thrown a large amount of plumbing work which should properly belong to the qualified master plumber, into the hands of journeymen, apprentices and persons in other lines of business who saw a chance to make a profit above the cost of the license by tacking on plumbing as a side line to their legitimate business. The by-law should fix the lowest limit of weight of iron pipe at 12 or 13 pounds to the foot, as it is frequently the case with cast iron pipe that one side is much thinner than the other, and in pipe weighing but nine pounds to the foot, a very slight indentation is sometimes sufficient to puncture the metal on the thin side, while it is with difficulty that joints can be made tight without cracking the pipe. It is the opinion of persons who have followed closely developments in sanitary science that at least in the newer sections of the city, where the sewers are in good condition, the trap and breather which the present by-law specifies shall be attached to the house-drain between the building and the sewer should be abolished, and the soil pipes allowed to act as ventilators for the sewers. It is a well-known fact that for two or three months during a severe winter, such as we have just passed through, the street gratings, which are designed to act as ventilators for the sewers, become choked with snow and ice, and sewers and drains leading therefrom are charged with foul gases, which, were iron drains employed, and outside traps and breathers omitted, would be carried through the house-drains and discharged into the atmosphere above the roof. In recent amendments to the New York plumbing regulations, the use of the outside trap and breather is made optional, and in practice their employment is said to be declining.

THE Committee of the Ontario Association of Architects appointed to recommend to the City Council required amendments to the Toronto Building By-law, have completed their work. The Committee have given their most careful consideration to the subject, and have presented to the Council a draft by-law embodying what they believe to be necessary. The matter will shortly receive consideration at the hands of the Council. The O. A. A., as well as the Special Committee who have had the matter in hand, have rendered a valuable service which the Council and public should not fail to recognize.

WE regret to learn that the exhibition of architectural drawings under the exclusive direction of the O.A.A., which it was announced in our March issue would form a distinctive feature of the sixteenth annual exhibition of the Royal Canadian Academy, will have to be foregone. As the result, it is said, of representations on the part of some of its members, the Academy has seen fit to withdraw its permission to allow the architectural drawings to occupy a separate room at the Exhibition and to be hung under the direction of a special committee appointed by the O. A. A. This decision will to a large extent destroy the advantage which it was hoped might accrue to Canadian architects as the result of public attention being drawn to a carefully arranged exhibit of their work.

IN the preparations now in progress for the erection of new buildings to take the place of some of those destroyed in the recent Toronto fires, contractors have had their ingenuity exercised and been put to considerable expense in pulling down the brick walls, chimneys, etc., which stood their ground after the more combustible materials had been devoured by the flames. In this connection our attention has been drawn to the fact that when work of this character is required to be done in Great Britain, permission is asked by the authorities of the engineering schools to be allowed to perform it free of charge, as an object lesson for their students. The practice is one which might with advantage be adopted by Canadian engineering and technical schools. It would no doubt work to the benefit of both students and contractors.

THE Society of Architects of London, resolved at a general meeting held last October, that after the 1st of November next, applicants for membership in the Society be required to pass an examination to show proof of qualification. The subjects of the first examination are as follows:—Architectural History: The general principles of the various styles and periods of architecture; their dates, mouldings and enrichments. Planning and design: The plan and design of some building, or portion of a building, with details to a larger scale. Construction: Constructional details in all trades. Materials: The properties, methods of working, manufacture, and the application of materials to building works. Specifications: Preparation of specifications, and the examination of builder's accounts. Contracts: The conditions pertaining to a building contract; the relative position of architect, client and contractor; and other questions of ordinary practice. Sanitary Science: To include water supply and drainage, ventilation, lighting and heating of buildings.

THE ONTARIO ARCHITECTS' BILL.

THE Act to amend the Ontario Architects' Act, prepared by the Council of the Ontario Association of Architects, and introduced at the recent session of the Ontario Legislature by Mr. O. A. Howland, M. P. P., has shared the lot of many other bills at the close of the session, in not having been reached for a second reading before the House prorogued. Good progress, however, has been made by the Registrar, Mr. W. A. Langton, and his associates, who were engaged in promoting the bill, and it is hardly anticipating too much to say, that it stands a reasonable chance of becoming law at the next session of the legislature.

Much of the doubt that surrounded the measure has disappeared. Having passed the first reading, Mr. Langton and his committee pursued the intelligent and convincing policy of bringing the principles of the bill before leading members of the House. The general impression had been that the bill was of an exclusive and monopolistic character, but a careful study of its main clauses sufficed to show, even leaders of the Patron Party, that there was nothing objectionable asked for in the bill. The important point aimed at is to make the degree of architect hold a parallel place with an M. A. or other educational degree.

There is nothing suggested that would bar out any person now practising architecture within the province from becoming a member of the Ontario Association of Architects were the new bill now law. On the contrary, it specially provides that any such person "by causing his name to be registered with the registrar of the Association within three months from the coming into force of this Act, and by paying to the registrar such fee as may be made payable in that behalf," becomes a registered architect under the proposed Act. The bill further provides, that in case any such person omits to be registered within the said period of three months through absence, illness or inadvertence, he is not necessarily prevented from qualifying under the Act, but at the discretion of the Council he may be admitted to enrollment.

The impression has prevailed, in some circles, that were the Act to become law builders and others would be prevented from undertaking the execution of plans for those who might prefer to place the work with them, rather than with a registered architect. This is not the case. If any person thinks that an architect's fees are too high, or for any other reason does not wish to engage his services to prepare plans for a building, the contractor who would construct the building can prepare the plans. This contractor may call himself by whatever name he likes, save that he does not announce himself as an architect. The thorough understanding of this clause by the members of the Legislature, and especially the Patrons, has done a good deal to remove objection to the bill. Some had thought that the farmer or other resident of a rural section, who might want a barn built, or farm house enlarged, would be compelled to engage the services of a registered architect, just as he would look to a barrister for a settlement of any point of litigation, or to a doctor to cure some of his bodily ailments.

Where objection has been taken to the bill in the past lest extortionate fees should be imposed by the Council of the Ontario Association of Architects, the bill as introduced by Mr. Howland leaves the fixing of the fees to the Lieutenant-Governor-in-Council, and shall be for the following purposes only:

A—For registration as a student.
B—For each assignment of articles.
C—For each examination.
D—For registration as an architect.
E—For the annual fees of members.

The qualification for registration is, that "the applicant shall be not less than twenty-one years of age and shall have served as a student not less than five years with a principal or principals entitled to registration under this Act or with any other principal or principals, whether resident or practising in Canada or elsewhere, approved by the Council and shall have passed such qualifying examinations as may be required by this Act." The concession is made that any person that has graduated from the Ontario School of Practical Science shall be required to serve only three years as a student, one of which three years may be served during the vacation of the school.

The Act, in fact, is an educational measure, pure and simple, designed to raise the standard of the architectural profession. Architects' bills have sometimes been referred to as legislation for architects, rather than legislation for architecture. The present bill is one in which this criticism has no application. It is legislation for architecture—the cause, not the individual. In an age when the disposition is towards scamp work, and a lack of thoroughness prevails to a large extent in all callings, architects and builders alike would, we fancy, welcome any measure that has for its purpose the raising of the standard of work done.

The local Board of Health of the city of Kingston urges the City Council to appoint an Inspector of Plumbing.

The Toronto Public Library has recently received through the Secretary of State, from H. H. the Maharajah of Jeypore, a set of seven volumes on Indian Architecture. The work will form a valuable addition to the already interesting collection of architectural books to be found in the Toronto library.

SAWING STONE BY WIND POWER.

MR. JOHN KLINE, jr., of Halifax, Nova Scotia, is the owner of a stone sawing mill which enjoys the unique distinction of being the only mill of the kind in America operated by wind power. Mr. Kline furnishes Stone with the following data:—

Mr. Kline's principal reason for adopting this kind of power was because fuel is quite expensive in Nova Scotia, notwithstanding it is a coal-producing country, and further, because with this power he could let his mill run windy nights with less attention—the wind in that region being of a more uniformly steady character than in the lower countries of the temperate zone. Thus a material saving is effected over steam power and a larger production is assured. The wheel adopted is 16 feet in diameter. It runs a gang of three blades in excellent shape under a light breeze. Mr. Kline figures out a positive saving over steam of three dollars a day, not counting his saving in labor, and the mill is yet an experimental one in the application of the most modern machinery for sawing stone. The mill is set to saw 1½ inches per hour, in granite, and it is doing the work splendidly. It is guaranteed to furnish sufficient power under an ordinary wind, say one of five to eight miles an hour velocity, to cut three inches an hour in the hardest granite, using crushed steel for feed to the saws. The machine works true and is under regulation to any speed desired in any wind less than a tempest.

In connection with this brief allusion to a novel mill for sawing stone Mr. Kline writes interestingly of other matters relating to the trade in the Province. He says: "You will be surprised, no doubt, when you learn that of the boundless quantity of good granite and building stone, to be found in Nova Scotia, that so little of it is produced for use in building our towns and cities. The cost of working granite is so high that large contracts are rarely made. Being the largest producer and manufacturer in the Province, and the only one using steam power, I have been involved in the labor question more largely than others, and in efforts to popularize the use of granite have been at a disadvantage on that account. Some years ago I had the price of granite within the reach of any one disposed to use it, and had taken a large contract, when the cutters formed a union and advanced wages 50 per cent. and demanded that the granite be brought to Halifax in the rough and cut there, my quarries being about three miles away. The masons and bricklayers joined the cutters and boycotted my granite. I employed non-union cutters, but am debarred from handling any dressed stone for buildings in the city. In consequence the demand for the material has lessened, I am poorer in purse, the contractors get fewer contracts for granite and stone buildings, and a great many of the striking cutters have had to go to other places and work ten hours a day for 25 cents an hour. I pay two to three dollars a day of ten hours, according to the skill of the workman, and they have steady work the year round, but the jobs are not on Halifax Buildings.

"We get between four and five dollars a ton for rough granite delivered in the city. The amount of granite handled in Halifax in one year is about 2,000 tons, mostly for street purposes. I export largely. You will wonder when I tell you that I have sent granite to Aberdeen, but it is true. I have an order from there for a large cargo of granite, samples of which I have sent to you, and which is taken from a quarry in Annapolis county. I get for a block containing 36 cubic feet $23 a ton in Aberdeen. For smaller blocks the price at that city is about 65 cents a cubic foot; the average rate is fair, and much better than we get in Halifax.

"Our excellent granites could be produced and exported at a reasonable profit if capitalists would become interested in developing them. I have an arrangement with shippers here to take any quantity from five to a hundred tons at a time, so there is no necessity for me yarding stock for shipment."

Mr. Kline intends to equip his wind power mill with the latest improved machinery, and to test the full capacity of the windmill as a prime mover in the manufacture of stone.

THE officers elect of the Contractors' and Builders' Association of Ottawa, are as follows: President, John A. Askworth; first vice-president, John McKinley; second vice-president, Joseph Gravelle; recording secretary, James Bennett; assistant recording secretary, H. Burgess; treasurer, E. B. Butterworth.

PERSONAL.

Mr. W. P. Witton has commenced the practice of architecture at No. 24 James Street South, Hamilton, Ont.

Mr. Thomas Tompkins, contractor, of Brockville, Ont., has recently returned from an extended trip to Australia and New Zealand.

Mr. S. G. Curry, ex-President of the Ontario Association of Architects, has resumed the practice of his profession in Toronto, having opened an office at No. 70 Victoria Street.

Mr. George Browne, architect, of Winnipeg, who spent the greater part of the winter in Ontario, has returned to the Northwest; but expresses his intention to remove to New York City at the close of the present year.

Mr. H. C. McBride, of London, Ont., was in the city a few days ago. He will superintend the erection of the new Queen's Avenue Methodist Church, the plans for which are being prepared by Mr. Edmund Burke. Mr. McBride reports a fair outlook for building operations in the Forest City, this season.

VENTILATION A FEATURE.

THE builder of houses a few years ago was expected to introduce a warming plant only, with ventilation a thing unheard of practically; to-day he must not only warm the house, but must successfully ventilate it, and the same is true in buildings of all kinds. Ventilation is now bought and sold as much as the warming plant, and the manufacturer of furnaces and warming plants who cannot demonstrate his ability to ventilate well must expect to lose all contracts

The business of house-heating has developed wonderfully with the ideas of ventilation. Where a few years ago there were a few furnaces made, there are now a hundred, and all have been improved to a point that late comers in the field must expect to exercise the greatest ingenuity in order to get a foothold under the strong competition that exists. When a general idea is secured there are many who can go ahead with it and improve it. There are few persons who could devise the hot air method of heating at the outset, but once given the idea, there are hundreds who can go ahead and improve the original idea. This is true of anything, says the Hardware Trade.

Mr. Wm. Lockman, a veteran builder of Hamilton, Ont., who is now in his 86th year, is at present engaged in the erection of a residence for himself, and is preparing with his own hands all the woodwork for the building.

The officers of the Bras d'Or Marble Co., Limited, for the current year, are: President, Rod. McDonald, Halifax; directors, Messrs. G. E. Franklyn, R. Uniacke, H. Saunders, S. Mosher, and G. Hattie, of the same city.

A preliminary meeting of the master plumbers of St. John, N. B., was recently held to consider a basis of organization for an association of plumbers throughout New Brunswick and Nova Scotia. A meeting for organization will be held in a few days.

A bill was recently introduced in the British Columbia Legislature, to prohibit the employment of other than British subjects on provincial or municipal works to be paid for out of taxation, and to establish eight hours as the legal working day. The Speaker ruled the bill out of order on the ground that the matter was one which belonged to the jurisdiction of the Dominion Parliament.

Application has been made for the incorporation of the National Sculpture Society, the object of which is to establish a school of sculpture in Montreal. The proposed capital is $50,000, divided into 500 shares. The petitioners for incorporation are:—Messrs. Henri Lemaire, notary; Arthur Fiset, notary; Pierre Catelli, manufacturer; Edouard Pambrun, gentleman, and Charles Auguste Rocher, advocate, all of Montreal.

Mr. H. Gillen, architect, Kingston, Ont., agreed with the proprietors of the hotel Quinte at Belleville, to do the necessary architectural work on their new building, which was to cost $25,000. The building actually cost $36,000, and Mr. Gillen in rendering his account increased the amount of his fees in proportion to the increased cost of the building, and upon payment of the account being refused, brought action in the courts to recover his charges. The Judge decided that the hotel company were entitled to pay the increased amount.

POPULAR IMPRESSIONS vs. FACT.

AVERAGE human nature has a strong affinity for that which partakes of the mysterious. The superstitious is bred in the bone of most men. They like to speculate on that of which they know little or nothing. This, at least, would seem to be a generous way of accounting for many of the absurd opinions given out regarding the recent great fires in Toronto. Experts have shown how far off were those wise ones, who would have connected the Simpson fire with that subtle force electricity. In a previous number of the ARCHITECT AND BUILDER, it was shown that those who talked of the Simpson building as fire-proof, and would berate all and sundry who had anything to do

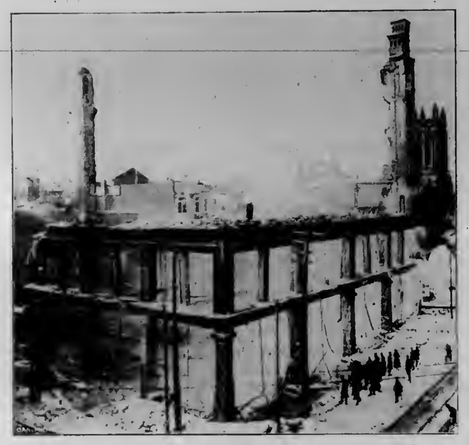


ILLUSTRATION SHOWING HOW PROTECTED IRON COLUMNS WITHSTOOD FIRE IN THE SIMPSON BUILDING, TORONTO.

with its construction, were simply talking of something they knew nothing about. Considerable notion seems, also, to have existed, and to some extent where better views ought to have prevailed, that had some other method been adopted in the placing of the large iron columns and beams that formed an important factor in the Simpson building, they would not have been so completely damaged by fire, as was manifest to everyone the morning after this unfortunate event.

The ARCHITECT AND BUILDER has taken some trouble to investigate this matter. Let us examine into the facts. It ought to be understood by this time that the Simpson building was not designed to be fire-proof. The internal columns and beams were of rolled steel and had to be of this material, as the spans were too long for wooden beams. The clear unobstructed space was a *sine qua non* necessitating as few columns as possible. In the case of buildings erected for office purposes, though of great height, and on the same plan, this condition does not apply to the same extent. But in large stores and warehouses great open space is a necessity. It was for this reason that the joists were of southern pine, the span and load being too great for the strength of the ordinary native pine. Objection has been taken to the use of southern pine in large buildings, because it is more inflammable than the white pine, but so far as the present case is concerned, with a fire of so great intensity, such a condition was neither here nor there, any more fire-proof substance must have succumbed. The plastering throughout the building was of acme cement, the columns being also plastered with it on metal lath. This protection would have successfully resisted an ordinary fire in the new building, but was powerless, of course, to resist the intense heat developed in the old adjoining buildings, which were directly connected with the new, without the interposition of any wall.

It has been said of the Simpson building that the steel columns, which extended from the ground line to the top of the second storey were inadequate to carry the weight of the building, and that the large masonry columns were partly used to give strength to the steel work.

The ARCHITECT AND BUILDER has made careful enquiry on this point, as it is one of importance, particularly from a structural point of view. Our information shows that the outer walls were carried from the third storey entirely on the steel columns, which extended from the ground lines to the top of the second storey. These columns were encased afterwards with cut stone, brick and terra-cotta. The protection of these columns and the beams which they carried was so thorough, that paper signs which had been pasted on them were intact when the brick work was taken down. The stone and terra-cotta of the two lower stories in no way supported the building, and were only a casing or ornamental and protective feature. All the columns and beams were calculated with the usual factor of safety and no settlement or structural defect of any kind, we have reason to believe, had shown itself up to the day of the fire, although the building had been rushed through in an unprecedentedly short time and under many adverse conditions.

Had it been intended to make the building fire-proof, the iron beams, which, as our illustration shows, became so terribly twisted, would have been encased in fire-proof material, such as porous terra-cotta. But this was not done. Profiting by the experience of the late fire, we are glad to learn, for the general safety of the city, that the new building that will be erected for Mr. Simpson, by the same architect, will almost certainly be made fire-proof.

We have heard comparisons made between the methods of construction adopted in the erection of such buildings as those of Simpson's and McKinnon's and some of the high buildings of New York and Chicago. It does not appear, in these larger cities where this plan of building is so much followed, that very much better methods of fire protection and construction are adopted than in Toronto, where the experience has not been nearly so great. The fact is in a composite building like either of those named, where wood, steel, and masonry work go into the structure, no better guarantee can be given in one place than another that a conflagration, when it gets headway, will not destroy it, providing, of course, proper fire equipment is possessed by the municipalities. The writer discussed this matter with a well-known local architect, who had, at one time practised in New York, and he cited the case of the destruction of a large warehouse there, built on somewhat similar lines to that of Mr. Simpson's, and where the result was just as disastrous.

Whether it is wise to encourage the erection of buildings, constructed on what is familiarly termed the skeleton plan, is a

ILLUSTRATION SHOWING THE EFFECT OF HEAT ON UNPROTECTED IRON GIRDERS IN THE SIMPSON BUILDING, TORONTO.

point on which architects and practical men will differ. Perhaps the greater safety lies in the adoption of a happy medium, where steel and iron will be mainly used, and yet, where, as we understand is the case in New York, masonry work is not discarded to nearly the same extent as in Chicago. There is just this about it, that where masonry work is employed, the openness and light aimed at, especially by owners of large stores, has to be sacrificed. And wisely or not, in this intensely practical age, utility more frequently predominates in settling these matters than any other influence.

Mr. Andrew Taylor, R. C. A., recently delivered a lecture before the Woman's Art Association at Montreal, on "The Importance of Form in Art."

ELECTRIC LIGHTING FOR LARGE BUILDINGS.

BY GEO. WHITE FRASER, E. E., TORONTO.

THERE have, until recently, been but two general methods employed for the electric lighting of large buildings. 1. The renting of the current from the electric company operating a central station; and 2. The installation in the building itself, of a private generating plant. There can be no rules laid down, of general application, pointing to the adoption of either method preferentially to the other; every case must be considered on its merits. Such consideration will reduce the question to its lowest terms, viz., a comparison of the costs of lighting by the rival methods. The variable quantities that will enter into this reduction as governing factors are: The price of current supplied from the central station per lamp hour, or per kilowatt hour on the one hand, and on the other, the cost of generating the current required in the building, using a private generating plant. This latter cost will be the total of such items as coal and water, etc., engineer's salary, little repairs, depreciation of plant and interest on capital expended in purchase of machinery, etc.

It is evident that local data will greatly influence the selection of method. For instance, a building full of dingy offices, and employing already an engineer and using quantities of steam, for heating, might very reasonably be expected to effect an economy in lighting by using a private engine or dynamo; while a church using a number of lights periodically, would not. These are, of course, extreme cases, illustrations merely of the general principle, but it is a great mistake to assume in all cases, that because there is a central station operating, it must be better and cheaper to rent current instead of generating it.

The object of this article is to introduce to the owners and designers of large buildings a modification of each of the two general methods described above, that have the merit of presenting very interesting features from an engineering point of view, and of promising well from that of the owner.

The first modification is the use of a gas engine instead of a steam engine, to run a dynamo in a private installation. This plan presents many very advantageous features. No boiler is required, with its coal dust, dirt, and chance of explosion. Less ground space is taken up. Gas engines are very largely used in Europe, and in the States for working dynamos, and many of them are absolutely guaranteed to use only 15 cubic feet of gas per horse power per hour. In connection with this, there is a very interesting and suggestive calculation easily made. Thus:—One thousand cubic feet of gas in Toronto costs the consumer $1.10 for lighting purposes, and 90c. for power and heating purposes. If burnt in a 5 foot burner, this thousand feet will give 3200 candle power hours. If consumed in a gas engine requiring 25 feet per horse power per hour, this 1,000 feet will give 40 horse power hours. These 40 H. P. h., if used to run a dynamo, assuming 75% electrical efficiency and 4 watt lamps, will give 5584 candle power hours. The Toronto Incandescent Light Co. sells current at the net rate of 6 cents per 160 candle power hours, barring special arrangements.

Reducing these prices down to their equivalents per 1,000 candle power hours, gives:

Gas in burner.....	costs,	34.375 cents	per 1,000 c. p. h.
Gas Engine and Dynamo	"	16.177 "	" " " "
Tor. Inc. Co.	"	37.500 "	" " " "

Now, one 16 candle power incandescent lamp burning for 62½ hours is equivalent to 1,000 c. p. h., so it can be seen how, in a large building requiring extensive illumination, it may very easily be actually less expensive to run a private dynamo, operated by a gas engine, than to rent either gas or current. So far, there is a difference, in favor of the gas engine, of over 100 per cent., but no account has yet been taken of two considerable items, salary of attendant, and interest and depreciation. These will of course greatly increase the cost as calculated above, but to what extent depends entirely on the size of the installation; there seems to be, however, a considerable margin to come and go on.

The second modification is the use of a storage battery located in the building, and kept constantly charged by wire from the central station. I am aware that the advantages of this plan are open to criticism, and would have to be the result of special arrangements with the central station. I am also aware that "Central Station Management" as understood in most Canadian stations, except the really large ones, is not the science that it has become in the States and Europe, and that as a fact, so little attention has been given to its study, that managers do actually not know those conditions of operation which are productive of best financial results to themselves. At the same time I am convinced that a little persevering effort on the part of interested persons would bring about a state of affairs favorable to the economical operation of the modification I have just suggested.

The position may be briefly and clearly described thus:—The best and most paying load for a central station is a *constant* one, one that doesn't jump from 0 at 5 o'clock p.m. to 500 H. P. at 8 p. m., but that remains fairly steady all the time. This is just the very kind of load that a storage battery gives, and moreover, it presents another very attractive feature to the central station as follows: A building is wired for say 500 lights; it will use these 500 lights all at the same time two or three times a year, but the machinery in the central station has got to have this 500 light capacity consuming interest and suffering depreciation all the year round, although it earns money only three or four times a year. A storage battery, however, that can be charged at the rate of 20 amperes continuously, will give out when required the whole current for the 500 lights, and keep them going for four or five hours. Thus the central station will only have to provide generating machinery sufficient for 20 amperes, which will be earning money all the time, instead of sufficient for 500 amperes which will be idle most of the time. Consequently it is to the obvious interest of the central station to encourage the use of the battery, and in order to do so it will lower price of current. A very well known authority on electric matters, has stated that it would pay central stations to sell current (for use with storage battery) at 4 cents per kilowatt hour in order to get the constant load that is so advantageous. This figure is equivalent to 16 cents per 1000 candle power hours, and to this must again be added interest of and depreciation on accumulators. Here again particular conditions will affect the total per 1000 c. p. h., but as in the former modification a considerable margin is left. I have no doubt, that central stations would see the advantage of lowering their rates on such loads, if the case were properly presented, and advantage to both parties would result.

There being no particular installation to study, it is impossible to be other than general in this article; it was intended merely to point out to parties having large buildings to light, or to supply elevators for, that there are several ways of doing it, each of which is best only under certain favorable conditions, while under different conditions it should give place to some more efficient method, the actually best method being determined only after due consideration of the peculiar conditions.

BRIBES TO ARCHITECTS.

THE Southern Chapter of Architects, at its last convention, adopted the following resolutions:—

WHEREAS, The architect is in effect the trustee or agent of his client, and in that capacity shall endeavor to serve the client to the best of his ability, and to secure for him (the client) the full value received of the work under his charge; and

WHEREAS, It has been suggested to this convention that some material men have been tendering to architects commissions to secure the sale of their materials, the acceptance of which is contrary to our code of professional ethics; therefore, be it

Resolved, That we, the Southern Chapter of Architects, condemn such methods as dishonorable and to be discouraged by all legal and honorable means.

We further consider all material men, and others, resorting to such methods, as unworthy to hold business relations with members of this Chapter.

Resolved, That after the board of directors shall have received sufficient proof of such practices, or attempts, it shall notify the secretary, giving him the names of the parties transgressing, which names the secretary shall thereupon transmit to each member of this Chapter. Be it further

Resolved, That these resolutions be published, printed and distributed for the general information of material men, architects and the public at large.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

MONTREAL MASTER PLUMBERS' ASSOCIATION.

SIX years ago a movement was started by leading master plumbers of Montreal, such as Messrs. John Date, F. Hortan, Jos. Lamarche, J. W. Hughes, W. A. Stephenson, J. C. Jacotel and A. Champagne, to form an Association of their own in connection with the Montreal Contractors' Association and as a section of the same, but unfortunately the efforts of these gentlemen ended fruitless with a banquet held two years after at the Richelieu Hotel. They and others having the welfare of their profession at heart were, however, not discouraged by their past experience, and new efforts were again made last summer to successfully carry out the scheme. A general meeting of all the master plumbers of the city and suburbs was consequently called last July to discuss the advisability of organizing the proposed Association, which was responded to enthusiastically by nearly all the plumbers of the city and suburbs. A committee was entrusted with the task of preparing a constitution and by-laws, and at a general meeting of the craft held for the purpose on Aug. 3rd these were discussed and adopted, and at the last session of the Provincial Legislature the Association secured its charter through Mr. C. Beausoleil, M.P.P.

MR. J. LAMARCHE.
President Montreal Master Plumbers' Association.

Since then, although a very short time has elapsed, the Association has been very active, and has more than once proved its utility. The new plumbing by-law of the city, passed last June, has been studied, and although admitted to be a great improvement on the previous state of affairs, suggestions were drawn up and sent to the Health Committee of the City Government, which they have now under consideration. Not only has this Association been established with the view of an interchange of professional knowledge and ideas amongst its members, which would be beneficial to them alone, but its field extends far beyond that, its object being also to instruct the general public in matters pertaining to hygiene and plumbing, by means of popular lectures given free at regular intervals by prominent hygienists and physicians, of which two have been recently given—the first by Dr. Lapthorn Smith, and the other by Dr. E. P. Lachapelle—which were a marked success, both in respect to attendance and instructiveness.

The Association has not forgotten either the important matter of giving proper instruction to apprentices. As a step toward this, the Department of Plumbing at the School of Art and Manufactures, now one of the most important at the school, has been placed under its control, and a committee has been appointed to look after its welfare and regulate its instruction. A reorganization of the Department is contemplated at the next session. The Association meets every second and fourth Thursday of each month at St. Joseph's Hall, corner St. Catherine and St. Elizabeth streets. A standard price list is now under consideration for adoption by the manufacturers of and dealers in plumbing materials, so as to put a stop to selling to private individuals at the same prices as to the trade, a practice which has been indulged in for some time to the injury of the trade.

The Association opened a branch on the 8th instant in Quebec, and propose also to establish similar branches in all the principal cities of the Province, and at St. John, N.B. Negotiations are now pending to amalgamate this Association with the Toronto Master Plumbers' Association, so as to make it a Dominion Association, and before the close of another twelve-month it is said that it will form part of the National Master Plumbers' Association of the United States.

The Executive Committee of the Association for the ensuing year is composed of Messrs. J. Lamarche, President, whose portrait accompanies this article; John Date, 1st Vice-President; A. Champagne, 2nd Vice-President; Henry Padden, 3rd Vice-President; W. M. Briggs, Secretary; J. W. Hughes, English Corresponding Secretary; Joseph Gibeau, French Corresponding Secretary; J. C. Jacotel, Financial Secretary; W. A. Stephenson, Treasurer.

On the refusal of the trustees of the French Baptist Church, corner St. Catharine & Cadieux streets, to take down the building which was recently condemned, on the ground of its being built contrary to the regulations of the building by-laws, and being a menace to the safety of pedestrians, the Building Inspector commenced to tear down the building on the 9th instant. All the exterior of the building was about completed, and the roof was being put on. It is understood that the building has been taken out of the hands of the architect, Mr. G. Mann, and given to another city architect to rebuild.

WATERPROOFING BRICKS.

AT a recent meeting of the Australian Association for the Advancement of Science, Professor Liversidge read a paper on the "Waterproofing of Bricks and Sandstones with Oils." These experiments were made with the view of ascertaining the length of time that bricks and sandstone are rendered waterproof or protected by oiling. The oils used were the three commonest and most readily obtainable for such purposes, viz., linseed oil, boiled linseed and the crude mineral oil known as "blue oil," used for preserving timber. The weatherings were made upon a flat portion of the laboratory roof exposed to the sun and weather. Good sound machine made bricks were experimented on. The amount of oil and water taken up by the sandstone was very much less than that absorbed by the bricks, although the area of the sandstone cubes was much greater than that exposed by the bricks. Equal amounts of the raw and boiled oils were absorbed; the blue oil, however was taken up in much greater quantity by both bricks and sandstone, but by the end of twelve months the whole of the 13½ ounces of blue oil had apparently evaporated away, and the brick had returned to its original weight, but those treated with raw and boiled oils remained unchanged. After the second oiling in November, 1890, and exposure for nearly four years and two months, they had practically retained all their oil, inasmuch as they had not lost weight and were practically impervious to water. It was noticeable that the sandstone cubes treated with raw and boiled oils returned to their original weights, but do not appear to have lost the beneficial effects of the oils, being practically impervious to water.

The March number of the Indianapolis Clayworker contains illustrations of the Beamsville Brick Company's works, and of specimens of the material produced therefrom.

Reports from Windsor, N. S., state that the plaster business for which that locality is celebrated, will be developed to an unusual extent during the present year. One company alone will, it is said, ship about 100,000 tons to New York.

The Master Plumbers of the city of Quebec held a meeting on the 19th of March, to consider steps for the organization of a Plumbers' Association for that city. A committee was appointed to appoint officers and a second meeting to complete organization will be held shortly. The Association will endeavor to prohibit journeymen and apprentices from competing with master plumbers, and supply houses from selling to any but the legitimate trade. The City Council of Quebec are taking steps to improve the sanitary condition of the city.

STUDENTS' DEPARTMENT.

AN AUSTRALIAN EXAMINATION PAPER.

THE following papers were set for the last associateship examination of the Royal Victorian Institute of Architects:—

STYLES OF ARCHITECTURE.

1. Name the five orders of Classical Architecture, and give their principal proportions and leading features, and illustrate the descriptions with sketches.

2. Explain and illustrate by sketches the meaning of the following terms: Billet, cortile, flèche, loggia, carona, telamones, systile, sgraffito.

3. Give briefly the leading characteristics as to plan, construction and ornament of the Greek, Roman, Romanesque and Gothic periods, and give rough sketches.

4. Write a brief description of two of the following buildings, giving the style and dates and names of their architects: Church of St. Vitale at Ravenna, Cathedral of Pisa, Cathedral at Florence, Library of St. Mark's at Venice.

5. Write a short description of one only of the following buildings: Salisbury Cathedral, Henry VII. Chapel, Westminster.

6. Sketch the differences in plan and section between the Basilican form of churches and the Gothic cathedrals of the late twelfth century.

7. Give a short account of some building designed by Palladio, Inigo Jones and Philibert De Lorme.

8. Name a typical Romanesque church in Germany or France, its date and particular features.

9. Name some representative French cathedral and describe it.

10. As to the accompanying ten photographs, give in each case (*a*) the style, (*b*) the county or locality, (*c*) the order, period or century, (*d*) explain upon what details of feeling you base your opinion, (*e*) if you recognize the building, give what particulars you can in addition.

MOULDINGS, FEATURES AND ORNAMENT.

1. Drawn to a scale of ½in. to 1ft., a Greek Ionic column showing cap and base, lower diameter to be 3ft.

2. Drawn to a scale of 1½in. to 1ft., the entablature carried by column above, and write against the various portions thereof the name each bears.

3. Describe the use of the human figure as a decorative feature in Greek buildings, and name the parts of a building in which such decoration was usually put.

4. What are the leading characteristics of Romanesque mouldings, and from what sources are they derived? Illustrate with sketches to large scale.

5. Describe and illustrate by sketches to large scale the following terms: Gargoyle, flèche, battlement, dormer, finial, sedilia, machicolation, peristyle, crochet and ballflower.

6. A doorway is to be formed in a stone wall 3ft. thick, the opening to be 10ft. wide, drawn to scale of 1in. to 1ft., the arch-mould and plan of jamb (*a*) in the thirteenth-century Gothic style, (*b*) in the fifteenth-century Gothic style.

7. Sketch a Gothic buttress, also a flying buttress, and describe the origin and use of the latter. State the period which your sketches represent.

SHORING AND SANITARY SCIENCE.

1. It is proposed to convert the front of the warehouse, shown in drawings A, into a shop, and to put a cellar extending back 24ft. and the full width of the building and 10ft. high from floor to ceiling. Describe in order each operation necessary to carry out this work, and illustrate by pencil sketches to scale.

2. When rain-water from the roofs has to be conveyed to the sewers, what precautions must be taken to prevent egress of drain air from the down-pipes in very dry weather?

3. As to water-closets. Describe and sketch some of the best types, and state their relative advantages and disadvantages.

4. How are automatic flushes produced? Describe and sketch some of the apparatus, and state under what circumstances their employment is necessary or advisable.

5. What is meant by the term "seal"? What should be the amount? How is it liable to be diminished? How can the latter be avoided? Give rough sketches.

6. Fig. 6 shows a plan of a building with stables at rear, and the w.c's., sinks, bath, &c., are marked. Sketch on the plan the various drains, waste-traps, &c., you would adopt, and describe and sketch the various fittings, connections, &c.

7. As to underground tanks, what special precautions must be taken in their construction and in the arrangements of supplies and overflows to avoid pollution of the water.

USEFUL HINTS.

It takes 813½ cubic feet of air to weigh as much as one cubic foot of water. If 813½ cubic feet were compressed into the space of one cubic foot, its weight would be about the same as an equal volume of water.

Radiant heat passes through moderate thicknesses of air and gas without suffering an appreciable loss or heating them. When a polished surface receives a ray of heat, it absorbs a portion of it and reflects the rest. The quantity of heat absorbed by the body from its surface is the measure of its reflecting power.

Admirable results may be obtained in interior decoration by confining the colors to creamy browns and relieving the color with gold. For instance:—Ceiling, white with a touch of cream; paper, rich cream ground and open floral design with gold; as bold a frieze as the height of the room permits; and woodwork also in creams, with the styles and rails, of course, much darker than the panels. A room decorated in this way presents a warm and charming effect that would be admired by nineteen out of twenty people of good taste.

In estimating temperatures under conditions where the thermometer is not suitable, such as in the uptake, of breeching, of a boiler, says the Master Steam Fitter, the following list of melting points of metals may be of assistance: Plumber's solder, two parts lead, one part tin, melts at 440 degrees; tin melts at 428 degrees; lead melts at 612 degrees; zinc at 793 degrees. It will be noticed that the addition of tin has a peculiar effect in reducing the melting point of the alloy below the temperature at which either of the component metals melt. With fine solder, which is one part lead and one part tin, melts at 370 degrees.

The manner in which mosaics are now made for decorative purposes is quite different from the elaborate system used by the ancients, which consisted in fixing the tesserae one by one on the cement previously applied on the wall. The modern method of the Venetian school consists in executing the mosaics in the workshop, by having the tesserae fixed with common paste on the section of the cartoon assigned to each workman. When all the parts of the mosaic are complete, they are put together on the floor or on a special wooden frame. The mosaic, which is then a perfect representation of the original cartoon, is again divided into sections on the reverse side, marked with a progressive number and carefully packed to be sent off to the place for which it is intended. The surface of the wall where the mosaic is to be fixed is then covered with cement, into which the sections of the mosaic are uniformly pressed, according to their numbers and the key-plan supplied to the fixers. When the cement has hardened, the paper on which the tesserae have been pasted is gently taken off, and the faithful copy of the original cartoon is again exhibited on the right side.

A GLASS ERA.

GLASS is a material whose astonishing possibilities we are only beginning to realize. Great progress in its manufacture has been made in the last ten or twelve years, blowing by compressed air having greatly increased the quantity and variety of the work that can be produced, while improved methods of moulding have made possible castings of large size. Large glass pipe, unaffected by the soil and having the strength of cast iron, is now turned out in considerable quantities. The material can also be made into plain and ornamental bricks, chimneys, furniture, and even tapestries and complete houses. M. Henrivaux, an enthusiastic French manufacturer, proposes to exhibit a glass house of novel design at the Paris Exposition of 1900. An iron skeleton will be erected, on which will be placed slabs of glass in such a manner as to form a double wall, in the interior of which hot air will be circulated in winter, and compressed air—which will cool the walls—in summer.

ILLUSTRATIONS.

SKETCH FOR PROPOSED HOUSE FOR A. DICKSON PATTERSON, TORONTO.—DARLING, SPROATT & PEARSON, ARCHITECTS.

COTE ST. ANTOINE ACADEMY, MONTREAL.—ALEX. C. HUTCHISON, ARCHITECT.

BOOK CASE AND WRITING TABLE FOR CUYLER A. HALLAND, —DESIGN BY R. MACKAY FRIPP, F.R.I.B.A., VANCOUVER, B. C.

RIEVAULX ABBEY, YORKSHIRE.

THE site selected for the Abbey was on the sloping bank of the Rie. The Valley of the Rie is so tortuous that, looking from the Abbey, it seems to stand in a magnificent amphitheatre, surrounded on all sides by hills clothed with trees rising to the level of the moors above. From its situation it obtains the name of "Rievale" or "Rivaulx," and is called in the neighborhood "Rieval" and "Rivers." It was founded by Sir Walter d'Espec, who endowed his foundation with the manor of Hamelac, with wood and pannages for their hogs in his forest and four carncates of land (a carncate being as much as one team could plough in a year). Its first Abbot was William, a monk of Clairvaux (1131–1146),—"a man of great virtue and excellent memory"—the last, Richard or Rowland Blyton, who, with 23 monks, signed the surrender. The history of Rievaulx is meagre and uneventful, sheltered as it is in its secluded valley—the highroad to and from nowhere. The brethren appear to have commenced building a small stone church in the prevalent Norman style immediately after their settlement, of which nothing remains except the lower portion of the transept, which was incorporated with the new church built by Archbishop Abred, in the pointed Gothic which was then becoming fashionable with the Cistercian order. The choir, although roofless, is in a tolerable state of preservation, although portions of the outer walls of the aisles are gone. The aisles were separated from the centre by ranges of clustered columns, with bandings instead of capitals, from which spring richly moulded pointed arches. Above the triforium the centre spandril, ornamented with quatre foils in sunk circles. At the east end are six lancet lights—three and three—the upper tier with clustered shafts and lozenge mouldings, and flanking these at the end of the aisles are two smaller lights, all richly moulded. The turret staircases to the triforium were placed at the angles, but only one now remains. The clerestory windows are also lancet—fourteen on each side—in pairs under an arch outside. Each pair is flanked by a smaller blank lancet. The refectory is a noble apartment 100 feet by 30 feet, situated on the west side of the Quad.

The ruins were at one time much overgrown with ivy, which has been removed. At the dissolutinn the commissioners caused the lead to be stripped from the roofs of the church, the Abbot's house and other buildings, nearly all of which remain sufficiently to trace out the whole plan, and it is remarkable that the mouldings are as sharp and clear to-day as when they left the builder's hands.

Many abbeys have sprung from Rievaulx—notably Melrose, Revesly and Rufford—and its influence spread to York and Fountain, many of them passing under the Cistercian rule. The Abbey of Byland is within a few miles, and the whole district is rich in antiquities. Rievaulx is owned by the Duncombe family, whose seat is at Hembley, the nearest town.

A POMPEIIAN BATHROOM.

A VERY interesting discovery recently made near the old site of Pompeii is described in the European journals. A large building was unearthed on the property of a Signor de Prosco, containing several rooms, among them three bathrooms, furnished with large sculptured marble basins, heating apparatus, lead plumbing work, with bronze faucets, and tiled floors and walls. The three rooms correspond in their arrangements with the usual hot, tepid and cold baths usually found in the old dwellings of the wealthy classes. This is, however, said to be the most complete, richest and best bathing installation so far found. It has been so well preserved on account of the roof not having caved in during the great eruption of Vesuvius which buried the city of Pompeii in the year 79. Most of the houses were entirely destroyed at that time, only a few vaulted structures resisting the immense pressure of the lava and ashes. This roof is nearly 45 feet in length.

THE APPLICATION OF COLOUR TO ARCHITECTURE.

By G. F. STALKER.

FOR a very long period the idea prevailed among architects, and the public, generally, that the application of colour to buildings, in any way whatever, was a sign of effeminacy or pedantry, or a lack of taste. It was considered that anything which interfered with the tameness of tone in the material of which a building was constructed, interfered with, if it did not altogether destroy, the purity of the style in which it was designed. Whether this was the result of a most unhappy misconception, or a want of knowledge of the laws of colour and how to apply them, it is difficult to say. Probably it was a little of both. But whatever the cause may have been, the result was, that for many generations, architecture and colour were divorced. Precedent, that fickle and uncertain mistress, was dragged from Egypt, Greece and Rome to prove that colour was shunned by the ancient architects in their work, and that they depended entirely upon the proportion of their buildings, and the elegance of their detail and ornament for the matchless beauty which they possessed.

Still the eyes of men looked for something more than form, (however perfect) and light and shade, (however well disposed), and some restless spirits examined and analyzed the ancient precedents until they discovered and established beyond a doubt, that colour was applied, and that extensively, to architecture, by all the nations of antiquity. The anti colourists had omitted to reckon with Father Time, who, though he had not altogether destroyed the buildings of the ancients, had almost wholly obliterated the colour with which they had adorned them. Further investigation has shown that the combination of form and colour was well understood and practiced by every ancient people who have made their mark upon the world by the excellence of their architecture. And this is the more remarkable particularly in regard to the three nations mentioned, when we consider the care which they must have bestowed upon every detail of their structures. For we cannot but be impressed with their exquisite beauty if we see them only in photograph or in drawings in black and white. Add to this the colouring which architects of such perfect taste would apply to their buildings, and if from the meagre basis which time has left us, we can re-animate them, we should have before us the most perfect examples of architecture.

Following the ancient and natural lines, the Byzantian and Rennaisance architects gave great prominence to color in their work. In many instances (particularly in Italy) they sacrificed architecture to such an extent that it became a sort of framework for mural painting and decration. But, on the whole, their work was done in such good taste, that the defects in architectural detail were atoned for in the beauty of the colortng, and so, philosophically, it has been allowed to pass. Such an apology, however, would not hold good at the present day. There were thousands of excuses which could be given for the delinquencies of that time, which cannot, in fairness, be put forward now. We accept what they did, in good faith, based on the knowledge they possessed. Future ages will expect the same of us. We have all their work before us as examples to follow or shun, and we shall act foolishly if we do not profit by them.

In mediæval times the architects followed in the same lines as their predecessors. It is true, (all honor to them for it) they returned to the ancient practice of giving prominence to form. But they did not neglect the application of colour. They applied it to their columns and roofs, to their wall spaces and to their windows. Crude in many cases, no doubt, broken necked and out of joint are many of their figures. But the effort was there, and the aspiration which in such case covers a multitude of sins.

It is since the middle ages that the unfortunate divorce of colour from architecture has taken place. Various attempts have been made of late years to effect a reconciliation. In view of the fact that they were formerly wedded, and that they have never separated of their own desire, and that there is still, as there always has been, a strong affinity between them, it is surely the duty of all architects to bring them together again to live in harmony with each other. There are many reasons why this should be done in Canada, and many opportunities for doing it. One reason may be sufficient. In the sunny countries of Italy and Greece they enhanced the beauty of their otherwise beautiful

buildings by the application of colour to them. The sun shines on these countries from January to December, giving them changes of natural raiment only varied in beauty from one season to another. One would imagine that buildings devoid of colour would be suitable in such places. But the luxurient colouring of nature has created in them a demand for colour everywhere. Then the supply is provided for the demand. The clays and marbles of Italy are ready to hand, and by skillful application, their structures lose all their strength or purpose but gain much in their appearance and grace.

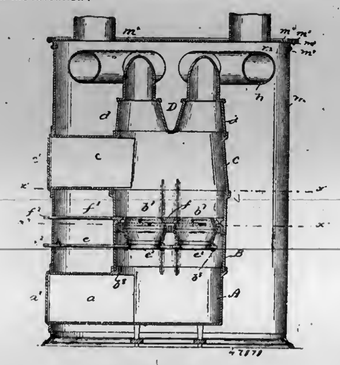
We cannot speak of our country as Sunny Canada, but we can hazard an opinion that there are few countries in the world of such varied colouring as our own. It is true we have not continual summer. But when summer is here it is brilliant; and our fall is so rich in colour, that it seems as if nature would provide us then with beauty enough to last us through our long, cold and colourless winter.

If the people in the sunny southern climes find pleasure in colouring their buildings, is it likely that the people of the frozen north will take less pleasure in the relief which colour will afford them? This is not likely. But the people will never take the initiative. It is for architects to do that. It is true that something has been done in this direction of late years, but it has been in such a hesitating, imbecile way that it is scarcely noticeable

In applying colour to our buildings, however, it is necessary to say that, externally at least, the colony should be constructive. And, so far as this is concerned, we are happily circumstanced in Canada. We have within our Dominion almost every variety of granite, marble, stone and clay to provide us with the means of applying colour to our buildings in the most artistic and, at the same time, constructive manner. It may be, however, that our architects have not given this matter that amount of study which the subject merits. Appearances have that look about them. If, however, architects would consider that colour is one of the essential details of their profession a very few years would make a wondrous change in the tone and character of our buildings.

RECENT CANADIAN PATENTS.

No 47,878, for a heating apparatus, to Henry Ransom Luther, Cambridge, Mass. The accompanying illustration and statement of claim will serve to explain the invention :—

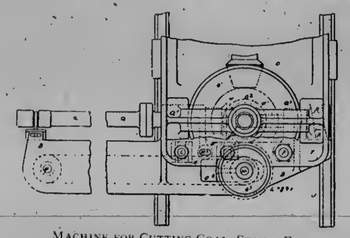


HEATING APPARATUS.

In a heating apparatus, a fire pot, an upper grate surface supported therein, means to shake said upper grate surface in sections, a series of independent pockets depending from said upper grate surface, a pocket support, a series of lower grate surfaces in the said pockets, and a common axis connecting said lower grate surfaces in series, whereby they may be rocked. In a grate of the class described, the combination with upper and lower grate surfaces, of pockets depending from the former and inclosing the latter, the upwardly and outwardly inclined, baffle surfaces on the sides of the said pockets to deflect the air or gases rising between the same away from the side walls of the pockets at the tops of the latter.

No. 47,891, for a machine for cutting coal, stone, etc., to Thomas Heppell, Leafield House, Chesterle street, William Patterson and John George Patterson, of Hardwicke Terrace, Gateshead, Durham, Eng. The following illustration and statement of claim will serve to explain the invention :—

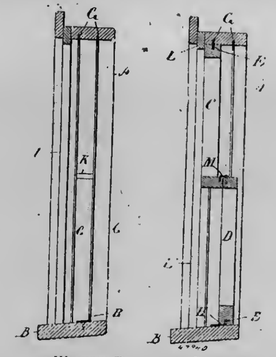
In a machine for cutting coal, stone and similar hard substances, the combination with a backstay B, pivoted to a suitable trolley, the means for locking the said backstay in its working position, of the cutter-bar A, mounted in bearings A1 and A2, on the inner end of the backstay, and a sliding bearing K, at the outer end of the backstay, cams R, R1, on the inner end of the said cutter-bar, a fixed pin S1, on the said backstay engaging the



MACHINE FOR CUTTING COAL, STONE, ETC.

said cams, a convey or chain or debris-removing apparatus carried on wheels journalled in the said backstay at M, M, and means for revolving the said cutter-bar and wheels carrying the said debris-removing apparatus.

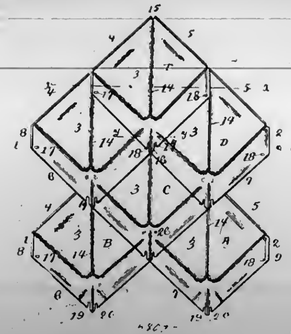
No. 47,940, for a window frame and sash, to Charles Day Morson, Park Hill, Ont. The accompanying illustration and statement of claim will serve to explain the invention :—



WINDOW FRAME AND SASH.

1st. The combination with the window frame, having parallel tongues G, at the sides, and a tongue at the top and sill, of the upper and lower sliding sashes C, D, having grooves at the side edges and at the top and bottom, and receiving said tongues. 2nd. The combination of the upper and lower sliding sashes, the meeting rail of the upper sash provided with a metal strip or tongue M, fitted into a groove in the meeting-rail of the lower sash. 3rd. The caskets K, secured to the window frame intervening the parallel tongues E, and opposite to the ends of the meeting rails of the sashes.

No. 48,037, for metallic roofing tile, to Ephraim Benj. Repp. Washington, Col. The accompanying illustration and statement of claim serve to explain the invention :—



METALLIC ROOFING TILE.

An approximately rectangular roofing tile having cut away sides 1 and 2, and provided with a rib 9, at one side 2, and an upward projecting flange 8, at its side 1, having holes 17 and 18 at the lower ends of the cut-away sides 1 and 2, and provided with points 19 and 20, at its central lower end, having a nail-hole 24, at the apex of a rib running along one side of the tile, and a raised portion 26, to accommodate the head of nail passed through a similarly situated nail-hole, of an under tile, having ribs 10 and 11, and flanges on the upper sides 4 and 5, said ribs and flanges meeting each other at their outer extremities.

METHODS OF RAPID CONSTRUCTION.

In the Engineering Magazine for February there is an article by Mr. Francis H. Kimball, who, with Mr. G. K. Thompson, designed and superintended the construction of the Manhattan Life Insurance Building—one of the loftiest of the new American class of structures, or sky-scrapers—descriptive of the mode employed in completing it within a brief time. Mr. Kimball writes :—

The temptation to excel some other record in the quick-building line, together with a desire for quick returns from rentals, losing but one season, is more than the investor can withstand. The architect has no choice in the matter ; he must accept the inevitable, and bring to bear all his skill to accomplish the end desired in the best and most workmanlike manner.

It is not difficult, at the close of one of these quick-building operations, to trace the reasons which led to so successful a termination.

The most recent example in point of the actual time consumed in erection and in finishing the great bulk of the building —which has not been equalled up to the present time, pound for pound of iron and brick for brick of masonry—is the Manhattan Life Insurance Building, with which the writer is identified.

No comparison can be made between New York and Chicago records, as our building laws are more rigid, in that they exact a greater degree of stability in the structural features.

In the case of the Manhattan Life Building, the time consumed in its erection may be divided into two parts, as follows : —Foundations ready for superstructure, five and two-thirds months ; superstructure, eight months.. The roof or eighteenth tier of beams was reached in exactly three months from the time when the foundations were ready, on which to set the first piece of steel composing the bolsters that support the cantilever system.

The time spent in preparing the foundations may seem to those unfamiliar with this work scarcely consistent with the progress afterwards made, but the architects found that, in view of the unsatisfactory nature of the ground composed largely of quicksand, the usual methods employed, such as piling of masonry, were inadequate for the purpose of a foundation to sustain the great concentrated loads, and they thereupon decided to reach bed-rock, 57 feet below Broadway, by some unprecedented means. They finally concluded to introduce the pneumatic process used in sinking bridge piers to rock.

Sinking the piers to bed-rock rendered the building independent of any outside operations, either building foundations or tunnels. The fact that they were the pioneers in this undertaking, so far as the application of this principle to building work is concerned, led to much carefulness on the part of the engineers, Messrs. Sooysmith & Co., in respect to the probable effect on the foundations of adjacent buildings, and that there might be no disturbance of such foundations, by reason of going so far below them, no attempt was made to force work to the degree attained in bridge-work where operations are carried on in an open country.

The magnitude of the work may be better understood by reducing it to cubic yards of masonry. This substructure, which starts on bed-rock and continues up to the level of the cellar floor, consists of fifteen piers, varying in size from 9 feet in diameter to 21 feet 6 inches by 25 feet square. The caissons made of steel corresponded in size to the piers they sustain, and were 11 feet in height. These caissons were filled with concrete, and contained altogether 1,260 cubic yards. The number of bricks used in the piers amounted to 1,500,000.

From this it may be seen that a good-sized building was sunk out of sight before any part of the superstructure could be begun.

The fact that a new method, with more or less experimental work attending its adoption, had to be devised, and the really large mass of masonry forming the piers, are sufficient excuses for the length of time consumed in this feature of the building. It was a work which in olden times might have taken twelve months. Even the progress attained was due to the fact that three relays, or gangs, of men were employed in sinking the caissons, thus giving the work the benefit of the full twenty-four hours in one day for the entire period of five and two-thirds months, except in the case of the masons, who worked only regular hours.

Suffice it to say that in three months about 5,800 tons of steel were raised into position. This was not accomplished, however, without night work. When the foundation work was prolonged to September 1, the prospect of completing the building on May 1 was not promising. A council was held—attended by the building committee, architects and builders—the purpose of which was to incite the builders to greater activity and also to settle upon a plan for beginning and continuing night work until the roof was reached.

This meeting resulted in the institution of day and night gangs of men for the erection of the steel frame ; and by reason of the time which, in consequence of the delay in the foundations, the contractors for this branch of work obtained for the making of the wrought material and the delivering of the same within a short haul of the building, coupled with the fact that great care was taken at the rolling mills in laying out the various members to templates, so that when they were assembled at the building no fitting was required, the work of erection went on without interruption from the beginning to the end. Recalling the incidents of these three months' work, and the system employed to produce the quickest results, it seems that no mistakes were made and that every moment was counted.

To better illustrate the magnitude of the skeleton, I may say that there were girders weighing 40 tons, many columns of 10 and 12 tons each, and cantilevers of 80 tons (in four sections of 20 tons each), the length being 67 feet.

All of these heavy members required special means of transportation ; the heaviest girder had to be rolled from the dock to the building by night, the task requiring three nights. It took just twenty minutes to raise it from the street to its position on the second floor.

On account of the great risks where material must be raised 300 feet in the air, and the haste with which the work must be done, the setters of iron and stonework should be picked men with certain qualities, the most prominent of which must be good judgment and steady nerves. It is rarely that serious accidents and even deaths are not recorded against buildings of even less magnitude than the Manhattan Life Building, but, strange to say, in this case there was no loss of life, and but few accidents worth mentioning. The work was greatly facilitated by the use of a travelling frame, with a derrick at each angle, by which material could be easily disposed of as it was raised from the street and placed in its proper position.

It was considered advisable to begin the brick masonry when four storeys of the steel frame had been set in position. This enabled the frame-setters to keep in advance of the other trades. As far as possible this plan was pursued throughout, but inasmuch as bad weather has no effect on iron and steel, while with masonry the contrary is the case, at times it was necessary to lay off the masons while the others pursued their work. When high winds prevailed all work had to cease. But with good weather, when all could work advantageously, the masons could hardly hold their own.

There seemed to be a friendly rivalry between the two trades as to which should outstrip the other, and the greater the exertion the brighter was the prospect of closing in the building before cold weather set in.

Rough piping both for plumbing and steam began when the masons had reached the fourth storey, and continued without interruption until all the lines, vertical and horizontal, with all their branches, were in position. In the meantime the masons had begun setting the fireproof blocks forming the partitions, and as far as practicable this was carried along with the advancement of the outside walls.

When the partitions of a storey had been set, the electrician ran his wires, enclosed in conduits, to the various fixture outlets. One can hardly realize now that this "roughing," as it is called by the workmen, is concealed from view—that more than five and a half miles of gas, water, waste and vent-pipes, five miles of steam pipes and thirty-five miles of electric wires were required to perfect the respective systems. The facing of the front on Broadway contains about 30,000 cubic feet of stone, which was cut and set in position in eighty days.

It was not at first the idea to undertake to finish more than ten storeys by the first day of May, as the plastering could not

be commenced until the winter was well advanced, and the outlook for enclosing the roof seemed distant and discouraging. When the twelfth storey was reached a temporary roof was deemed necessary for the protection from rain and snow of all the storeys below ; and such roof was constructed, and was of great help in removing all fear of damage to the finer grades of interior fittings.

Immediately thereafter plastering was begun, temporary heat was supplied, windows enclosed, and a general advancement made towards the completion of the storeys below. There was no cessation, however, in building above this temporary roof. Fortunately the weather was propitious, causing but little delay. The building was permanently enclosed by the time severe weather set in. Then all the forces that could be brought to bear were employed in the supreme effort of getting the entire building in such condition that tenants could occupy on the first of May any rooms that they might choose. It was successful. It proved a good investment for the company, as the greater proportion of the offices rented were above the sixth storey.

To follow all the different trades and describe the various methods employed to force the work almost beyond the limit of human endurance would be an interesting story. Suffice it to say that to the layman there can be no realization of the vastness of the undertaking.

Take the laying-out of the engineer's department—the boiler and engine, the electric and elevator plants, the plumbing and heating systems contained in a building of this magnitude, the decorative treatment of the interior, employing the carpenter and cabinet-maker, plasterer, marble-worker and metal-worker (on stairs and elevator fronts), the mosaic and tile flooring, gas and electric fixtures for lighting, to say nothing of a more or less ornamental exterior—and it seems hardly less than a miracle that all these different interests, all large because the building is large, could have worked harmoniously together, and achieved such satisfactory results in the period of eight months.

It might be asked, have manufacturers of building material kept up with the rapid advance in methods of handling, producing articles that will set more quickly, and reducing to the minimum the danger of destruction, such as that from dampness proceeding from brick, plastering and concreting ?

If the "drying out" of a building could be reduced to a few weeks instead of months, the length of time required for its erection would not be so much a matter of uncertainty. Some thought has been given to the mixing and manufacture of plaster, the application of which is made more simple than formerly by certain quick-setting qualities which make it practicable to put on the wood trimming within a few days after a room is white-coated.

There is yet room for improvement in the direction of freeing the process of plastering from dampness, and rendering it less objectionable from the standpoint of cleanliness to those who must follow the plasterers. But there is one feature of the mason's work to which much attention has been paid during the past ten years, but seemingly not in the right direction ; for the difficulty remains although the material is harder. I refer to fireproof blocking used for partitions and flat arches between beams. The blocks designed for partitions are not of uniform size ; therefore the surface of one side of the partition becomes very irregular, as the mason lays up one side to a line. The plasterer must even up with plaster, the thickness of which varies anywhere from half an inch to 1½ inch. It cannot be expected that the shrinkage of plaster will be uniform, to say nothing of the danger of freezing when the work is done in the winter months. Fireproofing of floors between beams consists usually of flat arches formed of terra-cotta blocks made hollow to secure lightness. These blocks do not make up a thickness equal to the depth of the beam, where the beam is more than 8 inches. They vary in depth according to the span between beams ; and where the beam is more than 8 inches there is a space above the arch to be filled, in order to meet the material of which the finished floor is composed. This space may be 4 inches, possibly 6 inches—sometimes more, sometimes less, according to the depth of beam. The concrete is generally composed of ashes and cement, especially when saving in weight is important.

Such a foundation is not of the substance required where there is a direct action thereon—as in the case of tile or mosaic floors—proceeding from the heavy and constant traffic usual in business buildings. Consequently such floors show the natural impact of the spongy concrete by numerous cracks, which, in the case of mosaic floors, can never be properly repaired.

This defect is not the only one of importance. A large percentage of the dampness usual in masonwork proceeds from this source. As this concreting is usually done just before the laying of the floors, it is quickly covered in, and dampness must pass through the wood-flooring in the process of drying-out. It is natural to suppose that kiln-dried lumber will absorb much of the dampness, and swell in consequence, so that afterward, when heat is turned on, it will shrink and open at every joint. More thought should be paid to a remedy for this, which may properly be termed a defect. Arches could be made that would reduce the space referred to, thus removing an element which, although it may not materially retard quick building, causes much of the criticism on the defective work (so considered) now credited to rapid methods of building. Other features no doubt enter into this class of building to which attention might be directed with profit to the builder, but it is hardly possible to discuss them in detail here. The individual experiences of others would be interesting and profitable.

Without co-operation on the part of the builder, the architect's suggestions are of no advantage, and the work lags in consequence. It is important, therefore, that none but the most reliable men should be selected to do the work. The architect, moreover, should make the selection, for if he is to come in for his share of censure in case of delay, it is better that he and his own men should wholly deserve it than that he should suffer for mistakes over which he has had no control. Should the whole work pass into the control of one firm (usually masons), it should be an arrangement satisfactory to the architects.

The architects of the Manhattan Life Building, Messrs. Kimball & Thompson, were ably assisted throughout, and they take great pleasure in publicly acknowledging their indebtedness to the different firms who aided them to make so remarkable a record.

The secret of success always lies in constant, unremitting push in every department. Begin at the very beginning ; an ounce of push at the start is worth a pound of push at the end. Start the trades whenever and wherever it is possible so to do, and keep up the tension ; then satisfactory results cannot fail to follow.

MANUFACTURES AND MATERIALS

THE OLD MEN'S REFUGE AT KAMLOOPS, B. C.

The Old Men's Refuge at Kamloops, Vancouver, B. C., from plans by R. Mackay Fripp, F.R.I.B.A., sketch of which appeared in a recent issue of the CANADIAN ARCHITECT AND BUILDER, has all its shingles colored with Cabot's Creosote Shingle Stains. These stains are used extensively on the Pacific Coast, and have repeated there their continuous successes in the east.

Messrs. Knowles & Co., of Avondale, have purchased for $10,000 from Messrs. Dill Bros., the plaster quarry at St. Croix, N. S.

The Beamsville Pressed Brick Company have recently been experimenting with a new brick machine, the invention of Mr. Sims, of Toronto. The machine is said to be capable of turning out from forty to fifty thousand bricks per day.

S. A. Lazier & Sons, of Belleville, Ont., have secured the sole right for Canada to manufacture the Norwich Folded Paper Floor Deafener, which has been extensively used by architects in the United States for building purposes with the most satisfactory results.

Mr. H. J. Warsup, Superintendent of the C. P. R. Cement Works at Vancouver, has recently experimented with British Columbia clay for the manufacture of cement, fire and building brick, etc. The experiments are said to have proved that in British Columbia there is to be found china and pottery clay in considerable quantities, and the necessary materials for the manufacture of plaster paris, fire brick, building brick and cement.

The Montreal Quarry Co., Limited, which has recently been granted incorporation, propose to acquire certain quarries in St. Denis Ward, Montreal, and to carry on the business of quarrying and selling stone. The quarries are upwards of two million feet in extent, are already fully opened up and well-equipped with plant. From them has been taken a large amount of limestone used in the public and domestic buildings in the city of Montreal. The provisional Board of Directors of the new company consist of Alderman Peter Lyall, P. A. Peterson, C.E., D. G. McCaskill, W. G. Reid and George McDougall.

CODE OF ETHICS.

THE following code, which is in conformity with the best standards of practice, has been adopted by the Boston Society of Architects:

Section 1. No member should enter into partnership, in any form or degree, with any builder, contractor or manufacturer.

Section 2. A member having any ownership in any building material, device or invention, proposed to be used on work for which he is architect, should inform his employer of the fact of such ownership.

Section 3. No member should be a party to a building contract except as "owner."

Section 4. No member should guarantee an estimate or contract by personal bond.

Section 5. It is unprofessional to offer drawings or other services on approval and without adequate pecuniary compensation.

Section 6. It is unprofessional to advertise in any other way than by a notice giving name, address, profession and office hours, and special branch (if such) of practice.

Section 7. It is unprofessional to make alterations of a building designed by another architect, within ten years of its completion, without ascertaining that the owner refuses to employ the original designer, or, in event of the property having changed hands, without due notice to the said designer.

Section 8. It is unprofessional to attempt to supplant an architect after definite steps have been taken toward his employment.

Section 9. It is unprofessional for a member to criticise in the public prints the professional conduct or work of another architect, except over his own name or under the authority of a professional journal.

Section 10. It is unprofessional to furnish designs in competition for private work or for public work, unless for proper compensation, and unless a competent professional adviser is employed to draw up the "conditions" and assist in the award.

Section 11. No member should submit drawings except as an original contributor in any duly instituted competition, or to secure any work for which such a competition remains undecided.

Section 12. The A. I. A. "schedule of charges" represents minimum rates for full, faithful and competent service. It is the duty of every architect to charge higher rates whenever the demand for his services will justify the increase, rather than to accept work to which he cannot give proper personal attention.

Section 13. No member shall compete in amount of commission or offer to work for less than another, in order to secure the work.

Section 14. It is unprofessional to enter into competition with or to consult with an architect who has been dishonorably expelled from the "Institute" or "Society."

Section 15. The assumption of the title of "Architect" should be held to mean that the bearer has the professional knowledge and natural ability needed for the proper invention, illustration and supervision of all building operations which he may undertake.

Section 16. A member should so conduct his practice as to forward the cause of professional education and render all possible help to juniors, draughtsmen and students.

THE PLANNING OF SMALL HOUSES.*

By T. W. F. NEWTON.

IN planning a small house it should be our especial study to avoid waste of space, and yet insure general utility. There must be no long passages; height must be kept down, and roofing as simple as possible. Breadth of effect must be studied rather than prettiness and ornament, as in this class of work there is no money to spare for either; all must be simple. One can hardly do better than conceive one's design on the lines of the old cottages in the immediate neighbourhood, as they will invariably suggest much in the way of simple planning, detail, and construction. It cannot in this connection be too clearly laid down that passage must be reduced to a minimum; this class of house cannot afford that to per cent. of its cost should be spent in passage. In large houses it is generally unavoidable but in small houses it can be so curtailed as to be practically *nil*.

The ground plan is the key to all the rest; if that be bad, as a rule all is bad; but it must be worked out by a careful consideration of the needs of the first floor. The front entrance should be fairly imposing, the door of ample width, with an inviting air about it. If it be a little lower than the usually given proportions, so much the better, as it will apparently increase the width. It is well either to have a porch or pent, or to recess the door, to afford shelter for anyone waiting to be admitted. Care should be taken that the front door be not too much raked by the principal windows. The door should open into a small lobby or outer porch, this in its turn should have a small cloak-room or recess for coats and hats. Three feet by three feet will hold a considerable quantity of these, and the general tidiness of the hall is thus preserved. Following this lobby an arched opening should give into a small hall of about 9 ft. by 12. This hall-sitting room, if carefully planned so that it may be shut off from the stairs and kitchens, will give quite a useful apartment. To secure this object it is advisable to have all the doors on one side, that the remainder may be free from traffic. An ingle-nook, if it can be arranged, or a corner fireplace will add to the picturesqueness of this cosy room. The ingle should always be low, never more than 6 ft. 6 in. or 7 ft., and a deep beam with a wide shelf over. An internal treatment of bricks gives a solid air of comfort, and wide benches at the sides add to this. The usual long passage hall is so much waste space, and quite useless as a room of any sort; neither can it be warmed. With this and the well of the stairs a current of cold air is generated which is drawn into the rooms every time the door is opened. If the stairs be shut off by a swing-door or a curtained arch, and a good fireplace given to the hall, an air of warmth and comfort is secured and greater privacy gained to the house, as the inmates may pass up and down unobserved from the hall.

The dining-room, if possible, should have an eastern aspect, and if it can also have a south light so much the better. The morning sun is always valuable in the dining-room in a house of this type, as it serves also as the breakfast-room, and the dinner is usually in the evening when the lamps are lighted. The chief points to be considered in this room are width, which should not be less than 13 ft. and ease of service to the kitchen and pantries—a small serving hatch from the latter serves a good deal of needless traffic. The fireplace is best at one end and the door at the other, at right angles to the fire. A long, low window, with a seat recessed, and a simple beamed ceiling should make a comfortable and useful room.

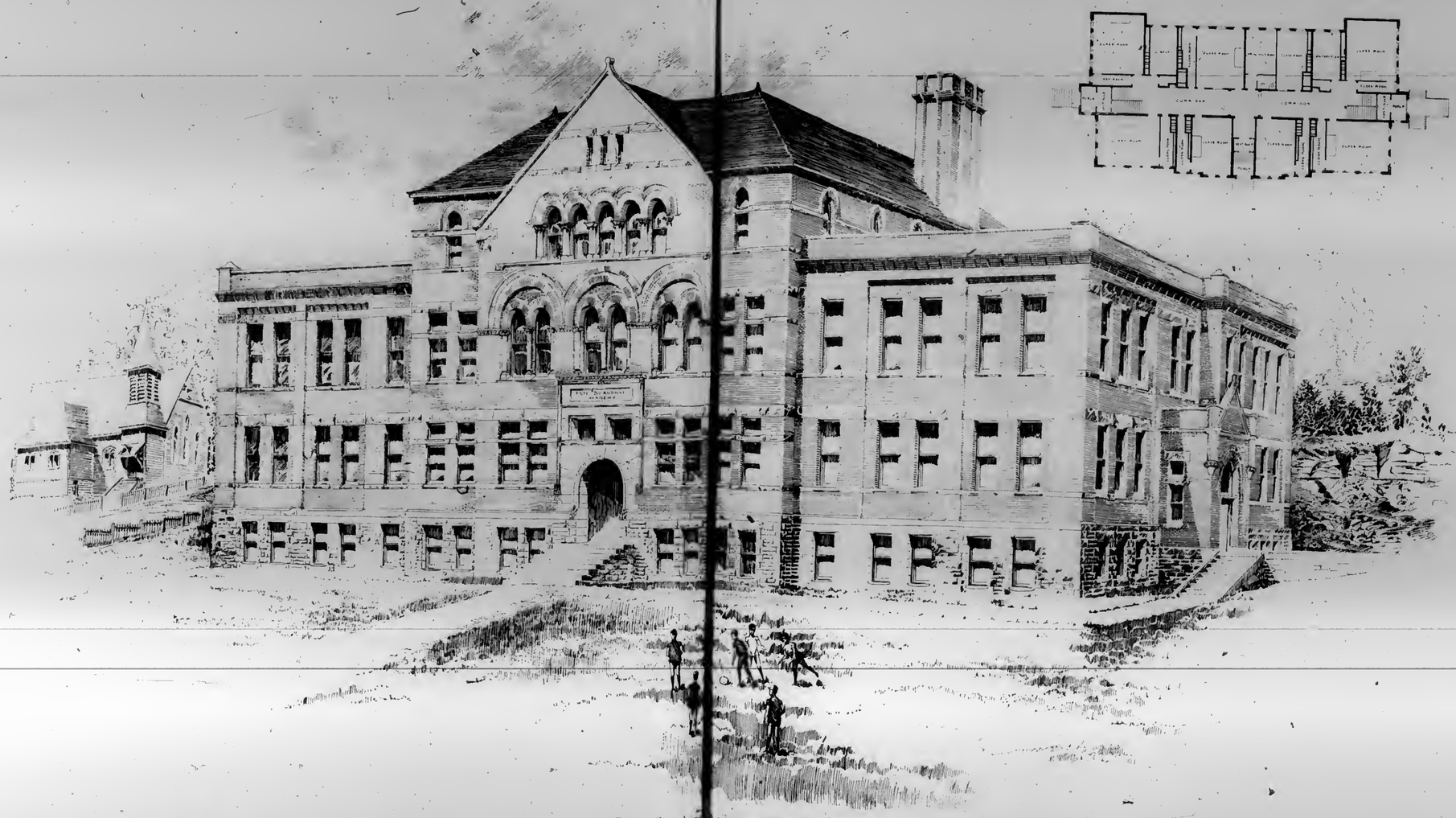
The drawing room, being more for afternoon and evening use, should face south to west. Here, I think, a square room is to be preferred—say 14 ft. by 14 ft.—with bays and ingle, and a plain ribbed plaster ceiling. There is a tendency to make ingle-nooks long, narrow, and high; this is out of character with the old traditions, as all old ones are just the reverse in every particular.

The kitchen should be of fair size, and the light preferably on the north or east side, so that the midday sun may not add to the heat. The windows should be at right angles to the fire, so that the light on the range may be unobstructed. The larder should have a similar aspect, and may open out of the scullery. The pantry is most useful near the dining room for easy service. The scullery should have sink and copper on the same side, under the window, and out of the draught of the door if possible; there should be two rows of 6 in. white tiles round the sink. The trades entrance and yard should be well away from the front door, and the space for coal and wood should be under cover and enclosed from the back porch. W. c. and ashpit are best distinct from the porch, and the former should not, as is too often the case lead out of the scullery. A small tool-house is useful for tools, stores of potatoes, etc. A good height for downstair rooms is 9 ft.

The first floor is gained by a light, easy, and wide staircase, alike convenient for all parts of the house, and the space underneath may be utilised for pantry or way to small cellar. The staircase, both up and down should be well lighted, and the landing so planned as to give easy access to four or five bedrooms, bath-room, box-room and w. c. Of the bedrooms, two should be of good size, and two or three smaller. A large bath-room with hot closet for airing linen is a great convenience; the shelves should be of open battens so that the heat may ascend. It is best to arrange the bath-rooms and w. c. over the scullery and outbuildings; by this means the circulation from the kitchen boiler is kept short, and breakages, should they unfortunately occur, do not cause so much damage.

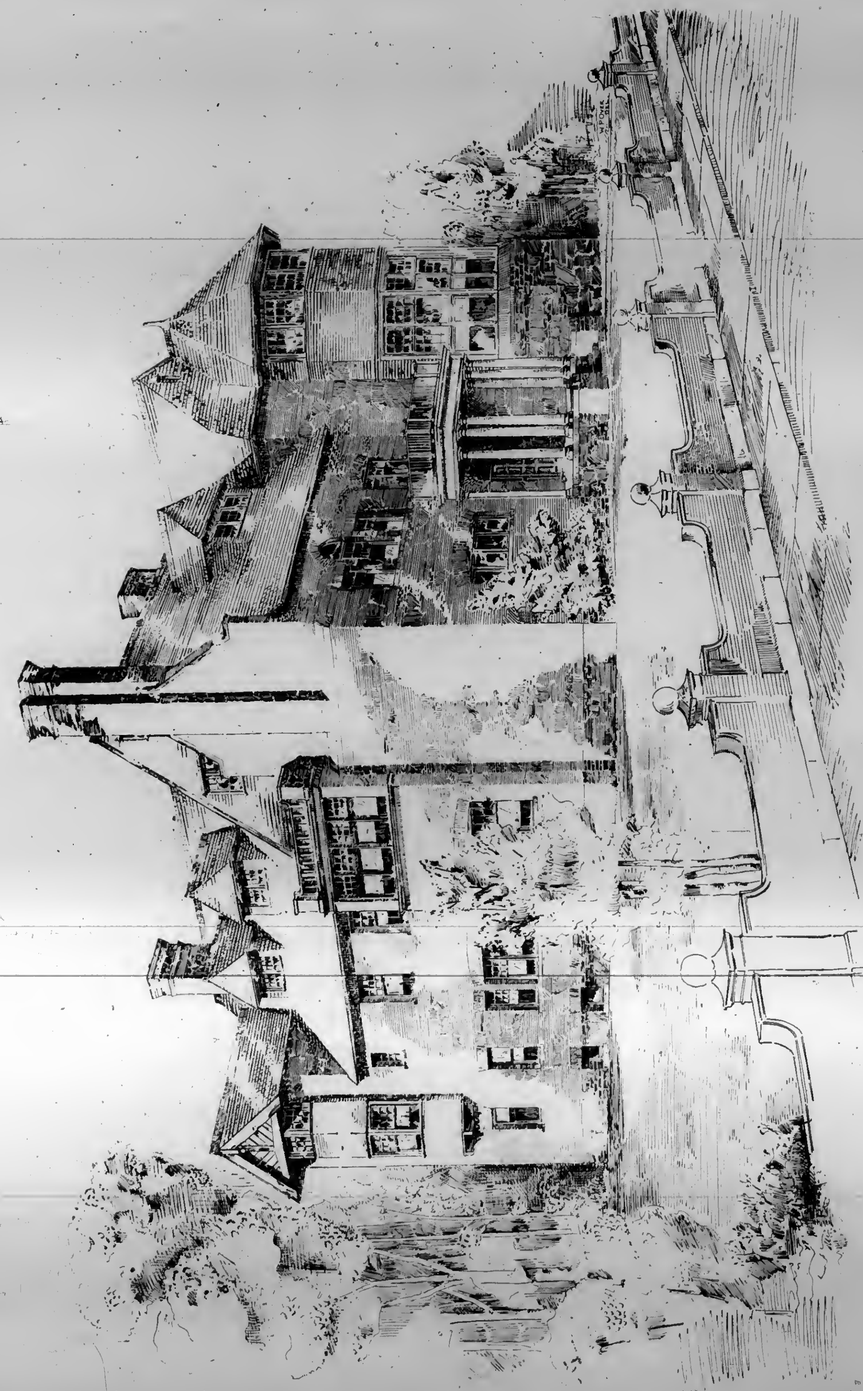
The bedrooms must be arranged with an idea as to the position of the bed, so that it may be shielded from the draught, and give a view of the fire to anyone in bed. Strong light opposite the bed is to be avoided. The roof can be started at 7 ft. and go off to 9 ft. in the centre.

* From a paper read before the Birmingham Architectural Association.

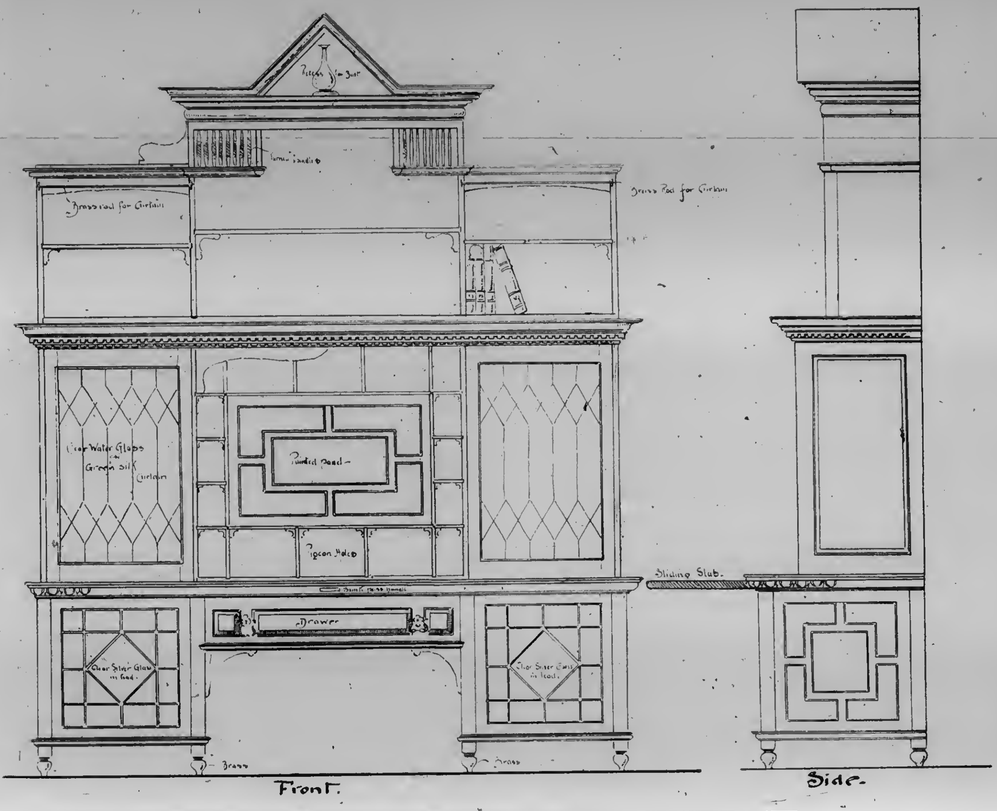


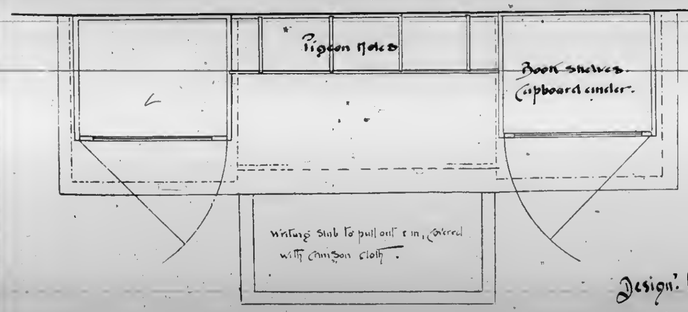
COTE ST. ANTOINE ACADEMY, MONTREAL.

ALEX. C. HUTCHISON, R.C.A., ARCHITECT, MONTREAL.



SKETCH FOR PROPOSED HOUSE FOR MR. A. DICKSON PATTERSON, TORONTO.
DARLING, STRATT & PEARSON, ARCHITECTS.





Book Case & Writing Table in Smoking Room, made in Rimu, Mottled Kauri, Rewa Rewa, & Mangeo, New Zealand woods for Cuyler A. Holland Esq^re

Design^d by R. MacGregor Fripp. F.R.I.B.A.
Vancouver B.C.

"Rievaulx Abbey"
S. Swale's del. 1894

CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—NO. 5. MAY, 1895 PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

D. B. DICK	Toronto.
W. A. EDWARDS	Hamilton.
F. J. ALEXANDER	Ottawa.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON — Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

J. Z. RESTHER	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
ROBT. FINDLAY	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. MCLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.
JOHN ALDRIDGE, 1st Vice-President.
WM. PARK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JAS. CRANG.
WM. PEARS.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
H. MARTIN.
THOS. CANNON, Jr.
JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this Journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

IN the competition for a museum at Cairo, mention of which was recently made in these columns, 73 designs were submitted. The Technical Committee appointed to examine the designs, have recommended that no first premium should be awarded, as none of the designs came sufficiently near meeting the requirements. They further recommended that four designs which most nearly fulfil the requirements, should be awarded a premium of £225 each, and that the second premium be given to No. 62, by Mr. Trauchet. Nos. 8, 28, 33 and 71 are given honorable mention. All the awards go to French architects.

A COMPANY composed of leading citizens of Montreal is applying for incorporation for the purpose of perfecting arrangements for an International Exhibition to be held in that city from the 24th of May to the 31st of October, 1896. The local architects are already engaged on the preparation of designs for the necessary buildings. Mr. Joseph H. Stiles, who was a member of the Committee on Awards in connection with the recent California Exposition, is Director General of the enterprise. An effort will shortly be made to interest every section of the Dominion in the undertaking. The promoters have taken this definite action after having visited Europe, and satisfied themselves that Great Britain will exhibit. In view of the ability, financial and otherwise, of the gentlemen who have taken this important matter in hand; there is little reason to doubt its ultimate success. If successfully carried out it should prove to be of incalculable benefit to Canada. The present seems an opportune time, when the commercial depression is lifting, to successfully launch the enterprise.

ARCHITECTURAL competitions are of late becoming more frequent. There seems to be a growing disposition on the part of church and other corporations to secure designs in this way, the object being to get their work done more cheaply. The falling off in building enterprises, consequent upon the commercial depression, has been favourable to the growth of the competition evil. Architects with little or nothing to do, have been tempted to disregard the ethics of the profession, and to enter competitions, depending on the slightest possible hope that they would derive some benefit therefrom. The apparent willingness of a certain number of architects to enter these competitions, has not only helped to propagate the evil, but has encouraged the promoters to more and more disregard the rights of competitors in framing the conditions. As is illustrated by an article published on another page concerning a competition on the Pacific Coast, architects are now invited to submit designs in competition without any provision being made to secure a proper award. They are distinctly told that the right is reserved to reject any or all the designs submitted, and no guarantee is given that in the event of a design being chosen, the author will be given the carrying out of the work. In other words the competitor is asked to place himself completely at the mercy of a body of men who in nine cases out of ten have not the slightest knowledge of the proper manner of conducting a competition, and who want to be at liberty to do as they please regardless of the rights of competitors. May we be permitted to enquire to

what greater injustice and indignity architects must be asked to submit themselves, before they will consider the time has come to call a halt. We are glad to see that at least one member of the profession on the Pacific Coast has unmistakeably shown that he considers the time has already arrived. Every reputable member of the profession who desires to maintain his own self respect, the esteem of his professional brethren and the welfare of the profession, should fall into line.

NEGOTIATIONS have been in progress since the first of the present month between the Toronto Builders' Exchange, representing the master builders of the city, and the masons', bricklayers' and labourers' unions, with the object of endeavoring to arrive at a satisfactory understanding with regard to the rate of wages to be paid now that the five years agreement between these bodies has expired. A number of conferences have been held and an agreement has been reached as between the Exchange and the Labourers' Union, under which the rate of wages will be reduced by about 20 per cent., or from twenty-one cents to eighteen cents per hour. It is understood that the master builders have expressed their willingness to come to an agreement on the same basis with the bricklayers' and masons' unions. Indeed we have been informed that the delegates appointed by these unions to negotiate with the master builders have reported in favor of an agreement on these terms, but their report has thus far not been ratified by the unions. It is to be hoped that the unions will see the advisability of acting on the advice of their delegates in this matter. If the labourers' union, which is least able to bear a reduction in wages, sees the necessity for such reduction, there is the more reason why the better paid trades should fall into line. It is scarcely necessary for us to point out that during the last three or four years the stagnant conditions prevailing in the building trades have borne heavily upon employers and employees alike. The former have found it extremely difficult to secure contracts, and the competition has been such that in order to secure work, contracts have had to be taken at very unprofitable figures. The employees have suffered from lack of employment, but when employed, they were paid the same rate of wages as in prosperous times. The employers have therefore been under the double disadvantage of having little to do, and of being compelled to pay high wages on such work as they could secure, while being at the same time forced by the keenness of competition to take contracts at unprofitable prices. In view of these circumstances, it would be most unwise for the unions to endeavor to maintain the rate of wages which prevailed under the recent agreement. Everything except labor has been forced down in price. The manufacturer and supply merchant have alike been compelled to cut prices, until it is estimated that prices of materials to-day are from twenty to thirty per cent. lower than five years ago. The unions should take a common sense view of the situation, and agree at once to accept, say a reduction of twenty per cent. We cannot imagine that they will be so blind to their own interests as to attempt to enforce payment of the present rate of wages. The result of such action would be to negative the benefits which are in prospect for both employers and employees from the improved conditions which are now commencing to be felt. It should be remembered that the price of labor is governed to a considerable extent by local conditions. What these conditions have been in the city of Toronto it is not necessary to describe. So far as the master builders are concerned, while they are firm in their determination not to renew an agreement on the basis of the one which has recently expired, they have shown their desire to meet the employees on any fair and reasonable ground. The settlement of the matter now rests with the unions, as their acceptance of the twenty per cent. reduction agreed to by the labourers' union will adjust matters for the present year at least. We do not believe that the master builders will be willing to again enter into a long term agreement, as their experience under the last one clearly demonstrated that the advantage of such an agreement is largely on the side of the employee. As has been pointed out, the employers were forced by this agreement to pay a much higher rate of wages than the conditions warranted. A point which should be guarded in any new agreement which may be entered into is, that the unions should bind themselves to expel any member of their organization who shall undertake contracts on his own account, and thus enter into competition with the legitimate master builder. It is understood that this is an evil from which the employers have suffered to a considerable extent during the recent depression.

THE ROYAL CANADIAN ACADEMY EXHIBITION.

THE architectural section of this exhibition has for the first time formed an important part of the exhibition. Even so, the profession is not widely enough represented. The drawings are nearly all by a few well-known Toronto men. Of members of the Ontario Association not residing in Toronto, there is but one exhibitor of original design, Mr. Fred. Henry, of London, and a couple of English sketches by Mr. W. L. Munro of Hamilton. Outside of the Ontario Association, there are but three exhibitors :—Mr. W. C. Harris, of Charlottetown, P. E. I.; Mr. A. T. Taylor, of Montreal, and Messrs. Clift & Pope, of Montreal, who sent in a set of competition drawings, which, contrary to the rules of the exhibition, were unframed, and were hung only at the request of the Ontario Association.

It can hardly be said, that the greater part of the drawings exhibited were exhibition drawings at all. They seemed to be, for the most part, office perspectives, made at any time in the last few years to show clients how their work would look, or to give the boys in the office practice. We would be the last to advocate a practice of misspending time in making pretty drawings of buildings, but on a special occasion of this kind, which is intended to appeal to the general public, who only understand a picturesque representation, a little of the spirit of the shop window architect, would have been in order. Canadian architects are always threatened by the idea that important work is best entrusted to an American architect from a larger city than Toronto, and it would be serviceable to the profession to make a good show occasionally, such as the public can understand. It is, however, apparent from this exhibition, that the important work which is being done now is in the hands of Canadian architects.

The largest piece of work is the Brockville Lunatic Asylum, designed by Mr. Tully, and recently completed. The perspective is on so small a scale that it needs a little calculation to convince the mind of its real extent, which must be at least 1,000 feet in length. There is, of course, repetition of pavilions, but the variable remainder is still of great extent. Mr. Tully also exhibits the original perspective of Trinity College—an old fashioned sepia drawing—and thus brings together what was probably his first and his most recent, though we hope not his last, great work. In the drawing of Trinity there appears a stone parapet wall to the terrace which was not executed, unfortunately it seems to us; the decisive base thus given to the building would have contributed greatly to its dignity. It is always difficult to have an adjunct of that kind executed at once, unless there is a consideration of pure utility to recommend it, and they appear to have been contented with a grass embankment at Trinity.

Next in size come the competition drawings of Messrs. Siddall & Baker and Mr. J. F. Brown, for the Legislative Buildings of Victoria, B. C. It is impossible to criticize these buildings fairly without the plans, but the plans would probably justify us in a suspicion of over windowing in parts. Mr. Brown's use of Romanesque forms is original and interesting, and without any of the brutal quality which, as in the case of the Ontario Parliament Buildings, is so often associated with that style. Of other large work, Messrs. Strickland & Symons' new Union Station, Toronto, has already appeared in the CANADIAN ARCHITECT AND BUILDER, is now sufficiently near completion to be a familiar object to Torontonians. It is modelled on an American type exemplified by the Illinois Central Station, at Chicago, but is a better design, and has had the peculiar difficulty of amalgamation with the old station, a difficulty which with that proceeding from the different levels, appears to have been skilfully met. The drawing by D. A. Gregg, about 3 × 5 feet in dimensions is a model of clear, serviceable perspective rendering, and should be studied by draughtsmen.

Mr. Lennox's design for the proposed new hotel, the next large piece of work, is also a beautiful drawing—indeed the drawing itself has so much claim to be considered as a work of art, that the tendency is to consider it apart from the design, and turning to Mr. Gregg's plain rendering of the Union Station which hangs next on the wall, one is compelled to admit

that it carries greater weight. Nevertheless, Mr. T. R. Johnson, who has signed a companion drawing of Mr. Lennox's Beard Estate Building, and is obviously the author of this, is to be congratulated upon a clear evidence of unusual talent. As to the hotel, if Toronto capitalists can build it, and Toronto's attractiveness can support it, we shall be very glad to see it. It may be questioned whether the received idea that hotels should be designed with some frivolity is correct, but this granted, the design in question is excellently carried out, amazingly so, when we consider that the style in which Mr. Lennox has worked out his large buildings, hitherto, is anything but frivolous. As a matter of fact, one feels sure that the gracefully projecting consoled cornices of this style mean galvanized iron, and sadness draws a veil over enthusiasm.

Mr. Burke's Simpson building of last year, now "the old Simpson building," will, we may suppose, be repeated in the more extensive new Simpson's building, which is about to rise from ashes. The problem, a packing box full of windows, is an exceedingly difficult one, and Mr. Burke had succeeded in giving a dignified solution without in the least entrenching upon the first requisite of such a building—abundance of light. Indeed the very determination to fulfil the conditions perfectly saved the design. Being full of light from top to bottom, the usual abrupt transition from solidity to plate glass is avoided, and though the show windows are unusually wide, the effect is unusually solid.

There is a design for a store front by Mr. Wickson, which, although it has a central gable brought by a pier plump down upon the middle of the girder, shows how suitable the mullioned gothic he has employed is for this kind of work: how much more suitable than the classic handling which has always prevailed. The English architects have now gone to Belgium in search of a style and the example has already made itself felt in this country and more of the same may be expected. If instead of looking merely for style our shop front designers would take a hint from the Flemish they ought to find the most characteristic fronts, which are simply mullions and glass from end to end, serviceable models for a store which is to be well lighted on each floor.

There are several other public and commercial buildings of various kinds which should be mentioned. Mr. Taylor, of Montreal, shows drawings of a new wing to the Art Gallery at Montreal, and the Notre Dame street branch of the Bank of Montreal, both of which are designed with knowledge and also well drawn. Mr. Taylor is evidently facile with his brush and has sent besides his own designs some water colour sketches of old buildings in Europe.

Messrs. Clift & Pope's design is a good commercial front.

Mr. D. B. Dick exhibits a photograph of the University Library and drawings of the interior of the library reading room and of the gymnasium. The stack room is the most interesting because the most straightforward part of the library. This cause and effect relation never fails. When will it be recognized as the only sure road to success?

Mr. Lennox's Athletic Club is a building of multifarious uses and has no leading motive such as the massive Romanesque requires. It is not a style that descends readily to the trifles of daily life.

The free handling of classic in Messrs. Gordon & Helliwell's competition drawing for the art gallery of Milwaukee is good.

Mr. Gouinlock's sketch for the Sheppard Publishing Co.'s building makes one hopeful for the coming Foresters' building.

Among the designs for churches, Mr. W. C. Harris, of Charlottetown, seems to have enjoyed the best opportunities and exhibits designs in a scholarly style for two handsome cut stone churches at Charlottetown. The interior of one of them is also exhibited and shows an octagonal crossing with the ceiling level with the nave and transepts, and showing outwardly as a small pyramid on the roof. A plan of this church would have been interesting.

Mr. Townsend has two very charming country churches which look to our mind as perfect in their way as any work of the living periods of church building. The wooden spires which make no profession of being stone and the country simplicity of other details do not impress one in the first place with their originality, they seem so fitting, but a closer inspection shows that this is original work of the first quality.

Mr. Darling who seems to be the church designer par excellence shows as great originality in another way. The examples shown, more costly than Mr. Townsend's, compare more directly in detail with old work, but the work is not so much an adaptation of gothic as an appropriation. It compares with old work but is essentially of our own generation. The modern multiplication of conveniences and the requirements of our climate, usually evaded by a designer or concealed under the exterior of an ancient church which had none of them, all appear as features in Mr. Darling's design and the result is that his churches have a touch of the same more highly organized character that distinguishes our modern domestic work from that of former periods. The type is thus somewhat altered but the gothic feeling is perfect and the variety and interest of the features increased.

It is precisely this more highly developed modernness that most of the other designs lack and which chills interest in them not only in spite of their "correctness" but because of it, for it is not correct now.

Mr. J. F. Brown opens up another question in a well worked out design for the Chester Mission of the Jarvis Street Baptist church. At first sight this appears to be a pretty little Anglican church with an apsidal chancel. The plan, which is inserted on a smaller scale, shows that what appears to be a chancel is in reality the infants' department at the entrance end of the church, the opposite end from the pulpit and choir. Is this good designing or not? It is an adaptation of an old external form to an internal use to which the old form is perfectly suited. Instead of looking upon it as a chancel clapped on to the wrong end of the church, we may consider it as an expansion of the apsidal baptistry which was common at the entrance end and was like this devoted to the young. Nevertheless the design is disturbing. The natural man abhors it but has no arguments. The truth probably is that whereas the chancel was the glory of a church, this infants' department is a mere adjunct, to be connected with the church occasionally by opening folding doors, and the real centre of interest, the pulpit and its surroundings, has probably no external expression but a flat wall and some little useful windows for the baptismal vestries, so that the design is in reality, turned round, proving once more the futility of imitation, even the cleverest.

Space fails to comment upon the dwelling house work, and indeed there are but few designs and no plans except on one of Mr. Townsend's drawings. There is little satisfaction in either looking at or discussing a dwelling house without knowing its plan. That which Mr. Townsend has shown for a $4,000 cottage in the country, is an admirable piece of work, and is carried out in elevation with the refinement and simplicity of true design. Scientific house planning is a study of our own days, and although the present exhibition is not strong in this class of work, it is satisfactory to know from papers that have been read in the Architectural Societies and printed in this journal, that the mind of the profession in Canada is turned towards its study; for it is the principles which have found acceptance in this branch of design that will be at the bottom of all true advance in architecture.

QUESTIONS AND ANSWERS.

H. Bros., Kincardine, Ont., write: We want to build a brick chimney 80 feet high, square chimney. What size should the base be for this chimney, and should cement or mortar be used.

ANSWER.—It will depend largely upon the nature of the soil upon which the chimney is to be built, as to the dimensions at the base. If built on clay soil, allow about three tons to the square foot; if on sand, about four tons to the square foot. You should take into consideration also, the thickness of the walls. Unless the chimney requires to be rapidly constructed, the use of cement mortar is not necessary; a good quality of ordinary mortar will be sufficient.

PERSONAL.

Mr. R. McKay Fripp, F.R.I.B.A., of Vancouver, has lately returned from a visit to Europe.

Mr. Edward Elliott, architect, Halifax, N. S., has recently associated with him in his practice Mr. Chas. H. Hopson, of Washington, D. C. The firm will hereafter be known as Elliott & Hopson.

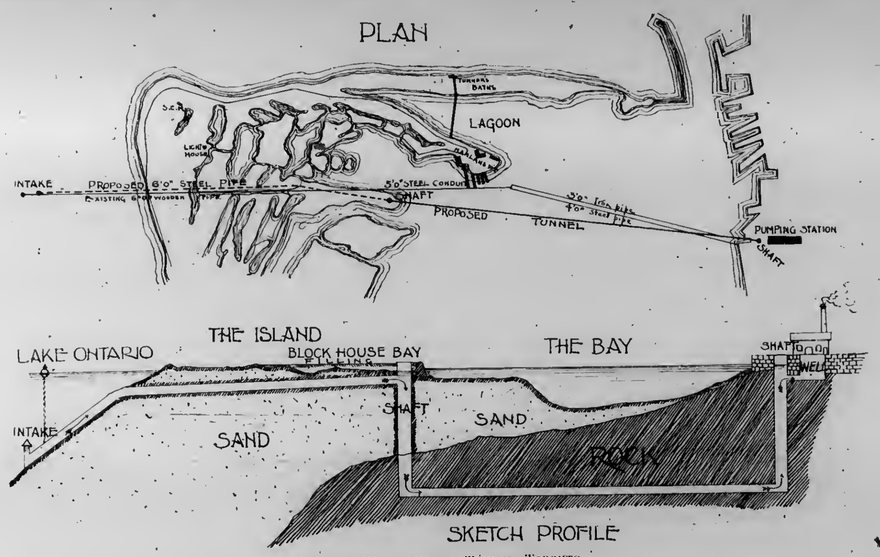
The death is announced at Hamilton, of Mr. Hiram King, who was engaged on the construction of the Desjardins Canal, Great Western and Hamilton and North-Western railways. Mr. King has resided in Hamilton since 1861. He was in his ninety-second year.

PROPOSED WATER WORKS TUNNEL.

So far as Toronto is concerned, her citizens will have a large interest in the proposed water works tunnel, an illustration of which is here given. The question of pure drinking water is one that calls for the best consideration of the people of every municipality, for it has been thoroughly established, and Toronto has had some bitter experience in this respect, that drinking water may be made the vehicle for conveying some of the worst forms of contagious disease.

How to remove the constant defects that have occurred in the Toronto Water Works system, has been a serious question with aldermen, City Engineer, and most thoughtful citizens, for years. The construction of a tunnel, as is now proposed, will, it is believed, prove a solution to these difficulties, and in the building of this tunnel, readers of the CANADIAN ARCHITECT AND BUILDER, whether residents of Toronto or not, will have a practical interest from an engineering standpoint.

As shown in the illustration, a shaft will be sunk at the pumping station of the Water Works, Toronto, to a depth of, at least, 100 feet, and it may be found necessary to go from 25 to 50 feet deeper. The diameter of the shaft will be 10 feet. Across at the Island, at what is familiarly known as Block House Bay, a second shaft of the same depth will be sunk. The length of the tunnel will, in round figures, be 6,000 feet, and 6½ feet diameter, running clear through the rock that is struck below. This rock partakes largely of the character of shale, but at the depth named is found to be of a very rock-like nature, hard and durable. The shale seams run parallel with the proposed tunnel, so that no trouble, or caving in, is anticipated in the construction of the work.



PROPOSED WATER WORKS TUNNEL, TORONTO.

Commencing again about 11 feet down in the second shaft, a steel pipe will be extended along to the intake, connecting there with another pipe, which, if the by-law is sanctioned by the people, will also be of steel. The pipe will be laid on a very slight incline, entering the intake at a depth of about 12 feet below the surface, and representing very much the appearance of water in a glass tube. The cost of the proposed steel pipe in the horse shoe shape, going into the intake, will be $75,000, and whilst its construction does not necessarily depend on the construction of the tunnel, yet it will form part of that work if the entire scheme is endorsed by the people. The total cost of the entire tunnel, including the new intake pipe, will be $525,000, and will be made to provide for the requirements of a city of 700,000 population.

The methods employed in tunnel building have changed so largely in recent years that the difficulties common in projects of the kind a quarter of a century ago are altogether unknown to-day. What with the compressed air rock-drills, steam and electric rock-drills, and the employment of high explosives, almost any reasonable scheme of tunnelling or excavation can be easily and successfully carried through. So important have been the developments in engineering science, that it is said a famous engineer once declared that he would undertake to tunnel straight through the earth from New York to Pekin, if the necessary capital would only be forthcoming. And yet, it is worth remembering that one needs only to go back 25 years to find that all tunnelling was done with hand-drills and gunpowder blasting. In the Toronto Water Works tunnel compressed air-drills will be used, and the nature of the rock at a depth of 128 feet having been examined, a sample of which is to be seen at the office of the City Engineer, this officer believes the way is clear for an easy completion of the work, when once entered upon.

The first important sub-aqueous tunnel was that under the Thames river, which was projected in 1798, but was not completed until 1843. It is believed that the Toronto tunnel can be completed inside of 18 months. Under the St. Clair there is a tunnel 6,050 feet long; under the Severn, one over four miles long, and the Mersey tunnel is 23,615 feet long, all completed within a reasonable period, so that it will be seen there has been good progress made in the construction of sub-aqueous tunnels, as well as in other directions of tunnel building, of late years.

Besides, in arriving at a correct estimate of the time for building the proposed tunnel, Toronto's Engineer has also other experience to guide him in arriving closely at the cost of the work. He has only to cross the lake to Rochester, N. Y., and there secure data of the cost and methods of building a tunnel of a similar character to that proposed by Toronto. Milwaukee also turns in its experience, whilst information is readily secured from other cities and municipalities.

In the building of the two shafts of the Toronto tunnel, either brick or concrete will be used. The latter would probably be the cheaper, but if, in its use, it should be found that defects showed themselves, then the resort would be to brick. The leading idea of the plan is to give Toronto a permanent work and after the amount of temporizing, at a terrible cost to its citizens, that has been indulged in, it seems reasonable to suppose that they would welcome something of a more enduring nature.

BRICK FOR STREET PAVEMENTS.

THE recommendation of City Engineer Keating, of Toronto, that $80,000 be expended in brick pavements, has, naturally, led to enquiries as to the wisdom of the suggestion, and should it be carried out, of the ability of brick manufacturers to meet the demand. Interest in the matter is accentuated from the fact that the Council of the City of London has had this question under consideration, and recently sent a deputation to leading American cities to make enquiries as to the utility of brick pavements. Winnipeg is also giving thought to the question, so that altogether brick for street pavements is becoming an active municipal problem.

At all times the subject of road-making is an important one for municipal bodies, and students of municipal engineering, though opinions and experience differ widely in different countries. In Great Britain, Germany, and other continental cities, wood paving is growing in favor, recent investigations in Berlin, that had been conducted with a thoroughness characteristic of the German people, and extending over a period of fifteen years, resulting in a verdict decidedly favorable to wood paving. In Canada and the United States, municipal bodies have shown a growing dislike for wood pavements. For a decade and more past, opinion has been growing in favor of asphalt, with brick, during more recent years, finding many strong advocates.

For street paving in Toronto brick has been very little used, though it may be news to not a few to learn that the following streets are paved with brick: Dundas street, from the bend to Lansdowne avenue; Lansdowne Ave., from Dundas to College; College, from Lansdowne Ave. to Bathurst; Bathurst, from Queen to Bloor, the pavement being laid between the street car rails only, and has been down about two years. Besides these streets, to a limited extent brick has been used for pavements in a few private lanes, and yards, where heavy traffic occurs. Just at the present time a lane in connection with the Gas Company's works, in the east end of Toronto, is being paved with brick by Messrs. Taylor Bros., of the Don Valley. This is in the line of an experiment, in anticipation of brick coming more widely into use for street pavements. Outside of these local instances, if we except a brick pavement on one of the main streets in the town of Chatham, laid in 1890, brick, as a paving material, has not been used in Ontario.

What is to be said in favor of brick paving? Contrasted with asphalt, it is claimed that it is less noisy. The objection against asphalt, because of its slippery nature in winter, rendering driving, in a measure, dangerous, will not hold good with brick so its friends allege, from the fact that horses are able to secure a foothold in the small spaces between the bricks, and this prevents their slipping. In point of sanitation brick and asphalt hold about the same position. Where necessity compels the tearing up of the road to effect repairs in gas mains, water pipes, and so on, bricks are more easily removed and replaced than asphalt.

If brick, however, is to come into active competition with asphalt the decision will rest largely on the price, and the ability of manufacturers to make a brick of the needed quality, and evenness throughout. The bricks used on Dundas, College and Bathurst streets were imported from the United States, and cost, laid down, from $20 to $23 per thousand. About half of this amount was represented in freight and duty. With bricks manufactured in our own country, this cost ought to be largely reduced, and yet, as we understand the temper of those who have looked into this matter, the cost would need to be brought down to about $12 a thousand, if the argument of cost of brick, as against asphalt, is to prove an important factor.

Are Canadian brick manufacturers in a position to make a satisfactory brick for street pavements, and in sufficient quantities to meet a large demand from leading municipalities? Why not? In the Don Valley and at the Humber, experts say that shale exists in abundance, suitable for making a good paving brick, so that Toronto is favorably situated for a brick industry. Mr. C. R. S. Dinnick has entered into the manufacture of vitrified brick at his manufactory, near Toronto Junction, and like others, looking forward to brick, coming into increased use for pavements, he has been putting himself in shape to meet a demand in this direction. In tests of vitrified bricks, made by Mr. C. H. C. Wright, of the School of Practical Science, Ontario bricks held a creditable place in contrast with bricks of well-known manufacturers in the United States.

It would seem, therefore, that there is much to be said favorable to brick paving, and if leading cities, like Toronto, London, and Winnipeg, are going to embark on work of this nature, there is encouragement for the extension of brick manufacture in Toronto, and other parts of Ontario.

OUR PUBLIC PARKS.

THE city of Toronto can boast of as many natural beauties of scenery in its parks and ravines, with their numerous glades and dells, as any large populously inhabitated centre can wish. The Torontonian is, generally speaking, proud of his city, and in all matters connected with municipal government is a law-abiding subject. There is one feature, however, in which his perversity and want of decorum may be said to earn for him the appellation, sometimes applied by provincial papers, of "hoggishness," and that is the determined way in which all these natural beauties are neglected and abused.

The condition of our public parks is deplorable. Apathy on the part of those charged with their proper maintenance leads the public to conduct itself in a manner which can find no parallel in any city of the size of ours. There is hardly a strip of boulevard which is not wantonly injured. The proper crossing place, or the appointed portion of sidewalk, is not put to its proper uses: a line across the grass is the rule. The earnest appeals of householders, who desire to keep their lawns trim and neat, are disregarded, and in public parks the rule is to avoid the path and spoil the sward.

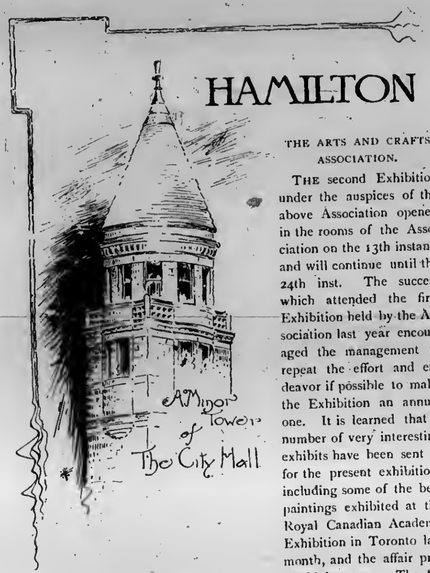
The Horticultural Gardens, which for many years were a most attractive place of resort, are spoiled by numerous tracks cut across the grass to the Pavilion. There is no necessity for shortening the distance from the Carlton street gate to the Pavilion; the beautiful broad walks, with their flower-flanked borders, are much more pleasant walking; the use of them will permit of the beautiful sward being cultivated, which has always been the charm of this pretty little breathing space, whereas, the well beaten track across the grass is worse than an eyesore. In the Rosedale ravines, and those passing northward to Reservoir Park, there lie attractions innumerable for the opening up of lovely vistas, of charmingly wooded hill sides, gracefully curving drives, and glimpses of scenery overhead and in front, as one would traverse them, were they put to a proper and suitable use.

But what of the Queen's Park? Is there a citizen who can visit another town or city without being ashamed and humiliated as he thinks of the condition of this park? The limited area for a public park which existed a few years ago has been sadly encroached upon by the erection of huge piles of stonework, till little of the ground seems to be left, and what remains is in a state of disorder, which is shameful to those charged with the maintenance of the grounds. Not only this; the conduct of the public in crossing the sward in every direction to make a cut-off, thereby breaking down fences, encroaching on boulevards and private property, has made the Queen's Park one of the most neglected and pitiable sights anyone would wish to see. No truly loyal citizen can take a stranger through the park with a feeling of pleasure. We spend large sums of money in advertising the advantages of the city, enumerating amongst other things its natural beauties. Can we call the Queen's Park one of them?

How do we compare in the maintenance of our public parks with such cities as Montreal and Halifax? The latter city, with a population of one-quarter of ours, has a public park which is a delight to all who visit it; whilst a visit to Montreal in summer makes one come home with a heavy heart to contemplate decay and ruin in every part of Queen's Park.

There are several associations who are interested in promoting the prosperity of the city for directly financial reasons. These of themselves are powerful enough to cause some immediate action being taken to mend the existing condition of the park, could they be induced to do so. They would soon receive the assistance of other associations, whose artistic pursuits and education would be invaluable in restoring to its natural beauty one of the most picturesque plots of pleasure ground any city can wish to possess.

Mr. G. Ernest Fairweather recently delivered a lecture on "Art and Architecture," at St. John, N. B.



HAMILTON

THE ARTS AND CRAFTS ASSOCIATION.

THE second Exhibition under the auspices of the above Association opened in the rooms of the Association on the 13th instant, and will continue until the 24th inst. The success which attended the first Exhibition held by the Association last year encouraged the management to repeat the effort and endeavor if possible to make the Exhibition an annual one. It is learned that a number of very interesting exhibits have been sent in for the present exhibition, including some of the best paintings exhibited at the Royal Canadian Academy Exhibition in Toronto last month, and the affair promises to be even more successful than the one held last year. The Association is doing excellent work, and is deserving of every encouragement at the hands of the citizens. It is one of the few institutions of the kind in Canada that have achieved a satisfactory measure of success, and should therefore be an object of pride to the city in which it is located.

The Association was originally founded in October, 1885, by a contribution of $50 each from fifty individual citizens who felt an interest in matters artistic, and in the improvement of handicraft on the part of mechanics and amateurs. The Association is held in high esteem by the artizan classes, inasmuch as it aims to enhance artistic skill and to insure public recognition to the artizan who produces meritorious work. At the Exhibitions of the Association the name of the artizan takes precedence of that of the firm with which he may be employed in connection with any exhibit of his work. This is a distinct departure from the method pursued at the various industrial exhibitions held throughout the Dominion. At these the name of the artizan is conspicuous by its absence. All exhibits are made in the name of the manufacturer, and no recognition whatever is given the skill of the artizan. The result of the different method pursued by the Arts and Crafts Association has been to stimulate artizans in various lines of manufacture in this city to put forth their highest skill, knowing that their name and work would

PUBLIC LIBRARY BUILDING, HAMILTON—HEADQUARTERS OF THE ARTS AND CRAFTS ASSOCIATION.

have to bear public criticism. The tendency has been towards bettering the position of the painstaking and skilful workman, while employers vie with one another in exhibiting the products of their manufactories and the skill of their workmen, and the public are educated to know and appreciate a good article, so that the result from every point of view is most gratifying.

During the past winter the students in attendance at the classes of the Association have not only had the benefit of trained instructors, but have listened at intervals to papers by practical men on such subjects as "Stained Glass," "The History of Architecture," "Wood Carving," "Furniture," etc. The subjects taught may be classed under the following heads:—Freehand, model, crayon, geometric, architectural, mechanical, perspective and memory drawing; shading, painting (oil and water color) from copies, casts and nature: painting portraits from life; modeling in clay or wax; wood carving; art needlework; casting; etching on copper; engraving; lithography; pen drawing for illustration; designing, as required for all industrial pursuits; practical plane, solid and descriptive geometry; architecture and engineering, with subsections of the same.

Students are privileged to work in the school seven or eight hours daily under an instructor who sees that no time is wasted, and can compete in about twenty-five sections, or study for medals and certificates granted by the Education Department of Ontario. A Sketching Club is organized during the summer vacation, each member paying a small entrance fee. The total amount of these fees, less postage, etc., is refunded to the members in the form of prizes. There is also in connection with the School an Art Literary Society. The efficiency of the

WALL PAPER DESIGN AWARDED DIPLOMA AT THE WORLD'S FAIR.

School may in some measure be judged by the fact that in the competition for scholarship at the Ecole des Beaux Arts, in Paris, whereat hundreds of the best students from all parts of the world competed, Mr. John Lyle, a late student of this school, took the third place in the Art subjects, and fifth place in modelling in clay, and gained his admission to what is considered the most advanced art academy known.

Mr. S. John Ireland, the Principal of the School, is exceptionally well qualified for the position he occupies, having had an unusually varied experience in the art and technical schools of England. It is a rare thing indeed to find a man who, like Mr. Ireland, has a practical knowledge of subjects so widely different from one another as water-colour drawing and machine design. Mr. Ireland is enthusiastically interested in the work in which he is engaged, and can be depended on to bring the efficiency of the school up to the highest possible point compatible with the means and appliances at his disposal.

There is one feature in connection with the institution which is open to criticism. The work of the students is judged by the Education Department of Ontario, which exercises control over the so-called "Government Art Schools" of the Province. If I am rightly informed, the names of the persons appointed to judge the merits of the work of the students are not disclosed, and there is no guarantee to the public that they are qualified for their duties. This fact has a tendency to weaken public confidence in the work of these institutions, and to limit the attendance and ambition of students. It is a well-known fact that the gentleman under whose control these art schools are placed has had no training for the position, and this fact has greatly retarded their success. If it is the intention of the Government to continue the yearly grants to these schools, they would do well to place them under control of a thoroughly qualified superintendent, and appoint equally well qualified persons, whose names should be given to the public, to pass judgment on the merits of the pupils.

In the ARCHITECT AND BUILDER for June some details will be

given of the Hamilton Arts and Crafts Association Exhibition now in progress.

ARCHITECTS' GRIEVANCES.

The local architects are complaining of the increased competition to which they are being subjected by builders. In most cities of Canada it is understood that the preparation of architectural plans and designs is finding its way more and more into the hands of properly trained architects, but in this city the opposite seems to be the case; the disposition of owners of property seems to be to dispense with the services of an architect in the belief that by so doing his fees can be saved. It is well known to those familiar with the subject, that the cheapest work often proves to be the dearest in the end, but most persons look only to the present advantage. The peculiar condition prevails in this city of builders entering into competition wherever possible with architects, and at the same time where the latter have work to be done, expecting the privilege of tendering upon it. An instance is cited in which an architect prepared designs for a building, and after calling for tenders was compelled by the owner to modify them in order to reduce the cost—again called for tenders with the result that the cost was declared to be still too high, and finally had the work taken out of his hands entirely and turned over to a builder. These are the kind of things with which Hamilton architect are contending at present, and some of them are in consequence feeling far from satisfied with their lot.

LEGAL.

THE case of the Royal Electric Co. v. Wand, and Wand, Plaintiff in Warranty, v. Walbank, decided in the Montreal courts recently, is one in which architects and contractors will doubtless feel an interest:

On the 17th April, 1889, a contract was entered into by which the principal defendant, Wand, undertook to build a brick chimney for the electric station of the principal plaintiff, at a fixed price of $3,300, and according to certain drawings and specifications made by the defendant in warranty (who as architect was to be the depositary thereof) in a good workmanlike and substantial manner, to his satisfaction and under his direction. In May 1893, the principal plaintiff instituted an action against the contractor, alleging in effect that the contractor had not built the chimney according to the rules of art, and that by reason of defects in its construction it had deteriorated to such an extent that it had been condemned by the city Building Inspector and by other skilled persons, who were of opinion that it would have to be partly demolished and reconstructed on a different plan; that in consequence it was taken down to the point indicated in the report of these experts, and reconstructed according to their advice, at a cost of $1,116, apart from the experts' fees, which amounted to a further sum of $165, making altogether $1,281.04. By the present action in warranty the plaintiff in warranty alleged in effect that he was not responsible to the principal plaintiff in the present suit, but if there was any responsibility, the same must fall upon the defendant in warranty as architect; that the plaintiff in warranty, as contractor, had carried out the drawings, plans and specifications with great care and in a workmanlike manner, with the best of materials, to the satisfaction of the architect, and that if any damages had arisen they had been caused by the faulty plans of the architect, and the responsibility must fall upon him. The defendant in warranty pleaded, first, a demurrer which was dismissed. Secondly, a plea to the merits, alleging in effect that the plans and specifications were correct and sufficient according to the rules of art in every respect, and the defects in the chimney were due to the fact that the contractor did not follow the plan nor carry out the specification provided for his guidance in certain respects pointed out in the plea. The plaintiff in warranty answered saying that he conformed to the plans and specifications, and to the instructions he received from the defendant in warranty, and that the work was done under his supervision. The principal defendant pleaded to the principal action, stating in effect what he had alleged in his action in warranty. The principal action was tried alone, and the principal defendant was condemned to pay the principal plaintiff the sum of $1,281.04, representing the cost of taking down and rebuilding the chimney according to the report of the experts. The court held that the plaintiff in warranty had failed to prove the material allegations of his declaration, and particularly that he constructed the chimney in question according to the drawings and specifications of the defendant in warranty, or that the damages resulting from the manner in which the chimney was built were caused by any defect in the drawings or specifications. The court held that the drawings and specifications were correct and sufficient and in accordance with the rules of art; that there was nothing unusual about them, or there would have been no difficulty in constructing the chimney in question in accordance therewith, and that, in fact, numerous chimneys had been constructed according to specifications substantially the same. The court further held that the plaintiff had departed from the drawings and specifications in several important and material respects. Instead of the inner wall or core of the chimney being carried up to the point indicated on the plan, and there united with the outer wall, it was carried up and united with the outer wall about 16 feet higher at the spring of the arches, and it was proved that this was the cause of the weakness of the chimney, and that the chief failure and defect in the chimney occurred at the place where the plaintiff united the wall, contrary to the defendant's plan. There was also a defect as to the holes for ventilation. The plaintiff in warranty should have consulted with the defendant in warranty, and followed his instructions if he did not fully comprehend the specifications. The weight of evidence went to establish that the damage to the chimney was not caused by wind pressure, but by the expansion of air, and that what contributed most to the cause of damage was the carrying up of the inner wall, and the failure to provide proper ventilation and to properly bond the chimney as required by the specifications. Upon the whole, the court came to the conclusion that the action of the plaintiff in warranty must be dismissed.

THE COMPETITION EVIL.

WE have received from Mr. Edw. Mallandaine, architect, Victoria, B. C., the following copy of a notice which recently appeared in the Pacific Builder, of Portland, Ore., and of a letter with reference thereto addressed by him to the Board of Supervisors:

NOTICE TO ARCHITECTS.

The board of supervisors of the county of Santa Cruz, state of California, ask for plans and specifications in detail for a county courthouse to be built on the lot owned by the county situated on the corner of Pacific avenue and Cooper street in the city of Santa Cruz. Two plans are asked for, one for an iron and steel fire-proof building, and the other a brick and stone combination. The building to consist of two storeys, and to be designed to provide for a courtroom and other rooms for offices for all the county officials, as well as a room for the board of supervisors, save and except an office for the county recorder, together with vaults for the county treasurer and county clerk, the necessary toilet rooms and other accessories to a building of that description. The cost of said building not to exceed $40,000. Plans and specifications will be received up to April 22, at 10 a. m. Each plan must be accompanied by a certified check for five per cent. of the estimated cost; conditioned that the architect whose plans are accepted will give good and sufficient bond that the cost of erecting said building shall not exceed the cost mentioned in his plans and specifications. All plans must be in black and white and addressed to the clerk of the board. The board reserves the right to reject any or all plans and specifications submitted. Ed. Martin, clerk.

(COPY)

VICTORIA, B. C., April 13th, 1895.

The Board of Supervisors for the County of Santa Cruz, Cal.
Ed. Martin, Secy.

SIRS,—The unmitigated insult to the profession at large set forth in your "Notice to Architects," (Pacific Builder) causes me to write and ask which of the two parties is more fit for Stockton—the one who drew up the notice or the lunatic at large who would act on it. The unblushing effrontery displayed is only equalled by the ignorance shown of all professional, not to say, business dealing.

I am, Sirs, &c.,
EDW. MALLANDAINE, Architect.

In placing the above material at our disposal, Mr. Mallandaine remarks that "it will show that at least one architect is to be found who can resent an insult to the profession."

MANUFACTURES AND MATERIALS

Mr. Theophile Girouard, St. Catharines, Ont., has patented an exterior finish for frame structures.

The Albert Mfg. Co., of Hillsborough, N. B., are making large shipments of their goods to Ontario.

The Gurney Stove & Range Co., limited, is applying for incorporation in Manitoba, with a capital stock of $50,000.

A handsomely printed and elaborately illustrated catalogue has been issued by Messrs. A. B. Ormsby & Co., 126 Queen St. east, Toronto, descriptive of their metal ceiling, wall decorations, etc.

The Metallic Roofing Co. of Toronto have issued a neat catalogue for 1895, illustrating their various brands of roofing, sheeting, corrugated iron, etc. Several illustrations of buildings on which their goods have been used are also published.

A sample of pure limestone from a quarry which is about to be opened at Lake Manitoba, is being exhibited at Winnipeg. The quarry is about 56 miles from Winnipeg. The stone will be conveyed by barges to Westbourne. The material is said to be very easy to work, and that on this account it will be able to compete with Selkirk sand-stone.

An order has been given by the Courts for the winding up of the British Columbia Pottery & Terra-Cotta Co., Limited. The company was incorporated in September, 1890, with headquarters at Victoria, and a nominal capital of $60,000 divided into 1,000 shares of $60.00 each, of which about $36,000 have been allotted and paid up in full. A liquidator will be appointed.

Mr. Wm. V. Williams, of Winnipeg, is about to commence the manufacture of a patent pressed brick, manufactured by a chemical process, and which, he claims, will revolutionize the existing order of things in the building trades. The brick, which can be made in any colour is said to be suitable for a variety of purposes, and to be cheap and durable. A company to manufacture is said to be in process of formation.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

At the last meeting of the Council of the above Association, Messrs. Resther and Findlay were appointed to the vacancy in the Council due to the retirement of Messrs. Dunlop and Gauthier.

THE ONTARIO LEGISLATIVE BUILDING.

THE Gazette of this city recently contained the following :—The complaint is made that the acoustics of the new Ontario Legislative chamber at Toronto, are so bad that the members cannot hear each other across the floor, and visitors in the gallery might as well be at a pantomime. Public opinion is divided as to whether the architect is a blunderer or an unconscious philanthropist. If all legislative chambers were arranged on like principles the members might give up talking, do nothing but work, and save both the ears and the purses of their countrymen.

THE LAND SURVEYORS' ASSOCIATION OF THE PROVINCE OF QUEBEC.

On the 10th of April was held the annual meeting of the above Association in the Government Buildings in Quebec. Matters of general interest were discussed by the 35 members present, and papers were read by Messrs. W. McLea Walbank on "Provincial Land Surveyors—What We Are and What We Will Have to Be," and by Mr. J. N. Castonguay on "Euclid as Applied to Surveying." At a meeting of the Board of Directors held the previous day, the following examiners were appointed for the ensuing year : Messrs. J. E. Mailhot, of Quebec ; B. C. Talbot, of Montmagny ; J. N. Castonguay, of Arthabaska ; D. C. Morency, of Levis, and W. McLea Walbank, of Montreal. The annual examinations were held immediately after the annual meeting and lasted until the 20th. There were seven candidates for admission to practice, of which one, Mr. J. E. Marion, passed. For admission to study the only candidate was Mr. Jerman, who passed successfully. The members of the Board of Directors, who are eligible for three years, are as follows : President, Messrs. A. Painchaud ; 1st Vice-Pres., W. McLea Walbank ; 2nd Vice-Pres., P. H. Dumais ; Secretary-Treasurer, C. E. Gauvin ; Syndic, George Roy, and Messrs. Thos. Breen, J. N. Castonguay, P. C. Talbot, J. E. Sirois, John Sullivan, D. C. Morency, J. P. B. Caspain, J. E. Mailhot, J. L. Michaud, F. X. Genest.

COUNCIL OF ART AND MANUFACTURES OF THE PROVINCE OF QUEBEC.

On Tuesday, the 30th inst., took place the official closing and distribution of prizes to the students of the evening classes of the Art and Manufactures School, with whose work the readers of the CANADIAN ARCHITECT AND BUILDER are already familiar, this institution having been the subject of my monthly correspondence in your November issue. The meeting was held in the Monument National on St. Lawrence street, in the same building as are now located the classes themselves, the accommodation at the old St. Gabriel street school having been found inadequate for the ever-increasing number of students.

There was a large and enthusiastic assemblage presided over by the President of the Council, Mr. L. J. Boivin, accompanied on the platform by the Vice-President, Mr. J. C. Wilson and Messrs. Hon. Judge Jette, Hon. Joseph Royal, Ex-Ald. Clendinneng, J. W. Hughes and others. The President opened the meeting by reading an address containing an historical sketch of the Council from its foundation up to the present date, accompanied by a most convincing proof of the great good conferred by the institution on apprentices in the several branches of the industries, and artist students, in giving them preliminary instruction in the great principles of art, and also treating of the greater good which must result in the future, to individuals, students and the country at large. The address was in substance as follows :

"Ladies and Gentlemen—I seize this opportunity afforded me by this distribution of prizes to the pupils of the night schools under the patronage of the Council of Arts, to say a few words as to the object the Government of this Province had in view in establishing that Council.

"On the 24th Dec., 1872, the act passed which legally constituted this Council to replace the old Board of Arts and Manufactures. The object of the Council, like that of the Board, its predecessor, is to advise the Commissioner of Agriculture and Civilization, and the Department of Public Instruction, as to all measures of a nature to develop the progress of Arts and Manufactures in this Province. Now that twenty-two years have elapsed since that period, when I recall to mind those who formed part of the first Council, it is impossible for me not to admire the wisdom which presided at the selection : the clergy, the liberal professions, journalism, trade and industry, were all represented.

"It is a generally admitted fact that the population of this Province have a natural talent and aptitude for handicraft, and especially for working in wood, iron and stone. There is probably not a single village which does not contain several youths who have a really remarkable talent for drawing. Unfortunately, this talent remains unknown and undeveloped through want of that technical education which we endeavor to give in our schools. It is very important that before learning a trade the workman should be able to trace on paper the model of what he wants to do, for drawing is the soul of all technical education. Once he knows how to draw he will easily understand and execut his work in wood or iron. If any article is made in accordance with the rules of drawing and geometry, it will not only be solid and useful, but will also have the elegance which will make it preferable to the purchaser. Take, for instance, the dress goods sold in our shops. Select two pieces of the same weight and quality ; there is no difference in the use for which both are intended. How is it, therefore, that one sells for 25 per cent. more than the other? The reason is very simple : the pattern or design of one is the work of a man who is educated in the art of his trade ; a workman who, during his apprenticeship, was not afraid to come and spend three evenings a week learning drawing, developing his intelligence and thereby securing for the future wages sometimes thrice as high as his companions, as intelligent and capable physically as himself—with this difference, however, that they neglected to learo while young. Examples might be multiplied indefinitely, but this one is sufficiently striking to convey my meaning.

"But, ladies and gentlemen, there is another and much higher consideration, which alone would suffice as a reason for the existence of these schools, and amply reward those who make sacrifices for their development. Man by nature loves and constantly seeks the beautiful. By developing this faculty he admires still more the handiwork of the Creator in all his surroundings. When he traces on paper a mountain, a river, a pure and cloudless sky, he sees everywhere the hand of the Great Master of all things. His soul rises higher and higher, his intelligence develops itself more rapidly, and the sense of beauty which he acquires will, without effort, inspire in him a sense of right. The workman, with the education suited to his trade, will not only always command better wages, but, from the fact of his intelligence being more fully developed, he will be a steadier workman. His cottage, however modest it may be, will be a model of cleanliness and taste. Thrift will reign in his home, because he will not have contracted bad habits in his youth, but it is in his great respect for the laws of his country that the State will reap its reward for the sacrifices it has made in educating the working man.

"Such, ladies and gentlemen, are some of the results which we have endeavored and are still endeavoring to obtain by further developing these working-man schools placed under our control. In looking over what has been done in twenty years, I was myself surprised at the great number of pupils who have been through our classes. I have made a summary of the attendance books of our various schools, and I find that, from 1872 to 1894, twenty-three thousand five hundred and seventy-five pupils have attended our classes. These classes are in Montreal, Quebec, Three Rivers, Sorel, Levis, St. Hyacinthe, St. Romuald, Sherbrooke, Huntingdon, St. Jerome, Granby, Chicoutimi, Farnham, Sillery, and for some years at Iberville. The Government of this Province has expended $185,200 in twenty-two years for the maintenance of these schools, say about $7.85 per pupil, making 35½c. per head per annum.

"I fancy I hear many of you asking of what use has this instruction been. What has become of the pupils who have passed through your schools during twenty-two years? The report of our Secretary for 1893 to the Honorable Commissioner of Agriculture, gives the answer to these questions. This report contains the names and occupations of 550 of our former pupils, who all fill important positions, either on their own account or as foremen in industrial establishments. Several of them are now in Paris or Rome continuing their studies. However, the number of those who owe their success to the instruction they have received in our schools is much larger, but you understand how difficult it is for us to discover their whereabouts. This, ladies and gentlemen, is what has been done in the past. The specimens of the work hanging on the walls show sufficiently what we are doing now.

The removal of our classes from premises which had become too small, to this splendid building, calls upon us to do much more than has been done in the past. New requirements demand our attention. To our classes in freehand, mechanical and architectural drawing, we will soon have to add classes of mechanical application. Pupils must be taught to apply to material substances the principles they have learned to put down on paper. Workshops with forges and turning lathes have become indispensable. Carriage-making, joiner-work, brick-making and laying, stone-cutting, making wooden patterns for iron and brass foundries, filing and polishing iron and wood, are so many things which want of means has hitherto prevented us from taking up. It is for you, gentlemen, who by your social position, are more especially charged with the duty of watching over the welfare of your fellow-citizens, to reflect upon the material and moral advantages that would flow from such a teaching.

And what have we done for the working-women. We frequently receive petitions asking us to do something for them. In our large towns there are those who are only waiting for the opportunity to acquire instruction in the various occupations which are suited to them. If we do not hasten to do something, the time is not far distant when they will work at many things which are now reserved for men. Most offices now employ women as stenographers, typewriters and assistant accountants. To my mind such a state of things is subversive of social order and can be productive of no good. Without doubt, women, at well as men, are subject to the law of labor, but we must carefully avoid whatever may contribute to lower woman's influence in the family. Let us give her cooking schools, where she can learn cooking, and study those industries which are specially suited to her sex—easier for her. Let them study needlework and crochet, which, with the aid of the study of drawing, might be made much more remunerative than any work they now do in shops, offices and factories. By developing the kind of instruction suited to working men and working women, we will escape those anomalies which threaten to subvert our social condition, to the detriment of the family, which is the basis of every well regulated society.

"Such, ladies and gentlemen, is a programme which is only slightly outlined, but which calls more and more for the attention of every citizen who wishes to promote the welfare of his fellow-citizens and of his country. In the first place, we must have those schools of application, of which I have just spoken, in which the great principles of mechanics would be applied, in which the future foremen of our large workshops would be trained, instead of our having to go abroad for them. I believe that before long our means will allow us to develop that portion of our programme. The installation of these workshops in schools are expensive, but fortunately there exists an establishment in Montreal with ample plant, which could be completed at a comparatively slight cost. I mean the institution founded by the executors of the late F. X Beaudry at the corner of St. Catherine and St. Urbain streets. Circumstances have not permitted these executors to give it the development which the testator had in view, but I have reason to believe that before long it will be again devoted to its object—the instruction of young workmen in the mechanical and industrial arts, and that an understanding will be arrived at between the Council and the administrators of that estate for the use of these workshops.

"We have everything needful for training our young men for the liberal professions ; we now have excellent commercial colleges, where those who wish to adopt business pursuits find everything necessary to prepare them for that important career ; but what have we for preparing those who are destined to industrial arts? Nothing, or almost nothing, and yet, gentlemen, the constant transformations of industry call continually for educated workmen to allow us to maintain an honorable position in this vast country. We must do here what is done in England, France and Germany : the municipalities must assist the Government. There are towns in England of from 3,000 to 4,000 souls, which allow these schools from $25,000 to $50,000 a year. How could the corporation of the city of Montreal more profitably employ a sum equal to our subsidy from the Government—$10,000 a year? With such an additional amount, the number of our pupils would soon reach 1,000 to 1,200. Montreal would become the great centre of industrial teaching for the whole country.

"The citizens who are always interested in seeing that their money is judiciously expended, should take an interest in the development of these studies to which they have hitherto been so indifferent. These, ladies and gentlemen, are the suggestions which I have thought proper to make on this occasion, where we have representatives of all classes of society assembled together. May these suggestions bear the fruit which I hope from them."

Then came speeches from Hon. Judge Jette and Hon. Jos. Royal, followed by a lecture on "Practical Education" by Mr. J. W. Hughes, which we regret, owing to pressure of space in this number, we are unable to publish.

The distribution of prizes, amounting to $145 in value, followed the speeches. The prizes were distributed in cash to the most deserving pupils of the different classes as follows :—

Freehand Drawing (Advanced)—Mr. E. Dyonnet, Teacher.—1st prize, S. Robertson, $10 ; 2nd prize, J. B. Lagace, $6 ; 3rd prize, N. Chaput, $4.

Freehand Drawing (Junior)—Messrs. E. Dyonnet and J. H. Egan, Teachers—1st prize, Jas. Gray, $8 ; 2nd prize, A. L. Dupont, $5 ; 2nd prize, B. Aubin, $5 ; 3rd prize, Geo. Moore, $4 ; 4th prize, W. Fleming, $3.

Architectural Drawing (Advanced)—Messrs. H. J. Peters and P. N. Picard, Teachers—1st prize, Charles Mitchell, $5 ; 2nd prize, A. Paquet, $4. Beginners—1st prize, E. Desautels, $5 ; 2nd prize, A. Caror., $3.

Mechanical Drawing, (First Season Pupils)—Messrs. J. T. Gardhan and Jos. Clement, Teachers—1st Prize, G. Wooley, $5 ; 2nd prize, F. Ponton, $3 ; 3rd prize, A. Reid, $2. Pupils of more than one season—1st prize, J. Boisclair, $5 ; 2nd prize, W. Pettigrew, $3 ; 3rd prize, J. Lacroix, $2.

Lithography—Mr. J. A. P. Labelle, Teacher—1st prize, H. Jackson, $4 ; 2nd prize, Jos. Gray, $3 ; 3rd prize, H. S. Nutter, $2.

Modelling—Mr. J. O. Gratton, Teacher—1st prize, E. Soucy, $4 ; 2nd prize, Louis Philion, $2 ; 3rd prize, A. Monastesse, $1.

Wood Carving—Same Teacher—1st prize, E. Laliberte, $3.

Plumbing (First Division)—Messrs. W. Britton and J. A. Peard, Teachers—1st prize, D. Coristine, $6 ; 2nd prize, H. Russell, $4 ; 3rd prize, Z. Bisson, $3 ; 4th prize, T. Daigle, $2. Second Division—1st prize, G. Guerin, $5 ; 2nd prize, J. Laroche, $3 ; 3rd prize, G. Jax, $2 ; 4th prize, A. Duclos, $1.

Stair Building and Building Construction—Mr. L. H. Blouin, Teacher—1st prize, J. B. Martineau, $5 ; 2nd prize, Jos. Laplante, $3 ; 3rd prize, H. Paquet, $2.

Prizes were also distributed to the Boot and Shoe Pattern Making Class, but are omitted, as they hardly interest our readers.

The exhibition of specimens of the pupils' work held from the 29th April to the 4th inst., on the occasion of the distribution of prizes, was located in the large Banqueting Hall of the Monument National, where each branch of the school established all through the Province, had a wall space and tables allotted to their exhibits. The first exhibit that met my eye as I entered was that of Levis, consisting mainly of mechanical drawings. These were accompanied by freehand drawings rendered in crayon, one of which, a floral study by Mr. Geo. Buckhand, is worthy of special mention. Mr. Jos. Turgeon exhibited a good drawing of the figure of a woman, as did also Mr. S. R. Page. If Quebec did not possess an extensive exhibit, it was nevertheless well represented by Mr. J. A. Gosselin with his drawing of a head of a child, and by Mr. A. Turcotte with his drawing of a typical old "habitant" of the French province, rendered in lead pencil, which, while not possessing all the brilliancy of the crayon, is none the less more pleasing

Montreal, as it might be supposed, had the most extensive exhibit : the advanced class of Freehand Drawing, the Modeling class, the Plumbing class, the Lithography class, all making a very good showing, but unfortunately half of the balance might as well have been left out altogether. The evident cause of the failure of the Architectural class is no doubt to be attributed to the fact that this class is mainly frequented by apprentices connected with the building trades, and who have had but one season's practice. The architectural student, having enough geometrical drawing practice during office hours, prefers to follow the course of the Modeling class or the Freehand Drawing class, where he is likely to derive more advantages. Mr. Charles Mitchell, a young architectural student, the winner of the first prize, exhibited drawings showing considerable skill, and his drawings in fact were the only exhibits of any interest in that section, one being a suburban residence in the colonial style rendered in water colors, and the other, two designs for school buildings, one of which was drawn in perspective in pen and ink.

In the Advanced Freehand Drawing class Mr. S. Robertson was without comparison the leader, all his drawings being nude studies of figures drawn in a sketchy way, and exhibiting a considerable knowledge of anatomy. Most of the other drawings exhibited were drawn from plaster casts executed by the pupils of the Modeling class of the school. Messrs. D. Coristine and H. Russell, of the Plumbing Class, have done work that could well compare with that of many excellent and experienced plumbers. The Modeling exhibit, although consisting of few specimens, was one of the finest in the Exhibition, and Mr. E. Sousy's work might fittingly find a place in the International Exhibition of Art.

Mr. A. C. Hutchison is daily expected to arrive home from his European tour.

I have been requested to state that Mr. Mann, the architect of the French Baptish church, corner of Cadieux and St. Catharines streets, which has been condemned and ordered to be torn down, is not Mr. Eric Mann, the well-known architect of St. John street. The latter gentleman, unfortunately, owing to similarity of name, has been getting credit in many quarters for the failure which this building has turned out to be.

STUDENTS' DEPARTMENT.

DOMES.

DOME is usually understood to mean a roof which is round or polygonal horizontally and of which any vertical section is either a round or a pointed arch. There happen to be none of elliptical or any other section than these. But some, especially in the East, have what is called an ogival outline, convex below and concave towards the top, and these are generally called cupolas, though there is no real distinction. Most of the great European domes have an opening or eye at the top, on which stands a lantern, except in the Pantheon at Rome, where the eye is open. Until modern times all the domes worth notice were of masonry—i. e., stone, brick, tiles, or pots, which last were used for lightness.

Pointed domes are much larger than hemispheres, having lost the flat top which has the greatest bursting pressure. A dome generally by the revolution of an equilateral arch, or one of sixty degrees, requires only a thickness of 0.137 diameter, 16½ in. for 100 ft., and one of seventy degrees requires 20 in. The tension at the bottom of a sixty-degree dome is only .15 of its weight, which weight, however, is 372 of a hemisphere on the same base, their heights being as 173 to 1.

For the same reason pointed domes are fitted for carrying a lantern, but they are not much benefited by tapering, having already lost the most oppressive parts. The Florence dome, across the flat sides of the polygon, is about seventy degrees of the circle of its curvature. Both in hemispherical and pointed domes the weight of the lantern they will carry varies practically as the cube of the thickness. Moreover, a lanterned dome requires tying much higher up than a plain one. In short, the cone is the only proper way of carrying a stone lantern. The cone at St. Paul's has a great chain round the base, which is probably superfluous, as the drum below it seems to be thick enough to contain the requisite slope, and visibly leans inwards besides.

Ribs inside a dome weaken more than strengthen it, as some persons imagine, unless they are themselves deep enough to be stable as independent arches, or unless they decrease in width and weight upwards like a lune, as those in the Pantheon do, which also is so enormously thick at the haunches that it has superabundant stability. Some of the Indian domes are thick enough for arches, and they have neither eyes nor lanterns. Polygonal domes may be considered as composed of a small number of widish lunes, and only differ from round ones in being rather weaker for any given thickness and size.

Domes require no wooden centering to build them on as arches do, until they get near the top—i. e., so long as each stone is laid on the ring of stones below it will not slide inwards. And if they are notched to prevent sliding the whole dome may be built without centering. The dome of Mousta in Malta was so built in this century by a common mason, who must, however, have been a man of genius. There would be no difficulty in building a dome of almost any size of bricks or stones, with the help of hoop iron in all the lower courses up to about twenty-three degrees from the bottom, and then less up to fifty-two degrees, and higher if it has to carry a lantern.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

MEMBERS and students of the above Association are invited to compete for a design for a seal, envelope and letter heading, to be delivered to the Secretary, 97 St. James Street, Montreal, before the 1st of August next. The design must be made so that the seal may be omitted or used as desired. The author of the best design will be awarded a prize of $10, the best four designs to be published in the CANADIAN ARCHITECT AND BUILDER.

USEFUL HINTS

There is an advantage in varnishing those parts of inside blinds which face the light, with good spar varnish. The exposure to weather and to the rays of the sun to which the facings of the blinds are subjected when closed, soon bleaches or blisters the ordinary furniture varnish that is commonly used on interior work. The exterior varnish being a slow dryer, withstands the elements much better than the varnish commonly used on interiors.

GLASS THAT EXCLUDES HEAT.—The announcement made of a German method of producing glass which will transmit light freely, but not heat, is supplemented by some details as to the process of manufacture. A plate of this material 4-10ths of an inch thick, containing 28 per cent. of iron in the form described as ferrous chloride, allowed only 4.06 per cent. of radiant heat to pass through it, while another plate of equal thickness, and and containing quite as much iron in the form of ferric chloride, permitted 11 2 per cent. to pass. The chemical distinction is very small, but the effect is said to be marked. A new thin slab of this glass permitted less than one per cent. of the heat of gas flames to pass, although transmitting 12 per cent. of heat from sunlight. Ordinary window glass, on the other hand, lets some 86 per cent. of heat through.

WM. TALLMAN. Established 1870. W. F. TALLMAN.

Beamsville Pressed Brick Co.

MANUFACTURERS OF

Fine Pressed and Ornamental

BRICKS . TERRA COTTA

RED, BROWN, BUFF AND OTHER SHADES.

COMMON BRICK, FARM, DRAIN AND ROOFING TILE, ETC.

Our goods have stood the test of a quarter of a century, and have been pronounced second to none in every respect. They are being used in the very best buildings in the country, which in itself is sufficient evidence of their quality. We are now prepared to supply TERRA COTTA and ROOFING TILE in any quantities. Write us for prices. Address all communications to

Branch Office: 146 St. James Street, Montreal. . . . BEAMSVILLE, ONT.

THE

Port Credit Pressed Brick & Terra Cotta Co.

(LIMITED)

MANUFACTURERS OF

PRESSED BRICK

TERRA COTTA . . . DRAIN AND ROOFING TILE

. . . . ENAMELLED BRICKS—various colors . . . .

Works: PORT CREDIT, ONT. Office, 52 Colborne Street, TORONTO

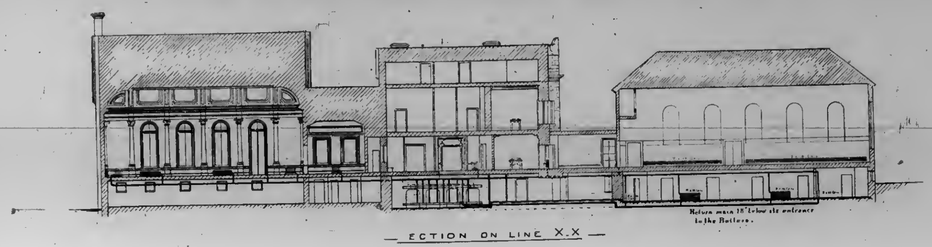
Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

STORE OF MESSRS CATTO & SON
NOS. 57-61 KING STREET EAST
TORONTO CANADA

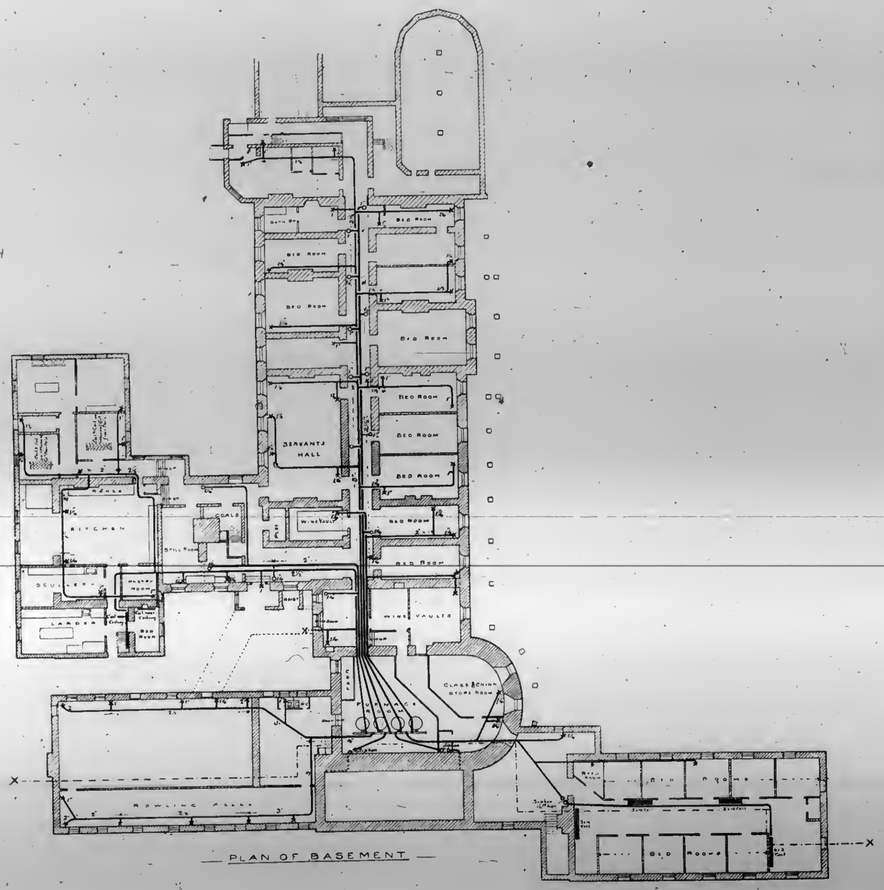
LANGLEY & LANGLEY. ARCHTS.
CANADA LIFE CHAMBERS.

tects
ring
once
vail-
ndow
st six
ntil a
night

PLAN SHOWING THE HEATING APPARATUS, OF GOVERNMENT HOUSE, OTTAWA ONT..



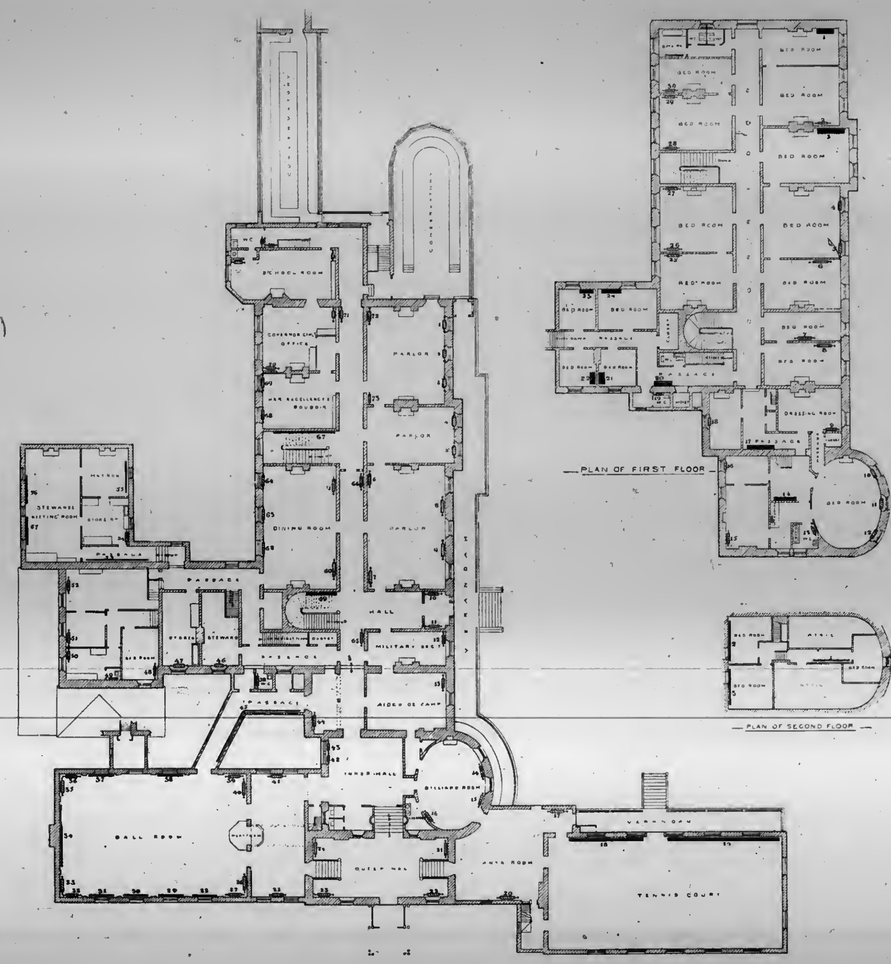
SECTION ON LINE X.X



PLAN OF BASEMENT

VOL. VIII.] CANADIAN ARCHITECT AND BUILDER. [NO. 5.

PLAN SHOWING THE HEATING APPARATUS. OF GOVERNMENT HOUSE OTTAWA ONT..



PLAN OF GROUND FLOOR

PLAN OF FIRST FLOOR

PLAN OF SECOND FLOOR

SKETCH OF RESIDENCE FOR HOWARD ST.:

T. GOLDSTONE, DES. AND DEL.

CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—NO. 6. JUNE, 1895 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, -- TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

D. B. DICK	Toronto.
W. A. EDWARDS	Hamilton.
F. J. ALEXANDER	Ottawa.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

J. Z. RESTHER	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
ROBT. FINDLAY	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. MCLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.
JOHN ALDRIDGE, 1st Vice-President.
WM. PARKS, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JAS. CRANG.
WM. PEARS.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
H. MARTIN.
THOS. CANNON, Jr.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

THE movement for a Dominion organization of Canadian Master Plumbers is still being pushed forward, the Montreal and Ottawa local associations being the prime movers. The plumbers throughout Ontario and the maritime provinces have been invited to consider the question, and an effort will be made to hold a preliminary meeting for organization in the near future. The Montreal association at least appear to be desirous that the proposed Canadian Association should affiliate with the National Plumbers' Association of the United States. To what extent this feeling is shared by the local associations in Toronto, St. John, and elsewhere, has not been learned.

REFERRING to the article on another page concerning tests of fire-proofing material made recently at Deseronto, somewhat similar tests took place recently in Boston of several kinds of wood which had been rendered fire-proof by the injection of fire-proofing compounds. The process consists of forcing by hydraulic pressure a chemical solution into the substance of the wood or other material. A structure built of wood thus chemically prepared was blackened and carbonized to a depth of one-half or three-quarters of an inch, but otherwise remained unimpaired under the action of heat so intense as to melt the window glass. There appears to be no doubt that wood thus prepared will resist the action of fire, but the fact that its preparation costs from twenty-five to thirty dollars per thousand feet, is sufficient to prevent the process from coming largely into use. Porous terra cotta, on the other hand, is not only equally capable of resisting fire, but is likewise very moderate in cost, and has other properties which commend its use in building construction even where it is not required as a fire-proof material.

THE collapse of several large buildings in New York city recently, resulting in the killing of a number of persons, has drawn public attention to the necessity for the proper education of architects. In the case of one of the buildings referred to, a tenement house on Orchard street, the jury found the owner, the contractor and the building inspector to be criminally negligent in having used and allowed inferior material and workmanship. The plans also were found to be seriously defective, brick piers in the basement being loaded to the extent of ninety tons to the square foot, while the limit allowed by law was but eight tons to the foot. The architect of the building was practically unknown in the profession. The jury who investigated the circumstances in connection with the collapse of the building close their report as follows: "The most efficient check which could be placed upon practices of the kind which have led to this disaster, would be the licensing of all architects, who should be required to undergo a thorough examination as to their qualifications to practise an art upon which the lives of so many people depend." Legislation of this character the Ontario Association of Architects have been endeavoring for several years past to have placed on the statute books of the Province of Ontario, and it is to be hoped that their petition will be granted before disasters similar to those which have occurred in New York shall be witnessed in this country.

IN reply to a letter from Mr. Jas. Robertson, of Montreal, concerning the use of galvanized pipe for conducting water into buildings for drinking and culinary purposes, Prof. J. T. Ronald, of Bishop's College, writes as follows: "Certainly it is unwise to use such pipes for the distribution of water for domestic use; some waters would in all probability have very little effect on the zinc, others again might dissolve notable quantities of this metal, and all compounds of zinc which are soluble are poisonous. It therefore follows that in some cases no trouble would arise from the use of galvanized pipe, whilst in other cases such pipe might be the means of introducing into the water a larger or smaller quantity of a corrosive zinc compound. It would be safer not to use such pipe."

THE second appeal of Mr. Neelon, the contractor for the Toronto City buildings, from the decision of the lower courts, refusing him an injunction to restrain Mr. Lennox, the architect of the building, from interfering with or preventing him from carrying on the work on the building under his contract with the corporation, and to compel the defendants to deliver up possession of the works and for other relief, has been dismissed by the Court of Appeal, with costs against the plaintiff. The ground on which the trial judge refused the petition of the plaintiff was that under the contract the architect had power to dismiss the plaintiff without the consent of the court house committee of the City Council. It has not been learned whether it is the intention of the plaintiff to carry the appeal further.

A REAL estate boom similar to the one experienced by Toronto a few years ago, appears to be setting in at Buffalo, and speculation in land and building in that city, is at present unusually brisk. Several Toronto real estate men are said to be operating at Buffalo, neglectful of the experience which many of their class received in Toronto so recently. As mentioned elsewhere, a number of Canadian contractors have also gone to Buffalo in view of the extensive building operations which are in progress in that city this year. It is believed that the Buffalo boom is on a somewhat more solid foundation than the one through which Toronto passed. The location of the city is such that it is believed to be certain to become one of the greatest commercial and manufacturing centers of the Uniten States.

In our Montreal correspondence we print a petition which has recently been presented to the City Council of Montreal, by the Council of the Province of Quebec Association of Architects, asking that a committee be appointed to supervise the erection of public monuments, the laying out of parks, etc, in that city. We are pleased to see this action taken, and trust that the example of the Province of Quebec Association will be followed by the Ontario Association of Architects, so that if possible the appointment of committees of this character may be secured in the leading Canadian cities. The need of some properly qualified authority to govern the erection of public monuments is apparent in Toronto at the present time. Had such a committee been in existence, the Volunteer Monument now in the course of erection in Queen's Park would probably have occupied a different site. The proper place for monuments of this character would be in the rear of the Parliament buildings. The space in front of the buildings should be reserved for statues, and the mixing up of statues and public monuments of the character of the one mentioned should not be permitted.

No understanding has yet been arrived at between the Builders' Exchange, representing the master builders of Toronto, and the bricklayers' and stone masons' unions, for the renewal of an agreement to govern the rate of wages to be paid the workmen in these trades. The only union with which an understanding has been reached is that of the labourers. The other trades are apparently not satisfied to accept the reduction of about 20 per cent. agreed to by the labourers' union, and we feel quite safe in saying that these are the best terms which they will be able to make. In an article elsewhere in this paper, the fact is mentioned that contracts are being taken to-day at one-half the figures obtained twenty years ago, and that never before in the history of Canada were prices so low as at present. Under these circumstances it is folly in the extreme for the trades unions to demand or expect to be paid the same rate of wages as they have been accustomed to receive hitherto. We are informed that owing to the refusal of the unions to moderate their demands, a number of their members are deserting their ranks and are making their own terms with the employers, whilst others are being expelled owing to their inability to pay their dues. From these two causes the strength of the unions is being sapped, and they have everything to gain by endeavoring to come to an early understanding with the employers.

THE information comes from London that electric radiators have been successfully employed as a means of temporarily heating the Vaudeville theatre in that city, and that in consequence electric heating is likely to come into use in a number of public buildings in that city. The advantages of the electric system are that radiators can be placed in out of the way corners which would be difficult to heat by steam pipes, and that they can be stored away when not required for use. While the system is undoubtedly more expensive than steam while in operation, yet less than half the time is required to bring the temperature of a public building up to the required standard of comfort than when steam is used: thus the extra cost while in operation in offset by the shorter time in which it performs its work. Another advantage is, that the temperature can be perfectly regulated to suit the requirements, and the employment of skilled attendants is to a large extent avoided. The question as to what heating methods will be employed in the future is an interesting one. One thing is absolutely certain, viz., that the use of coal as a means of generating heat is not likely to be continued much longer. The manner in which gas is superseding coal for cooking purposes shows clearly the trend of public opinion. The coal stove is being banished from the kitchen, and it is safe to say that the coal furnace will soon follow.

WHILE a fair amount of building is being done throughout Canada this season, contracts are being taken at figures lower than ever before, and consequently there is little profit in the work. A warehouse building which was destroyed in the recent Toronto fires is being rebuilt at exactly one-half its original cost. In other words, a building which twenty-one years ago cost $12,000, is now being put up for $6,000. At the time it was originally built, the brickwork cost $15.00 per thousand, as against $11.00 per thousand to-day. Prices of material have also gone down, but it cannot be said that the cost of manufacture, in the case of brick, for instance, has been reduced in like proportion. It is true that by means of improved machinery the cost of making brick has been considerably reduced, but on the other hand the cost of burning has increased by about $1.00 per thousand as the result of the increased cost of fuel. Apparently, the keenness of competition has served to reduce tenders in other cities as well as Toronto. As an illustration of this, the contract for one of the new churches to be erected in London, is said to have been let at about $10,000 below the architect's estimate. The majority of contractors have been so long without employment that now an improvement has set in, they are willing to tender at ridiculuously low figures in the hope of securing work. The result of such a state of affairs is by no means satisfactory. It tends towards inferior work both on the part of the contractor and the architect, as the latter is affected by low prices in the same way as the former. Cheap work by contractors means additional worry for the architect and reduced commissions. We learn that quite a number of contractors have recently gone to Buffalo and other American cities where building operations are brisk, and this will no doubt tend in some measure to improve the condition of things in this country.

News comes from New Brunswick that the St. George Red Granite Works have ceased operations because of the refusal of the employees to accept a decrease in wages, demanded of them because of the competition of Scotch granite in Western Canada.

Mr. Charles T. Cote, inspector of factories for the City of Quebec, and Mr. Joseph Lessard, inspector of factories for the Montreal district, have been appointed inspectors of religious institutions for their districts, to enforce the new Provincial laws respecting the safety of those buildings.

SURVEY OF THE BUILDING SEASON.

Is work looking up? This is a question asked by most men engaged in the building trades, and with midsummer well nigh reached, it ought to be possible to provide an intelligent answer. In Toronto, as an outcome of the great fires the early part of the year, a number of large buildings are under construction. Permits have been issued for the erection of the new store for R. Simpson, the Globe office, McKinnon's wholesale warehouse, Rooney & Co.'s warehouse and several other structures in the business districts of the city. The new Foresters' building is also a work of some magnitude, and it is being pushed forward with energy. These taken altogether will run the permits of 1895 into large figures. This work, however, acceptable as it is, is yet abnormal, and cannot be taken as representing a genuine revival in the building trades. Go outside of these contracts and the figures in Toronto will not total up very large. Few contracts have been let for house building. Drawings are completed for a number of private residences, and in some cases permits have been issued and the work commenced, but these are not sufficiently numerous to cut a large figure in any estimate of the building operations of the season. Briefly stated, it has to be admitted that the depression in the building trades that has been a feature for several years, since the days of the breaking of the real estate boom, still continues.

Some factors that enter into building operations, if not new, are deserving of consideration. The recklessness that characterizes tendering for work this year is fully as manifest as in some of the worst years of the recent past. A study of the tenders that come in for almost any class of work, whether on a small scale, or some of the more extensive operations, is full of interest. On a contract running into a few thousand dollars, there will be sufficient difference between the highest and lowest tenders to indicate that good judgment, much less business commonsense, has had little to do in the calculations. This is a condition that reacts upon everyone associated with building operations. The man who contracts to do a job at 25 per cent. less than a profitable price must even up somewhere, or else the time will speedily come when he will count out, and creditors will suffer. As it is, building supply men have prices forced down to a figure that means no profit to them, and necessarily, wages must come down with other values. The architect suffers, for with every decrease in the estimated cost of building, his percentage experiences a decline. Of course, the argument is that if one man does not tender low, his neighbor will do so, and get the job. This explanation does not remedy the evil, and emphasizes the great need there is for men engaged in the building trades arriving at something like a sensible policy in placing tenders.

There is a lot of nonsense talked about the benefits that come to the masses when low values prevail. A study of economic laws and the lesson of careful observation is, that business thrives when prices are reasonably high, and it is when values have the life squeezed out of them, so to speak, that every individual in the commonwealth is a sufferer. Wheat at 50c a bushel may seem to mean cheap flour for the masses, but the past year's history of wheat in Canada runs parallel with a season of depression in which all classes have suffered. With this important article of consumption now doubled in value word comes that business is on the turn, values hardening in all important lines, wages being advanced, and good times returning. This hardening of values, that is reported in iron, steel, hides, wheat, and other products, unfortunately, does not find any immediate placement in the building trades of Canada, though there is reason to believe, that in the near future, conditions will change here, as they are changing in the country to the south of us.

Prices for building material have seldom been more depressed than this season. To quote the words of a leading Toronto architect: "Bricks can be bought almost at one's own price, stone is simply not in the calculation, so demoralized is trade in this line, Portland cements are certainly away down, sewer pipe is cheap enough to suit anyone, lumber is showing some tendency to advance, though current prices here have not changed much, iron and steel, being the only supplies that enter into building construction where prices are hardening."

The conditions that prevail in Toronto are in the main illustrative of the situation generally throughout the province, and other parts of the Dominion. London has been helped, as Toronto, by fire, and two leading churches, that were destroyed this year, are being replaced by new and handsome structures. With this exception, there is no building boom in the Forest City. Steady progress is being made in building lines in Hamilton, and the people of that city are satisfied with this growth, but no great things are to be reported from there. And so one might run through the leading cities and larger towns throughout the Dominion.

Building in Toronto will be helped later when the demand for habitable houses more nearly reaches the supply, and with a revival in general business, this day will not be very long postponed. In country towns and rural districts building this season is fully up to, and probably, ahead of late years, many important buildings in the line of school houses, and other public institutions being in course of erection. Taking the Dominion over the season will, on the whole, maintain the average of recent years, with the outlook for the future improving.

WATER HAMMER IN STEAM PIPES.

Recently numerous explosions of high-pressure steam pipes led a German engineer to call special attention to the great danger from water hammer. To prove this experiments were undertaken to show the high pressure in a pipe when water hammer occurs. A pipe 12 inches in diameter, ¼-inch thick and 21 feet long, blank-flanged at one end, was partially filled with water, and at the other end steam supplied through a three-inch pipe. Three pressure gauges at equal distances were screwed to the pipe and one in the black flange. When steam of five atmospheres, 73 pounds per square inch, was admitted suddenly above the water, the pressure gauges indicated respectively pressures of 426 pounds, 114 pounds, 199 pounds and 114 pounds per square inch, or nearly 30, 8, 14 and 8 atmospheres. When steam entered slowly again above the water, hardly any concussions and abnormal pressures were noticed. Steam was then admitted through a valve 2 inches in diameter, and the steam, at a pressure of 5 atmospheres, now entered below the water. The concussion was so violent that the threads of four of the nuts were shorn off, the fourth gauge placed there was crushed, though the gauges were designed for a maximum pressure of 2,133 pounds per square inch, while the other gauges indicated pressures of 483, 385 and 923 pounds per square inch. The end of the pipe bulged considerably. On a new trial the first three gauges registered 313 pounds, 185 pounds and 853 pounds per square inch, the fourth, refitted, over 2,130 pounds; a rent of eight inches in length formed, starting about four inches from the far end. This damaged part was then cut off, the pipe closed again, and the water level lowered to 63¾ inches; pressures of 498 pounds, 498 pounds and 853 pounds per square inch were then observed. The water level was then raised to 10 inches and steam turned on again; this time two bolts broke in the end plate, and fissures formed near the middle of the pipe. In all cases air and water were thrown out through the air and water outlets. This occurred always in sudden rushes, after an interval of 15 seconds, when steam was turned on fully, and of several up to four minutes, when the valve was only partially opened, to one-fifth in the last instance. Only part of the water was forced out; a minimum of 3 inches always remained in the pipe. The experiments prove that the blow did not begin before the steam had condensed and the water had acquired the respective temperature. The different indications of the gauges seem to show that the blow was propagated in waves, which affected the pressure gauges according to their positions. The maximum pressure observed was 30 times higher than that of the steam which caused the concussion. If we consider that the steam inlet had only one-thirtieth of the area of the steam pipe, that steam pressures of three times the intensity of those experimented with are actually used on shipboard, and that part of a pipe might, under circumstances, be entirely filled with water, we must admit that these lodgments of water may lead to most disastrous consequences.—Engineer and Iron Trades Advertiser.

The corner stone of a new Catholic church at Cobourg, Ont., was laid on the 9th inst.

The Standard Drain Pipe Company, of St Johns, Que., have elected the following officers: President, W. C. Trotter; Vice-President, Capt. Chas. Coursol; Directors, G. H. Balfour, T. H. Dunn, F. C. Henshaw, and J. T. Ross.

PROPOSED PALACE HOTEL FOR TORONTO.

THE project, considerably talked of in recent years, to build a hotel on a palatial scale in Toronto, seems likely to develop, shortly, into a reality. A fortnight ago, Mr. James Rothschild, of New York, a large capitalist and owner of the new Majestic hotel in that city, visited Toronto, for the purpose of considering the advisability of building a hotel on a similar plan here. He is reported to have been well pleased with the outlook and intimated his willingness to put $400,000 into the project, providing certain local conditions are complied with.

Mr. G. W. Yarker, the well-known banker, is representing local interests in the project. A representative of the CANADIAN ARCHITECT AND BUILDER had an interview with this gentleman some days ago. Whilst not prepared to say that the project is an absolute certainty, he intimated that everything was developing favorably, and that it was likely to take practical shape at an early date. Mr. Rothschild had gone carefully into the matter, studying the local situation, and was satisfied that the investment would prove a profitable one. The Ontario government has given Mr. Yarker the necessary assurance that the site, which has been selected, namely, the old Upper Canada College grounds, could be secured on conditions agreeable to Mr. Rothschild. It is expected that $200,000 of local capital would be subscribed, and that the city will grant certain privileges in the way of a favorable rate of taxation and low water rates.

The proposed building will be modelled after the Majestic, of New York. It is a twelve storey building, with six hundred rooms and two hundred and forty-five bath rooms. The Toronto hotel would be eight stories high, though covering a wider area of ground, with three hundred rooms and nearly two hundred bath rooms. In many respects, the Majestic is planned on new and attractive lines. The rooms on each floor are arranged in suits, as well as single rooms. The idea is to cultivate, especially in the winter season, a family clientage. According to the plan proposed, a family may have its own suit of rooms, which will either be furnished by the hotel, or the guests themselves, and these are so arranged, as will be seen from an illustration of one floor of the Majestic, issued with this number of the ARCHITECT AND BUILDER, so that the utmost privacy and home-like features are secured, even to the private hall.

In Continental cities, particularly in France, it has become the custom with many of the better class of families to reside at hotels conducted on the plan of the Majestic, rather than keep house. And this custom has been taking a good foothold lately in United States cities, as is witnessed by the success of that now famous hostlery, the Waldorf, in New York, built by the Astors, and the large share of business that has come to its latest rival, the Majestic, since its opening in October, 1894. What may be the result of any extensive change in the domestic life of Toronto, and its possible bearings on residental property, is, perhaps, a question that would come into consideration here. Mr. Yarker believes that the business the proposed hotel would gather around it would be very largely of its own creation and not interfere, to any material extent, with existing conditions. He said that the projectors would not look for business that would, at the present time, be going to other hotels, though he had to admit, that naturally, what might be termed the better class of guests would prefer a hotel such as that now under consideration, were it placed at their disposal.

The expectation is, that the new hotel would draw to Toronto tourists who to-day pass it by. With other citizens, Mr. Yarker believes, there are few more attractive summer resorts than Toronto. "If," said he, "American families in large numbers will spend a month or more at a time at the Arlington at Cobourg, might we not expect a very marked influx of this kind of business to Toronto, with a hotel here built like the Majestic of New York."

The appointments of the proposed hotel throughout would be very attractive. There would be a banqueting hall on a scale of considerable magnificence and equal to every likely requirement of the largest conventions and public gatherings. A winter garden is a novel and beautiful feature of the Majestic, and this idea would be carried out in the new hotel. A garden in the courts and on the roof of the hotel would be another novelty. Here guests and their friends are supposed, when so inclined, to spend the evening and sit and sip at ice and enjoy the cool breezes of the lake, as in New York they do those of the Hudson or Central Park.

In answer to the enquiry, when it might be expected the new hotel would be completed, Mr. Yarker said it was hoped that arrangements would reach a point to permit of it being in readiness to receive the guests of the British Association for the Advancement of Science, which is to convene in Toronto in 1897. This would mean that arrangements would be well developed by the fall, so that plans could be prepared and building operations commenced in the early spring of 1896, if not before.

Mr. Yarker intimated that the drawings would probably be prepared by an American architect, and the work of construction placed under the superintendence of some well-known member of the profession in Canada. With an American capitalist largely interested in the project, and the new hotel to be modelled after an existing hostlery in New York, it is not unnatural that the employment of an American architect should be suggested. But there is another side to this matter. The proposed hotel is to be erected in a Canadian city. Substantial assistance is to be given by the provincial government, and favors are expected of the City Council, besides which not less than $200,000 of Canadian capital is likely to be subscribed. The work performed by Canadian architects is evidence that they are equal to the designing of such a building as that proposed; this being the case and all other things being equal, they should have the preference, and certainly an opportunity to prepare designs, if so desired. Another important consideration that should weigh in giving preference to Canadian architects, is the recommendations that are made as to the character of material that shall be used in the construction of the building. Canadian interests were prejudiced when an American architect was chosen to prepare designs for the Parliament buildings of the province. Within our own country will be found the men and the material, with few exceptions, to meet every requirement that will be called for in the proposed hotel project. We would not want to take narrow ground in this matter, but knowing what has been done in the past by Canadians, and the high position they hold in the architectural profession, what is asked is only fair and equitable.

CARLETON PLACE TOWN HALL COMPETITION.

Concerning the above competition, a correspondent writes the ARCHITECT AND BUILDER as follows:—"An article stating that the tenders for the proposed new town hall and fire hall at Carleton Place all proved too high, that new tenders will likely be called for, has been going the rounds of the technical journals for the last two months or more. It has occurred to me that a statement of what has actually been done would be interesting to you and to the architects who sent in plans in competitions.

"In May 1894 an advertisement appeared in the CONTRACT RECORD calling for plans for a "town hall and engine house", apply to the town Clerk for particulars. Those who applied were told they wanted a building of a certain size and kind, to cost from $15,000 to $18,000. In all fourteen plans were received. The Council accepted G. W. King's plan with an estimate of $19,500, and when tenders were called for, the lowest one was $23,700. All tenders were rejected, as were also the plans. The Council then instructed Mr. King to prepare new plans on the lines of the former ones, but to cost not more than $18,000. These plans were received about a month ago, the estimate of cost being $18,000. At a meeting of the Council held a few days later the Council, in committee of the whole, rejected the plans. At a special meeting held about ten days later they acted as stated in the enclosed clipping.

"I would like the other twelve men who sent in plans to know the treatment they got at the hands of the Council."

The clipping enclosed in our correspondent's letter contains a report of a meeting of the Town Council of Carleton Place to consider the Town Hall project, at which the following resolution was adopted:—

"Moved by Councillor McNie, seconded by Deputy-Reeve Moffat, that the clerk be, and is hereby authorized to return the sketch plans and specifications now before the Council to the architect, Geo. W. King, Toronto, instructing him to prepare the finished plans and specifications, which this Council will accept for tenders, as per agreement with architect, after the architect has made the following changes in the sketch plans and specifications: The external walls of building to be of stone throughout, and to be built three feet higher than called for on plans; these walls to be built below high water mark with large dimension stones full thickness of wall laid in cement. The main hall to have an elevated floor. The interior finish of ground floor hall, main hall and staircase, first floor, Mayor's room, committee room and clerk's office to be of black ash, instead of pine, as specified. And that the architect be asked to have these finished plans in the hands of the Council as soon as possible, so that tenders may be called for without much more delay."

ARTS AND CRAFTS ASSOCIATION.

As promised in your last issue I now give a more detailed review of this interesting association's exhibition.

To commence with, the architectural drawings, which are few in number when compared with those of last year, A. W. Penne had a good pen perspective of the Stinson street school; J. Walker had also a good perspective of a portico; A. W. Patterson showed eight different treatments of a street front.

The crafts exhibit was an improvement on last year's work. Gilson Bros., of McKenzie's Stained Glass Works, had six specimens of stained glass, all good in design and color. A bedroom suite in brid's-eye maple, designed by J. Burton, carved by A. Burton, and cabinet work by W. D. Taylor, employees of Hoodless & Son, was well worthy of close inspection. S. Boggs, employed by Malcolm & Soutes, had two daintily upholstered chairs. Chadwick Bros. had several specimens of spun brass work, which in point of finish and artistic turning, would compare favorably with the best work from Birmingham. A. Venator had a spool holder made of different woods glued up and then turned. A photo cabinet by J. Jeffrey is a first-class bit of cabinet work, carved, veneered and inlaid. L. Bailey exhibited a pair of brass dragon candle-sticks, very quaint in design. W. Ennis exhibited a piano made epecially for this exhibition, the style and tone of which is good. P. L. Scriven gives examples of wood engraving.

The artistic needlework forms a good exhibit—no doubt from the fact that Mrs. Wright, late superintendent of the Royal School of Art Needlework, London, England, has a class in the Hamilton Art School. The sofa cushion by Mabel S. Ireland is very rich in color. Kate Saunders has a chair, silk embroidery on white velvet, which for excellence of work takes us back to the 16th century. Mrs. Wright had several specimens of her work: most exquisite.

The loan exhibit of M. W. Devine, who has resided in India for 23 years, and during which time he has made a collection, is superb. Many a "pointer" has been obtained by Hamilton craftsmen from this collection. A. S. Wood and W. Marshall also contributed largely, both in the pictorial and crafts sections. Some designs for cotton prints by M. Sheed and M. Jackson are quite dainty, and show the outcome of the practical work of Hamilton Art School.

Among the local picture exhibits, those of Miss Knott were noticed. Her fruit pieces showed good handling. Mrs. Ireland had a triplet of sketches, in one frame, full of light and having a touch of nature in them. Miss Nellie Weylie had two subjects, one in oil, "My Kitchen Table," and one in water color, "Harmony," with the secondaries. The latter is a triple compositionof green mignonette, orange marigolds and purple cinerarias. Miss Baine, the Secretary of the Association, has five water colors of local bits. We expect to see in the near future some strong, telling work by this artist. Miss Ottelee Palin, too, has some carnations which bespeak excellent work at no distant date. Mr. S. J. Ireland, President of this Association and Principal of the Art School, has three oil pictures and five water colors—all painted from nature and not retouched in the studio, consequently very faithful bits of landscape.

To make art handicraft better understood and appreciated, while the Exhibition was on, the following crafts were particularly demonstrated: Stained glass, pottery, lithography, engraving, metal-spinning, wood-turning, wood-carving, etc. The exhibitors of these different crafts each gave one evening to practical work. Lathes and other heavy tools were brought in, and when power was required a 2 H. P. Kay electric motor supplied it. About 5,000 people visited the Exhibition and some sales were made.

In your last issue I inadvertently confused the Arts and Crafts Association with the Hamilton Art School. They are distinct societies, the former having come into existence through the latter training young students to take a place with practical workers. A small error like this is perhaps excusable, as Mr. S. J. Ireland, Principal of the Art School, is also President of the Arts and Crafts Association.

CORRESPONDENCE.

[Letters are invited to this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

ESCAPE IN CASE OF FIRE.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—The destruction by fire of the McDonald factory, Montreal, with the loss of several lives, is another example of the absolute sinfulness, both of the proprietors themselves for not providing for escape, and of the government in not forcing them to comply with the provisions of the law relating thereto.

What mockery to tell us of the central tower for the escape of inmates, when, as proven in this case, for the hundredth time, this very tower, as with any elevator shaft or stairway communicating by doors from each floor or storey with the interior, is the immediate cause, if it be built of wood, of spreading the fire throughout the building, or at any rate of causing the smoke and asphyxiating gases simultaneously to invade the entire edifice.

How can it be necessary to repeat again and again—how can it not be seen or understood that any tower or stairway of the kind, or elevator, must have absolutely no communication whatever with the interior of the building? For, that even if it is incombustible or fire-proof, as must be an iron staircase surrounded by a brick wall, still can it offer no chance of escape, since it must and always does act as the flue of a chimney or ventilator shaft, by giving access to the smoke and heated air, thereby stifling anyone attempting to escape thereby.

No! the escape stairway must have absolutely no communication with the interior, but, as shown by the writer in a paper read by him before the Royal Society at Ottawa in 1888, and again before the Province of Quebec Association of Architects at Montreal in 1892, and in an illustrated article published in the CANADIAN ARCHITECT AND BUILDER for December of that year, (page 122), the inmates should be able to pass out simultaneously and instantaneously by the windows on to iron galleries or balconies running along each storey of the building and opening on to the stairway; so that, there being no direct communication between the building and the escape way, no draft can take place therein capable of sucking up the smoke and heated gases from a lower level.

In the case of a manufactory like McDonald's, where none but able-bodied persons are employed, iron ladders well out from the wall, to give a good foothold, and facing on a lane or courtyard, with iron balconies to reach them from every floor, through a window on each side thereof; (and these balconies need not be continuous where large apartments allow of the inmates flocking to the escape windows at some one point thereof) I say such ladders and balconies may amply suffice, and I am glad to say that Montreal already has many such humanitarian contrivances, as anyone can see by visiting the lane-way in rear of the St. Lawrence Hall, or between St. James and Craig sreets, and elsewhere; and it is pleasing to me here to chronicle to the world the existence of such careful forethought.

Why then was the McDonald factory without these balconies and stairs or ladders, if compulsory by law to have them, and if not compulsory, why not immediately make it so?

My recurring again to this matter of the McDonald fire, is forced on me from seeing it asserted in the finding of the jury or by some of the witnesses that "had there been no panic there would have been no loss of life."

Precisely so, but neither would there have been a panic, nor would there ever be a panic in any case, where means of escape were provided and made known in advance to the inmates, who should moreover be once in a while practised at using them, as in case of fire they would have to do.

I wrote the Montreal Star at the time of the McDonald fatality somewhat in the same strain, and it is to be regretted that a paper of such circulation should have allowed its readers to remain in ignorance of the true nature of a reliable fire-escape for fear of hurting Mr. McDonald's feelings or of jeopardizing his case before the jury of inquiry.

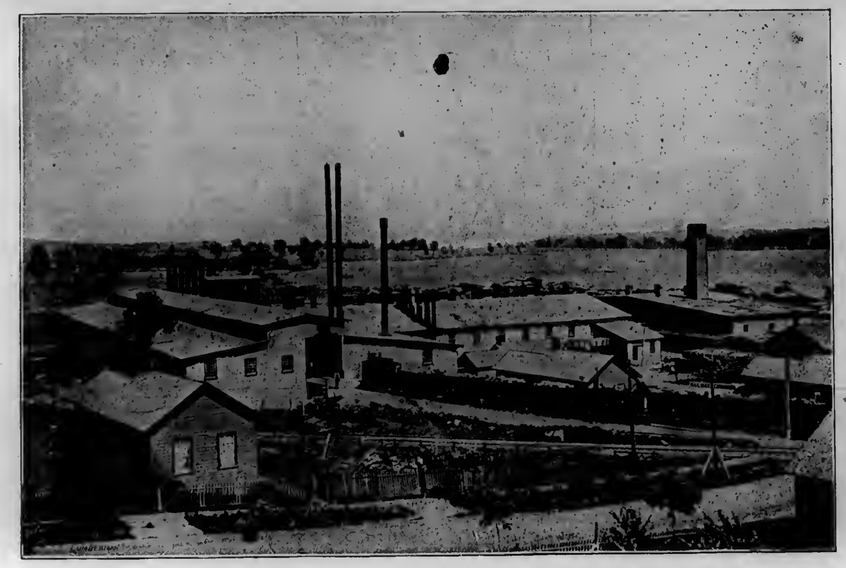
CHAS. BAILLARGÉ,
Architect, Engineer, Etc.

QUEBEC, June 10th, 1895.

TESTS OF FIRE-PROOFING MATERIAL.

By invitation of The Rathbun Company, a number of architects, principally from Toronto, paid a visit on May 23rd to Deseronto, for the purpose of witnessing a series of tests of porous terra-cotta fire-proofing material, manufactured at the Rathbun works. In addition to witnessing these tests the visitors were invited to inspect the various departments of the Company's extensive business, but a single day was found to be insufficient for this purpose. The inspection was therefore confined to the wood-working shops, the terra-cotta and brick manufactory, and the Portland cement manufactory at Napanee Mills.

The wood-working factory was first visited, and awakened a great deal of interest. The principal product of this factory is sashes and doors, in addition to all kinds of interior finish. An extensive and growing export business is being done. It is noteworthy that the doors manufactured to meet the requirements of the English market are much inferior in workmanship and material to those manufactured for the home market. It is thus possible for the manufacturers to utilize to advantage in their foreign trade, material which would not be acceptable for the home market. The factory is equipped with the latest labor-saving machinery, and every device that would reduce the cost of production appears to have been utilized. On this point the remark of an architect may be mentioned, that labor-saving machinery is not only an important agent in reducing the cost of building, but also in curtailing architects' commissions. It was noticeable that notwithstanding the variety of work being turned out, there was only one piece of work which was being manufactured by hand. This one exception consisted of a stair-rail of special design, which, of course, could not be made by machinery. In process of manufacture were some interior fittings for the Congregational Church at St. John's, Newfoundland. The interior of the factory was entirely free from dust, notwithstanding the large number of machines in operation. The dust from these machines is collected by fans and conveyed to the boiler room, where it is utilized as fuel.



THE RATHBUN BRICK AND TERRA COTTA WORKS, DESERONTO, ONT.

The terra-cotta works, which were to be the scene of the tests, were next visited under the direction of Mr. Rathbun, Jr., Mr. M. J. Hynes, superintendent of the works, and Mr. M. J. Butler, the company's engineer. The building is 390 feet in length, with a wing 190 feet long, and contains 200,000 feet of drying floor surface. The products of this manufactory are porous terra-cotta for fire-proofing purposes, terra-cotta for ornamental purposes, and dry pressed brick. The clay from which the porous terra-cotta is made is mixed with an equal part of saw-dust, the two materials being thoroughly ground together and afterwards passed down into the press. From one end of this machine is turned out porous terra-cotta arches, and from the other porous terra-cotta lining brick. The latter is dried quickly by means of a hot blast, while the former is elevated to the upper floors and air-dried to prevent cracking. This drying takes place in a temperature of 80 degrees, the temperature being maintained by the air passing over steam coils in the lower part of the building. Upwards of a mile of steam piping is in use for this purpose. The drying process occupies from ten days to two weeks. From these drying floors the material goes to the kilns to be burned. In the kilns the saw-dust is burned out, leaving the remaining material porous and very light in weight. The combined capacity of the several kilns is 300,000 pieces. These kilns are constructed on the down-draft principle, and are fed from a number of small openings in the top. It is a rather remarkable fact that one of these kilns, constructed of common white brick, has stood unimpaired for nine years the tremendous heat which is employed for hardening the fire-proofing material. Its durability is supposed to be due largely to the presence of fire-clay material in the brick. The process of burning in these kilns is such that a quantity of the material is constantly being perfected and removed, its place being taken by the unfinished product. The company keep constantly on hand a considerable quantity of material, so as to be in a position to fill orders promptly.

In another part of the building the visitors were shown the dry pressed brick in process of manufacture. The clay beds from which the brick is manufactured are located at Napanee. The clay, after being dried out and then ground to dust, so fine as to be capable of passing through the finest seive, is conducted to the press, where it is subjected to a pressure of 100 tons. The capacity of this department is 11,000 bricks per day. This department of the business, which was established only a year ago, is meeting with encouraging success.

The tests of the porous terra-cotta fire-proofing for which the visitors had been invited, took place in the open yard of the works. A number of terra-cotta arches of various spans had been loaded with pressed brick for the occasion. It was the intention to add to these loads until the breaking strain should be reached, but it was found that time would not permit, and therefore the additional loading was confined to one arch of six inch end construction, having a span of five feet, and a distributed load to begin with of 630 pounds to the square foot. About an hour was occupied in loading up this arch, the visitors watching the proceeding with much interest, expecting as each additional layer of brick was placed on the arch that a deflection would be noticeable. Examinations were made at repeated intervals, but no deflection took place. After the load had reached 1,000 pounds to the square foot, with no more sign of breaking than at the commencement, the test was considered sufficient, and was not carried further. Details of the tests are as follows:

10 inch Voussoir, 6 ft. span, distributed load, per sq. foot, 968 pounds.

9 inch End Construction, 6 ft. 6 in. span, distributed load, per sq. foot, 633 pounds.

8 inch Voussoir, 5 ft. 6 in. span, distributed load, per sq. foot, 666 pounds.

8 inch End Construction, 5 ft. 6 in. span, distributed load, per sq. foot, 799 pounds.

6 inch Voussoir, 5 ft. span, distributed load, per sq. foot, 612 pounds.

6 inch End Construction, 5 ft. span, distributed load, 612 pounds per sq. foot, 1000 pounds final load.

Since the date of the tests, the loads on the arches have been increased from 500 to 600 pounds to the foot, and are still standing under that strain.

While this test was going on, another of a different character was being carried out a few yards distant. A building, 6 feet 9 inches by 4 feet two inches, by 4 feet 7 inches high, constructed of one-inch boards and lined with one and a half inch porous terra cotta, had been filled with combustible material, saturated with coal oil, and set on fire. The fire burned furiously for fifty minutes without injuring in any way the covering of the building. At the end of that time the fire was extinguished, and some pieces of the porous terra cotta were taken out and immersed in cold water. To the surprise of those who witnessed the test, these pieces of material did not show the slightest crack as the result of contact with the cold water, and nails were driven into them with the same result. It is estimated that a

building lined with this material would prevent fire from spreading for at least twenty minutes, and usually this time would be sufficient to enable the firemen to obtain control.

Several of the architects who witnessed these tests and who had an opportunity of seeing the process of manufacture, expressed their regret that they had not known earlier the character of this material, as they had been importing more expensive and less efficient material for some of their buildings during the past two years.

After having partaken of luncheon, the company entered a special car on the line of railway owned and operated by the Company, and were conveyed to Napanee Mills, where the cement works are situated. These works occupy two large stone buildings about 600 feet apart. They are operated by a 250 h. p. Wheelock engine. By means of a rope transmission device installed by the Dodge Pulley Co. of Toronto, 150 h. p. from this engine is transmitted to the other building, a distance, as already stated, of 600 feet. By means of this device a great saving in power is accomplished. Near these works are located the deposits of clay and marl from which the Portland

cement is manufactured. The clay is peculiarly adapted for the purpose, being free from sand, while the only foreign ingredient in the marl consists of organic matter. The two materials are mixed in the proportion of one of clay to three of marl. They are thoroughly ground together into a homogeneous mass by means of a wet pan mixer. A sample of each lot of material is analyzed before leaving the mixer, to see that the proper proportions of materials are being maintained. Thus every ten barrels manufactured is checked, so that there is little opportunity for variation in quality of the manufactured product. From the mixer the material is carried up by a belt into the pug machine and from thence is loaded on cars and passes into the drying room, where it remains for twenty-four hours. From the drying room it goes to the kiln, and is subjected to a gradually increasing heat, culminating in a temperature of 300 degrees Fahr. The resulting clinker has a specific gravity of 3.13. The material next passes through grinders and three or four pairs of rolls, and is finished on French buhr millstones, which give it a granular finish. The finished material leaves only one to two per cent. residue on a 10,000 mesh sieve. The material thus finished is put into barrels, being weighed separately from the barrel. 350 pounds of material is put in each barrel, so that a uniform quantity of cement is contained in each barrel irrespective of the weight of the barrel.

In connection with the works there is a testing laboratory. The cement is tested by being made into pats on glass, then put in damp air for three hours, then immersed in water for twenty-four hours at a temperature of 130 degrees Fahr. If no signs of blowing are apparent as the result of this test, the material is considered to be of satisfactory quality. Should defects show themselves, it is put back into the bin and allowed to slake off free lime. A briquette made two months previously was broken on the testing machine in the presence of the visitors at 620 pounds, and another, one month old, broke at 450 pounds to the square inch.

The company experienced a great deal of difficulty in the early stages of this enterprise, but have succeeded in so mastering the process of manufacture as to insure a uniformly satisfactory product. The superintendent of the works is Mr. F. G. B. Allan. The works have a capacity of 150 barrels per day.

STUDENTS' DEPARTMENT.

USEFUL HINTS.

In some experiments conducted by the German government on steel and iron girders, the soft steel girder proved twenty-two per cent stronger than the iron girder. The strength of steel girders appeared to be about the same for the two flanges, if made alike in sections.

For filling up the pores of the wood before commencing to polish. For white wood, equal portions of whiting and plaster of Paris, thinned to a paste with turpentine and well into the grain of the wood If for mahogany, add rose pink, or whatever the color of the wood is, and dry color to match up to same.

The following is recipe for paint for ships' bottoms: 8 lbs. of resin, 1½lb. of "Cologne brown dry color," 15 oz. of shellac, 25 gills of spirits of wine, 6 gills of benzine, ¼ gill of toluence, and 10 drops of pyridine. As a finishing coat, a mixture of paraffin wax and white lead "boiled together" is applied hot.

To make plaster medallions look like marble, take pure sweet milk, boil it, and skim it two or three times; put it on the face of the cast, and blow it evenly on all parts, taking care that it does not get on the edge or back; put it aside for two or three days, then put it in a shallow dish face up, and pour in oil of sweet almonds until it comes up to half or two-thirds of the edge of the cast. Be careful that none gets on the face. As the cast absorbs the oil, put in more, until it is saturated. This makes the plaster perfectly transparent and of a beautiful colour. The milk forms a coat on the surface, which will bear washing.

The utilising of waste materials in buildings is not always safe. According to the report of the Chief Inspector on Alkali Works in Scotland, one fatal accident has occurred at an akali work at Irvine, owing to the use of tank-waste as a foundation or flooring, over which had been erected tanks for the condensation and storage of muriatic acid. This material consolidates into a hard mass, and is not unfrequently used in alkali works for filling up hollow places and making good the ground level. It is hoped that the use of this material will be avoided in future in places where it is possible that acid liquors may come in contact with it. In the Irvine case a bricklayer, having to effect some repairs to pipes connected with the acid tanks, was overcome by a rush of sulphuretted hydrogen gas caused by an overflow of the muriatic acid on the bed of tank waste below. The bricklayer fell to the ground insensible and could not be restored.

Yellow pine can be stained to resemble oak in color by very simple means, but if it is intended that the figure should also be imitated, this will be found a more difficult task. A rich dark color can be gained by dissolving 2 lb. of patent size in one pint of water, add some brown umber to give a brown shade, apply while still hot with a brush, and wipe all surplus with a piece of rag. When dry smooth down with a piece of canvas or coarse rag, and fill up all nail holes, &c., with putty colored to match, then wipe over asphaltum dissolved in turps to gain the rich brown (¼ lb. of asphaltum to 1 pint of turps). Allow this to stand till the next day to harden, then varnish with a good quality church varnish. Should it be desired to imitate the figure or grain as well as the color, satisfactory results may be attained by using sizes and ochre instead of umber, and when applying the asphaltum passing a steel graining comb when nearly set and picking out a few light places with a piece of rag slightly wet with turps and held in position over the thumb of the right hand.

It would appear that the external surface of concrete walls will be affected by the character of the timber employed for the temporary framing. In some military works by the United States engineers the plan originally followed was to build all the concrete work with frames of undressed spruce lumber, and then, on removal of the frames, to plaster the exposed surface with cement. This coat of plaster could not be made to adhere to the older work, which rapidly absorbed its moisture, weakening the bond between the two, which was destroyed by the first cold weather, when the coating cracked and dropped off, much to the detriment of the appearance of the work. There was, besides, no economy in the use of spruce lumber, which warped out of shape when subjected to the moisture of the concrete, and could seldom be used more than once, and the plastering was very expensive. It was, therefore, decided to substitute framing made of first quality dressed white pine, grooved on both edges, and united by loose tongues of yellow pine, and to construct the masonary differently. That portion of the concrete next to the frame, 4 inches thick, was laid, and on the frames being removed, a rubbing with a float was sufficient to give a smooth surface to the face. The work was found to resist changes of tem perature without scaling or cracking.

The new Wesley College building in Winnipeg is approaching completion, the exterior work being sufficiently advanced to give some idea of its architectural beauty.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE last of the monthly dinners for the season of 1894-5 of the Province of Quebec Association of Architects was held in the Queen's Hotel on the 4th inst. This dinner was made on the occasion of welcoming back to the city Mr. A. C. Hutchison, 1st Vice-President, after a four months tour in Europe. There was present Mr. F. X. Berlinquet, ex-President from Quebec, and a number of the members. After the dinner Mr. Hutchison gave a brief outline of his trip, dwelling more particularly upon his impressions of the Ancient Greek, Byzantine and Mediaeval styles, as illustrated by buildings in Sicily. He also gave an account of revelations made by late excavations in the arena of the Colloiseum and on the Palatine Hill in Rome.

At the last meeting of the Council, held on the 11th instant, it was decided to hold the semi-annual examinations in Montreal on the 25th, 26th and 27th of July. Thirty days' notice will be required to be given the Secretary by intending candidates.

The following petition has been sent by the Council of the Association to the City Council:

"We, the Council and Members of the Province of Quebec Association of Architects, residents of this city, humbly beg to memorialize the Mayor and City Council, to appoint an Art Standing Committee, to whom all matters relating to the beautifying and embellishment of our city would be referred for their consideration and opinion.

"At present, we believe, there is no special committee delegated to look after this particular object, and accordingly, monuments, statues and other erections are and have been permitted to be put up in our public squares, streets and gardens, that are neither beautiful or a credit to the city.

"Other cities have taken such a step, notably New York and Boston, and have appointed Art Standing Committees of men of acknowledged artistic experience to advise them in such matters.

"Recognizing that taste and a wise knowledge of art requires a special and long training, which it is not in the power of everyone to command, we feel that such an advisory committee would be of great assistance, not only to the city and citizens, but also to the Council as a body.

"If this meets with approval, we would take the liberty of suggesting for your consideration, that this committee should consist of six members, all residents in the city of Montreal, and should include the Mayor and the City Surveyor or Engineer, and a representative from the following Associations:—The Royal Canadian Academy; the Art Association of Montreal; the Association of Architects of the Province of Quebec and the Council of Arts and Manufactures, or such other recognized artistic body as may be selected.

"It is intended that these appointments be purely honorary and with no emoluments attached."

A new granite firm recently formed in St. George, N. B, is composed of Stephen Conley, Owen F. Bogue, James H. Frawley, Caleb Hennessey, James R. O'Brien, Henry F. McDougall and Charles H. Lynott.

The Winnipeg Public School Board propose introducing the best known system of heating and ventilation In several new schools to be erected, and with that object in view invite correspondence from parties dealing in same.

Messrs. Kelley and McCutcheon, two local contractors, have submitted a proposition to the Winnipeg City Council to put in a plant for the manufacture of vitrified brick for paving purposes. A clay suitable for making bricks has been discovered within 150 miles of the city.

ILLUSTRATIONS.

OFFICES OF MESSRS. PERRAULT, MESNARD & VENNE, ARCHITECTS, MONTREAL.

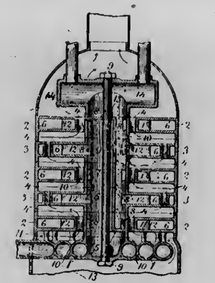
PLAN OF SECOND FLOOR OF HOTEL MAJESTIC, NEW YORK.

FORESTERS' TEMPLE, CORNER BAY AND RICHMOND STREETS. —GEO. W. GOUINLOCK, ARCHITECT.

THE above building, the corner stone of which was laid on the 31st of May, by His Excellency the Earl of Aberdeen, is to be known as the Foresters' Temple, and will be one of the finest headquarters of any fraternal society in the world. The building will be L shaped, with a frontage of 40 ft. on Bay street and 132 ft. on Richmond st., and with a depth north of 108 ft. It will be nine storeys in height, exclusive of a sub-basement, and will cost $300,000.00. The fifth and sixth flats will be occupied throughout by the staff of the I.O.F. The seventh and eighth flats will be fitted up as Assembly Rooms, etc., and a suite of rooms for commercial purposes. The building will be of Credit Valley brown stone and brick and stone facings, and will be absolutely fire-proof; the interior being constructed of steel girders and columns, protected by terra-cotta fire-proofing.

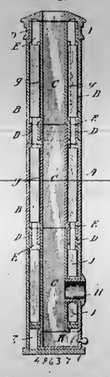
RECENT CANADIAN PATENTS.

No. 48593, for a hot water heater, to Thomas Stubbs Bayles, Toronto, Ont. The accompanying illustration and statement of claim explain the invention:



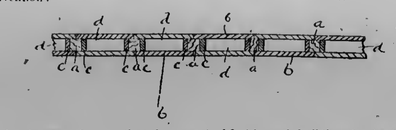
In a water heater, the combination of a spiral hollow section having a well at its centre, a flanged hollow section adapted to fit in close contact with said spiral section and having a well at centre and having a cross wall therein and flues, ports and walls as specified, and a distributing section as specified, adapted to receive a number of pipes therein.

No. 48,637, for a sectional chimney, to William Rollin Wilson and Merton James Bell, assignees of William James Culnan, all of Brule, Wisconsin. The accompanying illustration and statement of claim will explain the invention:



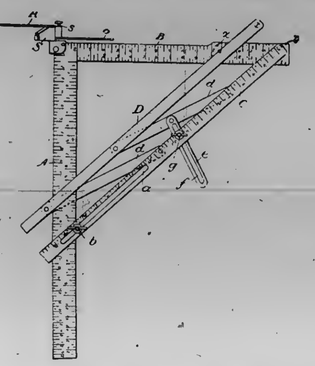
In a sectional chimney, the combination of two or more jointed sections, each section comprising an outer casing and concentrically arranged inner flue, vertical guiding holding beads and removable spacing and holding ribs inserted in the air-space between the inner and outer casing, one end of the outer casing being provided with a joint shoulder and reduced to enter the air-space formed between the inner flue, and the outer casing of an adjoining section and the outer casing provided on its inner surface near its reduced end, with a shoulder which prevents the inner casing from being pushed in too far, and one end of the inner flue being formed with a joint shoulder and enlarged to receive the smaller end of the inner flue, whereby, when one or more sections of the chimney are united, continuous gas tight joints are formed between the adjoining ends of the sections of the inner flue and the connecting ends of the sections of the outer casing.

No. 48,655, for a fire resisting material, to James Day Baker, Montreal, Que. The accompanying illustration and statement of claim explain the invention:



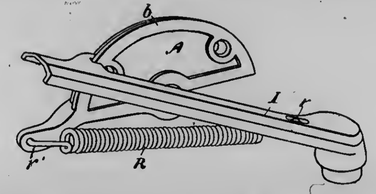
As a means of preventing the spread of fire through buildings having hollow walls, the combination with the combustible vertical studding thereof, of the vertical lengths, e, and the transverse lengths, d, of fire-resisting material with their meeting edges formed to interlock, for the purpose set forth.

No. 48,706, for a roof-framing tool, to John Parkhill, Rochester, Minn. The accompanying illustration and statement of claim explain the invention:



A device for indicating the side cut of rafters comprising a rule or bar adapted to have its edge placed on the plumb cut of the rafter, as indicator plate pivoted to the said bar, to swing at right angles to its length, the said plate having indicating lines marked from a common centre thereof, and fingers pivotally connected with the said plate at opposite sides of the pivotal point and adapted to swing in a plane at right angles to the said plate.

No. 48,743, for a door check, to Henry T. LePage, Toronto, Ont. The accompanying illustration and statement of claim explain the invention:



A door-check consisting of a pivotal plate, the upper edge of which is arc-shaped, a bearing formed in the pivotal plate, a lever; a pivotal pin for the lever working in the said bearing, a pocket in one end of the said lever, a bar connected to the under side of the said lever at or near the said pocket, a guide coonected to the said lever at or near the said pocket, a guide connected to the said lever at or near the said pocket, a guide coonected to the said lever at or near its opposite end working on the upper end of the said plate, a spring having a hook-shaped end encircling the said bar, the opposite end of the spring hook-shaped, and held by the said pivotal plate as specified.

PERSONAL.

Mr. Jos. Lamarche, President of the Montreal Master Plumbers' Association, had the misfortune to break his leg while stepping out of his buggy a few weeks ago.

Messrs. R. W. Thomson, B. A., Sc., and Edgar J. Laschinger, B. A., Sc., graduates of the School of Practical Science, Toronto, have gone to South Africa, where they expect to find promising openings for their energies and abilities.

We observe that Mr. Chas. Baillairge, the talented City Engineer of Quebec, and President of the Province of Quebec Association of Architects, has made request for an increase of salary. It is to be hoped the Council will recognize Mr. Baillairge's able and faithful services to the city during the 29 years he has occupied his present position, by acceding to his request. Such versatility of talents as he possesses are rarely combined in one individual, and at one time or another the City of Quebec has received the benefit of them all.

The death is reported in New York City, on May 16th, of Mr. A. M. Wellington, one of the editors of the Engineering News, and a consulting engineer of great ability and wide reputation. It will be remembered that Mr. Wellington was employed as consulting engineer in connection with the project to elevate the railroad tracks on the Esplanade in the city of Toronto, when the Esplanade improvement scheme was before the Council a few years ago. Mr. Wellington was the author of a number of valuable books on engineering.

BRICKS AND BRICKWORK.*

THE characteristics of a good brick are: 1. Regularity of shape, so that when built into a wall the pressure is equal over its surface. 2. Toughness as opposed to brittleness, *i. e.*, it ought not to snap when broken, but should require two or three hard blows. 3. Clearness of ring when gently knocked against another brick, and not a dull, heavy thud. 4. Homogeneity of surface and texture in the interior, and, above all, absence of small stones or pebbles or lumps of chalk; and 5. Nonporosity, *i. e.*, slowness in absorbing water. I am very much disposed to think the latter quality the most important, and one that is perhaps the least attended to. I mean, of course, with facing bricks. The rate at which a brick—or, for that matter, stone either—absorbs water is a more important element in its goodness than its total absorptive power, because when built in a wall the bricks are exposed only to intermittent wettings, and if in testing two samples of brick I were to find that one absorbed 15 per cent. of its volume of water in the course of an hour, while another absorbed 20 per cent., but took four hours to do it, I should prefer the latter. The crushing strength of a brick is an interesting subject of inquiry, but practically you will find it very rare indeed for bricks to be exposed in walls to anything approaching this crushing strain. Professor Unwin, at the Central Institution, Kensington, kindly tested some bricks for me a few months ago, and it was found that a Leicester brick was crushed with a load of 245 tons per square foot, a Coventry brick at 217 tons, and a London stock at 125 tons, while a blue Staffordshire brick only crushed under a load of 385 tons per square foot, and could not be broken by the machine. A two-brick wall carried up 102 feet high, which is, of course, much higher than would ever be done in practice, would exercise a pressure of five tons per square foot on the lowest course, and this will show you how small is the chance of a brick itself being crushed; but a brick and brickwork are two very different things, the intervention of the mortar joints introducing an entirely new element. Brick piers are very awkward things to experiment upon, and require very special machinery; but some practical experiments upon them have been made in the United States, and you may take it that three tons per square foot in mortar, and five tons in cement, are about the safe loads that should be placed on brickwork.

The reason why some bricks in a clamp or kiln are good and others bad—irrespective of their position—is very difficult to understand even by practical brickmakers, but the most eminent firms are quite willing to admit that they do get a number of bad bricks, and one gentleman told me that out of a very large number of burnings his experience would lead him to the conclusion that 30 per cent. on an average were of an inferior quality. One practical point is never to be guided in choice of a brick by color alone, as it may frequently happen that what looks like an excellent brick may really be as bad as they make them. Knock them together and see how they ring; a bad brick will never ring well, and then break the brick and see its interior. If you see pebbles, or find the interior soft and not of close texture, you may safely condemn the bricks.

Underburning is, I believe, a fruitful cause of inferiority in bricks, as they are then soft and friable; and from my own observation I should say that, if you notice a load of bricks coming on to a job, with a large number of broken ones among them, the chances are that the bulk of the bricks are bad ones, and they should be rejected. This is altogether apart from the risk to the work owing to the temptation to the men to use snap heaters. To revert for a moment to the question of porosity. I believe if in an ordinary wall you were to pour water on the face at a level of about 6 ft. from the ground, none of it would run down as far as the ground; the water would get absorbed before it reached so far; and this with very fair bricks. It may be of interest to you to know of an easy method of rendering a brick wall almost, if not quite, impervious to water. Wash the surface over with a solution of soft soap and water, about half a pound to a gallon, laid on with a soft brush; and, when that has dried in, apply a solution of alum and water, mixed in the same proportions, and the result will be that you have waterproofed the wall. I am indebted to Mr. Rowland Plumb for this recipe.

It goes without saying that however good your bricks may be, you will never get good brickwork unless good mortar is used, and anyone who is in the habit of inspecting old houses will have noticed that in nineteen cases out of twenty it is the mortar which has perished, and not the bricks. In fact, I believe a good brick is just as good after one hundred years' use as when it was new. I am sure the difficulty which public officers have with the speculating builder lies more frequently with the composition of this than with the bricks. The stuff which the 'highly respectable building-man' will try to pass off as sand is of a fearful and wonderful nature. Sometimes he will use sand, but of such a soft, sugary texture, with no sharpness about it, that it is impossible for it to make good mortar. This you can test for yourselves by trying it between your fingers. But I should strongly advise you to look with the greatest suspicion on a heap of brownish grey stuff, which the builder will tell you is road sweepings. I am not saying that in country districts where the roads are mended with granite, if the road-siftings lie in heaps for some months and are carefully washed, you may not obtain a very good building material, but as a rule there is much organic matter in road sweepings, and it is very easy to mix garden loam with it, which is, of course, utterly unsuitable for mortar. Another thing that men will often try to use for mortar, especially in a building which is to take the place of one recently pulled down, is the siftings of the old lime mortar and plaster which has come from the debris of the old houses. Sometimes you may spot this unmistakably by the smell, as I myself once did, a heap smelling very strongly of stale smoke from chimneys. As to lime, it is utterly impossible to discuss this question at the fag-end of what I fear has been a terribly long infliction on you—it would take an evening to itself. I can only say I much wish it were more frequently the practice to build with cement-mortar. I am sure that cement and good sand mixed with 5 and 1 would make better work than ordinary lime and sand mixed 3 and 1, and the latter cost would not be very great. There is one thing that you should be on your guard against in country districts—never allow any brickwork to be built in chalk-lime mortar. It never sets in the interior of the joints. As to the joints, except in winter, I should always prefer to have the joints struck as the work goes up, rather than raking them out and pointing afterwards. There is always the risk of not raking the joints out far enough, and the chances are that the pointing will not adhere to the mortar in which the bricks are laid. Whether you have a struck joint or a pointed one, insist upon having it cut in at the top of the joint, and not at the bottom. The men will always do this if they are explicitly told to, but if not they will always cut it in at the bottom—why, I have never been able to understand—giving a lip on which the water collects. In hot weather you must be careful to dip the bricks in water before laying them, or they will absorb the water far too quickly, and prevent it setting properly.

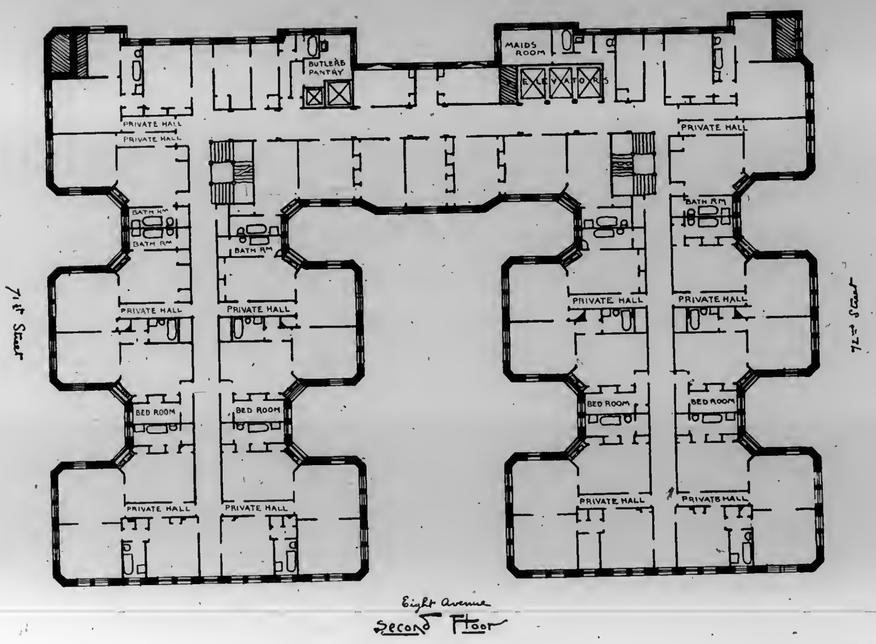
In this country it can very rarely fall to our lot to be allowed to carry out a commission on those ideal conditions which Mr. Brydon so humorously alluded to in this room, when criticizing the students' work at the Institute, viz., where cost is no object. Economy and utilitarianism are the conditions under which much of our work has to be carried out. We must often, therefore, be compelled to give up the use of stone and fall back on brick. But do not let us on that account despise our material. It is a good honest material, which lends itself to an inexpensive decorative treatment of a perfectly legitimate kind, and I can only hope that in this short paper—the deficiencies of which I am fully conscious of—I may have given you some reasons for not neglecting the study of the history of brick in the past, and I am confident that such a study will be productive of nothing but good in its results on the brick architecture which you will have to construct in the future.

* Abstract of paper read by Mr. John Slater before the Architectural Association, London, England.

THE Port Credit Pressed Brick and Terra Cotta Co. have removed their Toronto office from 52 Colborne street to No. 28 Victoria street.

The Ryan estate, Coldwater, Ont., is constructing a new residence. Mr. Croker, of Orillia, is the architect, and the work is being done by Mr. Eaton, of Orillia.

In the town of Barrie, Ont., W. A. Boys, Dr. Richardson and Geo. Overs are each erecting new residences. Their respective cost will be $3,500, $2,500 and $1,500.



PLAN OF SECOND FLOOR OF HOTEL MAJESTIC, NEW YORK.

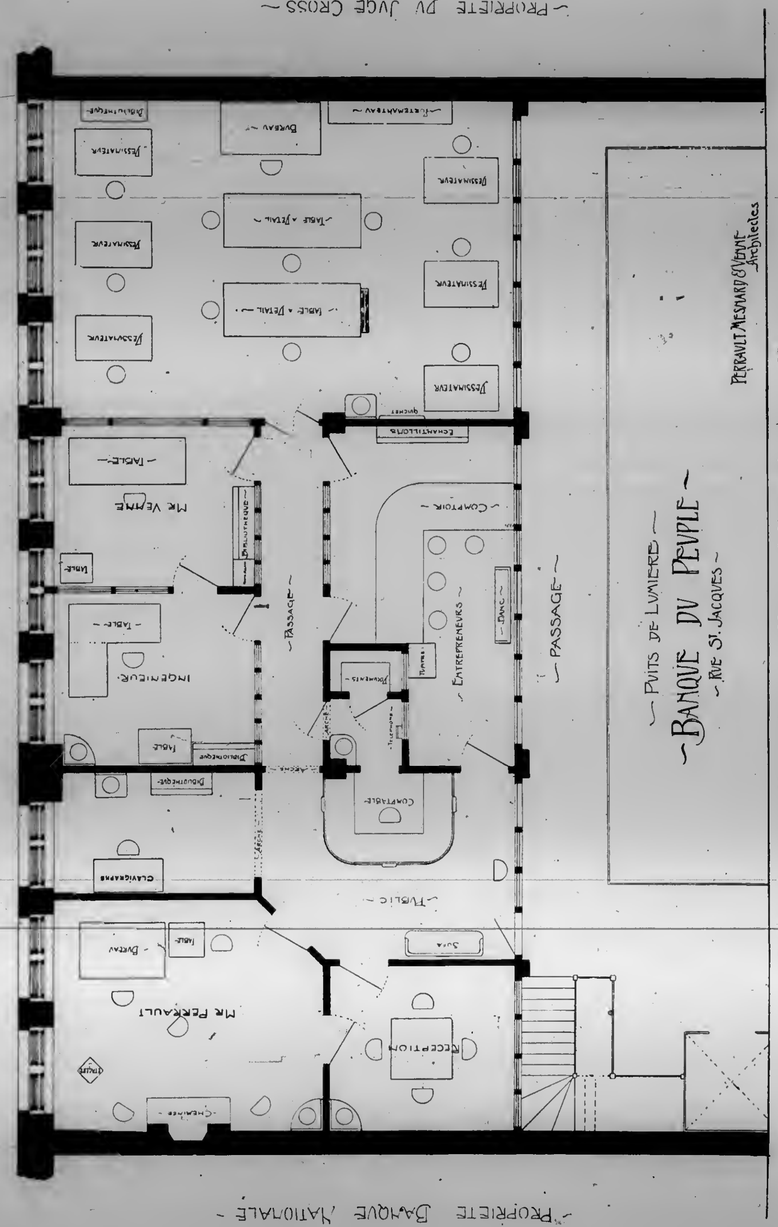
(Illustrating Article on Proposed Palace Hotel, Toronto, in this Number).

OFFICES OF MESSRS. PERRAULT, MESNARD & VENNE, ARCHITECTS, MONTREAL.

(GENERAL DRAUGHTING ROOM, LOOKING INTO MR. J. VENNE'S OFFICE.)

OFFICES OF MESSRS. PERRAULT, MESNARD & VENNE, ARCHITECTS, MONTREAL.

(VIEW IN MR. M. PERRAULT'S OFFICE).



PLAN OF OFFICES OF MESSRS. PERRAULT, MESNARD & VENNE, ARCHITECTS, MONTREAL.

NEW BUILDING FOR THE INDEPENDENT ORDER OF FORESTERS, TORONTO.

G. W. GOUINLOCK, ARCHITECT, TORONTO.

CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—NO. 7. JULY, 1895 PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods,
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

D. B. DICK	Toronto.
W. A. EDWARDS	Hamilton.
F. J. ALEXANDER	Ottawa.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:
W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

J. Z. RESTHER	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
ROBT. FINDLAY	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. MCLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.
JOHN ALDRIDGE, 1st Vice-President.
WM. PARK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JAS. CRANG.
WM. PEARS.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
H. MARTIN.
THOS. CANNON, Jr.
JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

AT the convention of the National Association of Master Plumbers of the United States, held last month at Philadelphia, Mr. John Date, of Montreal, was introduced as the representative of the Montreal Master Plumbers' Association, and a communication from the Montreal Association was read expressing a desire for affiliation with the American organization. Mr. Date was cordially received, and there is no doubt but that his presence at the convention will tend to promote good feeling between the master plumbers of the United States and of this country. Mr. Date will also no doubt have gathered some information which can be used to advantage in the work of the Canadian organization. At the convention referred to, a resolution was passed requesting manufacturers to discontinue the practice of selling goods to persons who are not legitimately in the business. The definition of a "Master Plumber" agreed to by the Association was: "An individual who represents the industry of plumbing in its most complete state, that is to say, that he must be the proprietor of a plumbing establishment who deals in the merchandise used in the various branches of the business; who engages in trade with the public generally; who hires a requisite number of men, for the purpose of practically constructing plumbing systems in buildings everywhere, and is himself responsible for the work accomplished."

DOUBTS of a serious nature are obtruding themselves into some minds concerning the value of asphalt as a material for permanent street pavements. The city of Toronto has spent upwards of a million dollars on asphalt pavements within the last five years. Some of the pavements thus recently constructed are already full of cracks and holes. This is especially true of those on streets traversed by the street railway. The constantly recurring vibration from the passing cars appears to result in disintegrating the asphalt covering, patches of which become separated from the concrete foundation, leaving here and there ugly appearing and dangerous ruts. Even on streets where there are no street car tracks the pavements show numerous cracks and depressions. It is noticeable that in the first pavements of this character laid in Toronto eight or ten years ago, these defects are not to be seen, which is regarded as evidence that either greater skill or care was exercised in their construction. The statement has recently been made that the frequent sprinkling of the pavement in summer causes it to become rotten and greatly tends to shorten its life. As to the correctness of this statement we do not presume to speak. If it is well founded, then in deciding upon the extensive use of this pavement one of the most important requirements was overlooked. While in appearance and in several other particulars asphalt is the ideal of what a pavement should be, unless it can be made more durable than it gives evidence of being on some of the streets in Toronto, it will not repay its cost. At London, Ont., where a considerable amount of paving is to be done, this question appears to be receiving the careful attention which its importance demands. It is by no means certain that a well constructed macadam roadway will not eventually supersede some of the pavements which have recently come into favor.

THE difference between the estimates for the year of the appropriation required by the Boston Public Library and the amount voted for this institution by the City Council, is such that after expenses and salaries are paid nothing will be left for the purchase of books. This suggests the question as to how much in our public libraries is spent for the mere amusement of the public in the purchase of novels. We think that in the interest of the city, for the education of its inhabitants, for the study of those who earn their living within the city, a very small proportion of the sums expended on books should go to the purchase of "light literature." Professional associations often have their own libraries, but not always, and it is very seldom that the mechanic is able to obtain at his own cost the books he requires for the necessary theoretical knowledge. Such people's needs ought to be the first consideration, and the purchase of novels a very secondary one.

THE rights of "adjoining owners" to support from abutting buildings or even from the soil of the adjoining vacant lot is a matter of more or less consequence to everyone connected with building. It is most important for the owner of the buildings to be torn down, or of the vacant lot in which it is intended to excavate for foundations, to ascertain for his own satisfaction what rights, if any, the adjoining owner possesses, and in all cases where such rights exist he must give ample notice to his neighbor so as to allow of his shoring up his premises if necessary, but it devolves upon the adjoining owner to prove his claim to support. In the absence of any right of support, if on receiving notice he fails to protect his own building from injury, and reasonable time is afforded him for doing so, he cannot claim damages for injury if they occur. In the same way, should the owner of the vacant lot desire to excavate below the foundation of his neighbor's wall, the neighbor must see to his own protection. If the wall is a party wall, the adjoining owner undoubtedly possesses right to support as far as the half wall and the soil supporting it is concerned. The position of the architect or the builder depends very much upon the nature of their employment; to be free from consequences it is often less costly to them to give the notices themselves, or to have an understanding with their employer that he takes all responsibility himself, and that they are acting only and entirely on his instructions. Where they are acting as agents of the employer, the employer is of course responsible for their failure to notify the adjoining owner, but it might be very difficult for them to free themselves if he took action against them to recover the damages paid by him.

THE case of the Dominion Government against Mr. St. Louis, the contractor for the labor supplied in connection with the building of the Lachine bridges, has dragged on its course through different trials in such a way as to mystify the ordinary observer. The case will form a precedent and carries many lessons with it. But the principal point is the further evidence adduced in reference to day labor as opposed to contracts, and it will now undoubtedly be generally admitted that the system of day labor leaves so much latitude for fraudulent transactions that it is hardly wise to resort to it, when it is at all possible to have the work done under contract. The Government was not aware of any negligence on the part of the contractors until the works were far advanced, but the moment it felt its ground sure, it took very decided action. The engineers were dismissed; $60,000 claimed by Mr. St. Louis on account of the works was refused; suit was entered for the return of money said to be already overpaid, while Mr. St. Louis himself was prosecuted for false pretences. The Government was successful in withholding the $60,000, but it failed in the criminal prosecution, and the further case for the return of the over-payments came abruptly to an end by the action of the grand jurors in bringing in "no bill." Sufficient evidence was adduced in the criminal trial to show that an enormously unnecessary force of men was employed, that pay was drawn for men who did not work at all, while many other men who were also paid in full were proved to have done very little for their money. A typical case was that of one witness who actually worked 30 hours and was paid $6.00. In the pay lists, however, his name appeared as having done 320 hours' work, but as many carters had more than one rig and the drivers were careless about giving their correct names or numbers, it was very difficult to trace payments, and hence the decision of the Magistrate that all the fault did not lie with Mr. St. Louis.

IT is not uninteresting to note the arrangements made for the safety of the public in the event of fire in the Albert Hall, London—the greatest concert hall in the world—and to compare them with more modern plans. It was stated in a paper on the construction of the Albert Hall, that was read before the Royal Institute of British Architects many years ago, by Major-General Scott, the engineer of the design, that the corridors that surround the hall, with the crush rooms and staircases, together afford sufficient space for all the people which the auditorium and orchestra will contain, to be in movement at once without jostling each other. The central seating capacity of the hall is given at 8,365, which includes the orchestra and the "picture gallery" that runs round the hall over the corridors and at the back of and above the "balcony." The sum of the widths of the external doors for these 8,365 persons is divided between twenty-five entrances, of which one is 16 ft. wide and all the others 4 ft. 6 in., being one foot to every 64 persons. The capacity of the "picture gallery" is put down at 2,000, but on "great nights" there have been as many as 3,000 persons up there, although only two rows of chairs are provided against the balustrade that overlooks the hall—those who cannot obtain a seat promenading, without being able to see down on to the stage. On such occasions there would be from 10,000 to 11,000 present in the hall, and then the calculations for the 8,365 are naturally found insufficient; and although every person could leave the hall and be accommodated in the corridors, the pace at which one went down the stairs was, roughly speaking, about one step in three minutes. Nowadays, doors for exit, even though there are twenty-five, only 4 ft. 6 in. wide, would be deemed a decided error, for in a panic the public usually follow the leaders like sheep, and all would make for one 4 ft. 6 in. doorway. There are sixteen staircases 6 ft. 6 in. wide, and two 4 ft. 6 in. wide, open to the same objections as the narrow doors. The calculation is one staircase for each 200 persons from the boxes and arena, and for the balcony and picture gallery one for each 500. The amphitheatre has one exit for every 250 persons, each 9 ft. wide.

CRUSHED GLASS AS BUILDERS' SAND.

COMMENTING upon the suggestion of a correspondent that crushed glass should answer as a satisfactory substitute for builders' sand, the London Builder says:—"The suggestion is not altogether novel. In the United States refuse from glass works is sometimes used both for mortar and cement, though we believe its employment is being restricted. In Germany and Switzerland various proposals have been put forward from time to time to employ glass refuse for building purposes, but they do not seem to have come to much for reasons that will presently be seen. There can be no question as to ground or crushed glass being suitable for mortar. Judging from the sample sent us, the small fragments are angulate, and from the mechanical point of view, they leave nothing to be desired. From the chemical standpoint also there is practically nothing detrimental in the material, though it cannot be quite as durable as pure quartoze sand. The chemical composition of black bottle glass varies exceedingly within certain limits, but it may generally be regarded as being from 50 to 65 per cent. of silica, 20 to 25 of lime, 6 to 9 of potash or soda, and from 4 to 7 of iron—depending on the manufacturer and the class of bottle. Ordinary bottles would have about 54 per cent. of silica, 20 of lime, etc. In any case large proportions of lime, soda and potash are present, though the bulk of the glass is silica. From the state in which these ingredients exist in the glass, there is very little likelihood of their being able to materially influence the action of the mortar in any way. We cannot see therefore why glass sand should not be employed in the manner suggested; it would be purely a question of cost. The reason it has not been adopted to any extent abroad—and this is a point for our correspondent to note—is because with very little preparation it makes a good brick for use in chemical works, as the material is so little attacked by acids. Bricks thus produced have a specific gravity of only 1.5, and are very strong though somewhat brittle. A glass brick, in the shape of a flask, has been manufactured in Switzerland for some years, and slag bricks are well known."

THE BYSTANDER.

As a back ground to the most esthetic callings is found after all a strong scent of shop. Agassiz, the famous naturalist, once rebuked a friend of material tendencies, who thought he might turn his tastes to better money-making account, by saying that he had no time to make money. Everyone will admire the devotion of this great man to his calling; but, whilst artist and naturalist, or one engaged in any vocation, may have chosen such because of the love of the work, and do their work from day to day because they love it, yet it is true there is danger of the edge being taken off this devotion, if the calling does not also prove a means of providing bread and butter. The artist who finds no market for his work of brush or pencil is apt to lose much of that inspiration and enthusiasm that is one of the first elements of success in art. So, there is nothing remarkable in the statement of the Bystander, that in moving around among those engaged in architectural pursuits he finds them ready to discuss the business side of the situation, equally as much as the esthetic. That they possess a strong business instinct the Bystander has sometimes thought has been a help to their success. In the architect must necessarily be combined the taste of the artist and the skill and shrewdness of the business man. Designs prepared for the finest buildings must go into the hands of contractors and be put into execution, ere the work of the architect is shown to its fullest advantage. And this will not be done properly unless he has that business instinct that enables him to deal in a business way with contractors and others.

× × × ×

Talking the other day with Secretary Phillips, of the Builders' Exchange, Toronto, the Bystander formed the impression that the past month has taken on strength in building directions. Work is getting better forward in many of the large buildings replacing those recently destroyed by fire. Additional to these, Mr. Phillips said, the fact that contracts are now out for the the work sanctioned by the Public School Board, as also for the erection of the new building of the Toronto Lithograph Co. and others that might be named, has given a fresh zest to building operations. Queried as to the discontent in labor circles, he said that there was no change in the situation within the month. Apparently contractors, as work has increased, were able to secure all the labor that was required, and each was going on the basis of making his own arrangements with bricklayers and other workmen. That this open arrangement will in the end operate against the interests of labor seems more than likely. When trade slacks off it seems to the Bystander, workmen will see the mistake made in not coming to a reasonable arrangement with employers, based on the conditions of the business and labor world as it exists today. But the more thoroughly one looks into this question, at least this has been the result of observation and study by the Bystander, the clearer does it become that few classes of the community are more short sighted and constantly stand against their own advancement than the average workman. He has always a grievance, and is constantly in a ferment; at the same time he is seldom in a position to listen to reason and recognize that conditions change from season to season, and year to year, in the labor world as they do in the economy of nature and elsewhere.

× × × ×

Were the erection of tall buildings, or, as they are familiarly known, sky scrapers, as common in Canada as in the country to the south of us, there would be more interest felt in the remarkable advance that has been made this season in the cost of structural steel. "Where other building materials are somewhat depressed," remarked Mr. Edmund Burke to the Bystander, "steel is going up in leaps and bounds." Perhaps the only building of consequence in Toronto, where a large amount of steel will be used, is that of Mr. R. Simpson, Toronto, with less or more used in the Globe building and some others; but contracts for the steel in these cases were fixed before the present large advance took place. The time will come, no doubt, when there will be many more of these steel buildings erected in Canada. Where they have their disadvantages, and some of these have been brought home closely to the people of Toronto, there is also much to be said in their favor. And the close study that is being given to this class of work is an evidence that steel structures will become an institution of all large cities in the near future. The best architects and knowing builders, it is said, now see that every piece of steel is carefully tested and if not up to the standard they are thrown aside. Experts are hired and controlled frequently by the architect at the cost of those who put up the building. So exacting has this work become that two concerns in Pittsburg are making a specialty of furnishing experts to supervise and are doing the principal work of this character in the country. The Builders' Gazette, of Pittsburg, Pa., summarizing some comments on this subject, has this to say: "In steel frame construction the skeleton of the building is generally erected first, before the masonry is started. Under the old method the iron and masonry were used together in the building of each story. Where bolts were used largely in the last mentioned form, the steel sections are riveted almost wholly in the first. A steel thus riveted can be compared to an inverted bridge, for in fact the modern building is built on the bridge plan, and it is riveted in such a manner to make it, to all intents and purposes, one piece of steel from top to bottom. Thus any strain which may be put upon the building will be shared by the structure as a whole and not confined to any one spot, as in the ordinary building." As the Simpson building advances, and the Bystander understands that the erection of the steel pillars and girders will commence at once, no doubt progress will be watched closely by everyone interested in building operations, as features of construction, that will be to some extent new to our people, will be developed.

× × × ×

The Bystander has been pleased to observe, in the interests of the lumber trade of Canada, that the yellow pine of the southern states, which at one time appeared to be securing a good foothold in building operations here is losing in favor. This change has been brought about, in part, by the action of Canadian lumbermen, after the recent big fires in Toronto, when the attention of all concerned, and the insurance companies in particular, was drawn to the fact that because of the resinous nature of this wood, it was more inflammable than Canadian white pine, and was therefore less deirable for building purposes. One result of this enquiry has been that yellow pine does not occupy the same place in the specifications of architects; and in large buildings now being erected in Toronto, Canadian dimension timber will be almost entirely used. An Ottawa dispatch to the Canada Lumberman also carries some information on this point. It is there stated that an Ottawa firm made the experiment of bringing southern pine into that city, but discovered that although they were not at any loss, yet they did not consider that there was anything gained and have decided to stick to home manufacture for the future. Where the products of the forest are one of the richest resources of the country, there ought to be a pride taken in giving Canadian woods a preference in every case, unless there is some remarkably strong reason for an adverse course.

ILLUSTRATIONS.

MASONIC TEMPLE.—R. MACKAY FRIPP, F.R.I.B.A., ARCHITECT, VANCOUVER, B. C.

INSANE ASYLUM BUILDINGS, BROCKVILLE, ONT.—KIVAS TULLY, C. E., ARCHITECT.

FOREMAN AND WORKMAN'S HOUSE TO BE ERECTED ON THE COLDSTREAM ESTATE, NEAR VERNON, B. C., FOR HIS EXCELLENCY THE GOVERNOR GENERAL OF CANADA.—R. MACKAY FRIPP, F.R.I.B.A., ARCHITECT, VANCOUVER, B. C.

A judgment has been rendered at Montreal, in the case of Mrs. Thomas vs. the estate of the late Duncan McIntyre, awarding the plaintiff the sum of $1,400. The widow of the late Mr. Thomas, architect, of Montreal, sued to recover some $38,000 for services rendered by her husband to the late Mr. McIntyre. There were six items, one for $60, three for $2,800 each in connection with a proposed house on Peel street, one for plans for stable, and another item for services in connection with a house on Drummond street. The judge fixed the amount at $1,000 for the Peel street house and $400 for the stable, dismissing the other claims.

CHARACTER SKETCH.

E. H. KEATING,

CITY ENGINEER OF TORONTO.

"We put too much faith in systems, and look too little to men."—B. Disraeli.

PERFECT as may be the plans laid and the system under which work is performed, without men of character and determination to carry out the work, failure is very likely to follow. Many an important undertaking has been spoiled because the man in charge has lacked, not so much the knowledge, but the administrative talent enabling him to bring it to a successful issue. And as one views the administration of municipalities and governments, this seems to be a marked weakness.

These were conditions that were widely discussed, when in 1892 the citizens of Toronto found it necessary to appoint a City Engineer in succession to Mr. William Jennings, who had resigned from this position. The experience of the past three years would lead to the conclusion that in fixing a choice on Mr. E. H. Keating, no mistake had been made, and the weaknesses that in some respects had been feared are not likely to develop in this appointment.

Mr. Keating is a Nova Scotian by birth, and some of the circumstances that influenced him to leave Duluth, Minn., and accept the office of City Engineer of Toronto, furnished evidence that he was possessed of a strong Canadian sentiment, and that love of country to no small extent induced him to return again to the country of his birth. Mr. Keating was born in Halifax, N. S., in 1844. He was a school-mate of the late Sir John Thompson at the Common School, and later at the Free Church Academy. He completed his education at Dalhousie College, entering shortly after that into the calling that he had chosen, serving for some time under George Wightman, the government engineer.

E. H. KEATING,
CITY ENGINEER OF TORONTO.

Railroad building in Canada has proven a useful field of education for many of our best civil engineers. Mr. Keating's predecessor, Mr. Wm. Jennings, owed no little of the success he has attained in after life to the opportunities for development in his profession that were offered during his connection with the Canadian Pacific Railway. Mr. Keating took part in the survey of the Pictou Railway in 1867, under that famous engineer, Sandford Fleming. A little later he was appointed assistant engineer of the Intercolonial, then in process of survey. For a short time he was draughtsman on the Windsor and Annapolis, and then he returned to the Intercolonial during the construction period.

In 1870, when the work of surveying was entered into on the highlands between Hudson Bay and Lake Superior, for the Canadian Pacific, he again engaged under Mr. Sandford Fleming, and did good service in this particular work. In the same year the position of City Engineer of Halifax was offered him and accepted. This position he held from 1871 to 1890, having charge of the construction of many important civic works, particularly the water-works and the Halifax graving dock. These years were useful in obtaining a knowledge of civic management that stood him in good stead in positions of a similar kind, though of an enlarged character, that he held in after years. His arrangement with the City of Halifax enabled him to engage in other work aside from the city practice, and evidence of his skill and ability in engineering directions is scattered throughout the province of Nova Scotia.

In 1890 the people of Duluth were in want of a City Engineer, and the position was offered to Mr. Keating entirely without solicitation. He accepted it, remaining there until July, 1892, when he became City Engineer of Toronto. The reluctance with which the citizens of Duluth severed the official connection was a high compliment to his sterling worth and splendid abilities.

Mr. Keating's work in Toronto during these three years is before the people. Some of the most important undertakings entered into by the city have been completed within this period, under Mr. Keating's direction. The changing of the street railway system to electricity and remodelling the water-works department take a first place among these. It has called for vigorous watching to see that the arrangements between the Street Railway Company and the city have been faithfully carried out, but Mr. Keating has been equal to the occasion. The water-works plans have not really reached the ideal that the Engineer has before him. He believes that a tunnel, such as was described with some detail in the ARCHITECT AND BUILDER two months ago, is necessary to the success of the system. The citizens by their votes have declared against this, though there is no reason to suppose from any want of confidence in the Engineer, but rather because of the heavy burden of taxation that is being borne by them at the present time, and, perhaps, not without some misgivings, though they believe the Engineer to be a strong man, that his municipal advisers are not all possessed of the same measure of back-bone.

As the executive head of the most important department of civic management, Mr. Keating has shown himself possessed of that tact and diplomacy necessary to one occupying a place of this kind. He has also proven himself eminently successful in dealing with his subordinates. "The great art of commanding," said Napier, "is to take a fair share of the work," and Mr. Keating's success as a commander is due, no doubt, in a good degree, to the readiness with which he himself takes hold of the work of the office.

Personally the City Engineer is a very agreeable gentleman. Not given to much talking, he is at the same time always approachable and pleasant. With Wellington he can say that his watchword is "Duty," and to the faithful carrying out of this, other matters must be subordinate.

THE ESSENTIALS OF GOOD PORTLAND CEMENT.

At a recent meeting of the Society of Engineers a paper on Portland cement was read by Mr. D. B. Butler. The author stated that the chief chemical components of a good cement ranged as follows:—Silica, from 20 to 28 per cent., average 24 per cent.; oxide of iron and alumina, from 8 to 14 per cent., average 11 per cent.; lime, 58 to 65 per cent., average 61·5 per cent. These ingredients constituted about 96 per cent. of the whole, the remainder being made up of small proportions of magnesia, sulphuric acid, alkalies, &c. With respect to soundness, the usual test is the moulding of a thin pat with a minimum of water. This pat is allowed to harden on a glass slab, which it should do without cracking. This, the author says, is not altogether reliable, as he had known cases where, though the pat remained sound at the end of seven days, it went to pieces later on. He therefore advocated Mr. Faija's test, which consisted essentially of subjecting a freshly-gauged pat to a moist heat of 100 deg. Fahr. until set, and then placing it in warm water at 115 deg. Fahr. for 24 hours. A pat which stood this test without blowing showed a reliable cement. The edge-runner mills, which were now being largely substituted for stones, did not, he considered, give so large a proportion of the impalpable powder, which is the essential part of the cement, so that a cement ground by stones, and leaving a 10 per cent. residue on a 50 by 50 sieve, was equal in cementitious value to one ground in an edge-runner mill, leaving but half as much residue on the same sieve. From a number of experiments Mr. Butler concludes that the time of setting is less the higher the temperature. Some of the samples tried, when mixed at 80 deg. Fahr. set in half the time required at 40 deg. Fahr., and with other specimens the difference was even greater, and the result was of the same character whether the specimens were tested for initial set or for set hard.

The Canadian Granolithic Company, Ottawa, are putting down a granolithic sidewalk on Clarence and Wellington streets, Kingston.

THE AGE OF BRICK.

DURING the early Christian period, and away down through the middle ages, the majority of public and ecclesiastic buildings were mostly constructed of stone, which in the mild climates of Greece and Italy have not wholly disintegrated, particularly when the stone work has been backed up with bricks. Many of the finest structures of early Christian architecture, that were built of stone, have disappeared altogether, while many of those formed of brick and stone together have come down to us almost in their entirety, while not a single one of the great buildings composed of bricks altogether is known to have disappeared.

In fact, the most perfect buildings that have come down to us from the earliest days, are built of bricks, and we have evidence in a thousand and one instances of the superior lasting properties of bricks over all other known building materials. The Pantheon, the building of which dates back more than a century beyond our era, is built of bricks backed up with concrete, and despite the bandit and barbarian, and the tooth of time, it still remains almost entire, as an object lesson in the use of bricks. The great Gothic Church of San Stefano, Venice, though badly designed and worse constructed, shows the bricks of which it is built to be as sound and shapely as when first laid, though held together by a very inferior mortar.

The Triumphal Arch erected at Rimini in honor of Augustus, is partly constructed of bricks, and partly of marble; but while the marble is nearly rotten and dropping to pieces, the despised bricks remain perfect, and hold together the whole structure and its decaying aristocratic veneering.

By far the oldest Pyramid is of brick, the one of Sakkara, said to have been erected more than a thousand years before Jacob wandered into Egypt. It still holds together and gives promise of being a thing of mystery for a few thousands of years more. Indeed, we believe the Pyramid of Sakkara is supposed to be the oldest structure known. The Temple of Thebes, and the great Pyramids of Ghira, are modern by comparison.

For many reasons brick seems to be the best and most natural of building materials. It is easily handled, materials for its manufacture are abundant and readily obtained, no extra skill for the manufacture of the plainer sort is necessary, it can be moulded to any shape, it is better than stone inasmuch as it is a better non-conductor of heat or cold, it is drier, weathers better, will resist the action of frost and fire better, is lighter, and when well made will resist nearly as much strain as our best building stones. It can be carved if necessary, with a definiteness almost equal to most of our stones, and its economy places it within the reach of medium-sized purses.

Recent improvements in the manufacture of pressed bricks give the modern architect and builder a decided advantage over their predecessors in many ways. In olden times the architect was obliged to have all his moulded and ornamental bricks made by inexperienced workmen, under his own supervision. In the construction of a large building of brick, the brick-maker was one of the architect's staff, and made his bricks to the order of his superior. His appliances for making and burning were of the crudest sort, and, as we know from examination of old bricks, they were often badly made and badly burned. To-day the architect may choose his bricks from catalogues, making his own choice of shape, quality and color, and can rely on getting what he orders; and he can order to suit his design, whereas the old builders were obliged in almost every case to make their designs to suit the materials available.

Canada—Ontario at all events—is well equipped so far as modern bricks are concerned, and speaking from a knowledge born of long experience under several flags, the province named produces a brick that has no superior, and few equals on this continent. Specimens of bricks now before me, made on the Don, near Toronto, from Credit Valley, from the yards at Milton and Beamsville, are fully up to all required standards, and while they vary somewhat among themselves, both as to quality and color, any one of them is superior to the bricks of our grandaddies.

That the coming cities and towns of this great Dominion will be made of brick, goes without saying; even the streets hereafter will be of brick, and it is within the range of possibility that some method will ere long be discovered or invented by which strong slabs of brick or terra-cotta will be made that can be serviceable for sidewalks. This is an "age of brick," and the possibilities of the fertile art are beyond the comprehension of ordinary mortals.

One thing before closing. Some steps should be taken by brick-makers to have one uniform size throughout the whole Dominion. I find, in comparing different makes, quite a difference in sizes: in length, width and thickness. One-eighth of an inch difference counts up in a large building, and frequently confuses an estimator, particularly if he figures closely. Again, the bricklayer finds it difficult to work in pressed bricks with common ones, as the latter are nearly always larger than the former. A standard size would be a boon to all builders, and should be of importance enough to warrant legislation, if the brick-makers themselves do not agree upon a uniform size.

F. T. H.

Collingwood, July 3rd, 1895.

THE PROPER SHAPE OF CHIMNEYS AND FLUES.

THIS question has been considered by a man of a wide and successful experience, and answered very positively as follows:

"Having an idea that it was not all uphill work in a chimney, I concluded to investigate the operation of the one in my house, to see if there were any down currents in it, as I heard frequently asserted. I took light tissue paper and made some small light balls of it. I was particular not to crush them tight and make them heavy, and also was careful to keep them round. With these I went to the top, and balls that were dropped into the center of the chimney were invariably blown out. Those dropped into the corners in a majority of cases went to the bottom, where I found them on taking out the pipe to look for them. Those that did not go down, I think, struck some projection, and were thrown into the central up current and were blown out. This settled in my mind that rectangular flues were wrong, and while the area of a round flue of the same diameter might be less, it was equal in air carrying capacity, as it had only one up pressure, with no corners for friction and tendency toward a vacuum. This led me to making the ends of my partition hot-air flues round, and, while they are easier to make and cheaper, they are equally as effective as if they had square corners, satisfying me that all flues should be round."

From another experienced source comes this idea: "I believe that the house with round flues can be heated satisfactorily for the six months necessary with at least a ton of coal less, where the house with square flues would not be as comfortably warmed."

COLORING ARCHITECTURAL TERRA-COTTA.

THERE is no device resorted to by the clay-worker that is alike so inartistic and so ineffectual, says the British Clay-Worker, as attempting to give to architectural terra-cotta blocks a finer color than they naturally possess. The coating of such blocks with pigments or washes, or the staining of their surfaces, is never of a lasting nature; it soon wears off under the combined action of rain, smoke, frost, and other influences of an atmospheric nature.

"Then what are we to do if our clay will not yield a good color?" some may say. Well, the only course open is to determine whether it is admissable to use chemicals in the composition of the blocks, so that increased tone of color shall be due not to a superficial film, but to the mass itself. Obviously, this will be governed entirely by (1) the cost of the chemicals, (2) the facility with which they can be applied; and these conditions, again, will be governed by the price which can be got for the goods.

If the selling price warrants the expenditure of labor and chemicals, by all means color the mass throughout; but if, on the other hand, the extra labor and expense would not be recouped, it is clear that the best course to adopt is to abandon the manufacture of the blocks, for which the particular clay is obviously unsuited, and exploit the clay for other purposes.

Washes and stains, however, are never permanent, and permanence is the first quality that is demanded in architectural facings. If these principles were more often present in the minds of clay-workers, we should not see so many ghastly failures in our streets, failures which only tend to bring our industry into disrepute.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

MONTREAL may be called with some appropriateness, in a few years from now, the City of Monuments, if their number continues to grow out in the same proportion they have been during the last few years.

Two of these monuments having been unveiled recently, the readers of the CANADIAN ARCHITECT AND BUILDER will forgive me if I take advantage of the actuality of the subject to bring the same before their notice.

Amongst the monuments and memorials the Maisonneuve Monument stands foremost and unrivalled by anything yet erected in the city. It is not that it is the tallest or the most costly, as it is not these alone that are capable of producing a work of art, but it is the refinement of the whole, the agreeableness of the outline and the elegance of the details, which are yet very simple.

The statue stands on a pedestal of granite, having a low buttress at each of its four corners, on which are placed groups of figures, representing Closse accompanied by his dog, and Lemoine, two early settlers of the Ville-Marie; Jeanne Mance represented while attending a wounded young Indian, and an Indian of the tribe of the Iroquois, with which Maisonneuve often had trouble. On each of the four sides of the pedestal are bas-reliefs, the one facing Notre Dame Church representing the signature of the act constituting the foundation of Ville Marie, the one facing the Ontario Bank the exploit of Place d'Armes, the one facing the Bank of Montreal the heroic death of Dollard at the Long Sault, and the side facing the New York Life building the celebration of the first religious service on the island.

The cost of the monument has been about $25,000, nearly half of which has been subscribed by the municipal government and the balance by citizens of the city.

The Macdonald Memorial unveiled shortly before the Maisonneuve Monument, might no doubt be comparable, in respect to its sculpture, to the Place d'Armes monument, but from an architectural point of view it utterly fails to provoke that agreeable sensation and satisfaction one feels when passing by the down-town monument.

The aspect of the whole is of a triumphal arch, standing on a high pedestal, with its two side doorways omitted, and as an architect of some note remarked to me a few days ago, crowned by a candlestick holder. The memorial bears no inscriptions of any kind, with the exception of the name of the great statesman honored by its erection.

The roof is crowned by four lions, and over these by allegorical figures representing the seven provinces of the Dominion, holding a shield bearing the coat of arms of each of the Provinces. The total cost of the memorial was about $35,000.

Another of the monuments also recently erected is a granite obelisk, measuring about 35 feet heavenward, on Foundling street, near Place Royale, in commemoration of the founders of Montreal. The obelisk is perfectly plain, with no sculpture or bronze work, with the exception of the plates bearing the inscriptions, one of which reads as follows:

Le XVIII Mai MDCCCXCIII
Ce Monument a ete erige
par
La Societe Historique de Montreal
a la memoire
Des genereux fondateurs de cette ville
et
des premiers colons arrives ici
en
MDCXLII.

The Historical Society of Montreal is an institution deserving encouragement from all citizens and true patriots, for it is a noble task that it is pursuing. Although the field is not vast in a comparatively young country as ours, we should not lose sight of the great good derived from similar institutions in Europe, and especially in France.

Another monument, and the last I have to chronicle here, is Dr. Chenier's Monument, one of the agitators of 1837-38, which is now in course of erection in Viger Gardens. The foundations are now level with the ground, and it is expected to have it completed this summer.

MONTREAL MASTER PLUMBERS' ASSOCIATION.

The regular meeting of the above association was held on the 20th of June, the President, Mr. Lamarche, in the chair. Among those present were: J. W. Hughes, John Date, P. C. Ogilvie, J. A. Sadler, W. A. Stephenson, D. Gordon, H. Patton, Thos. Christie, W. M. Briggs, D. Sexton, J. Marien, J. Creed, John Watson, F. Horton and G. Denham.

The Secretary read a reply from the Toronto and Quebec associations, regretting inability to send delegates to the convention of the National Association of Plumbers of the United States, held in Philadelphia recently, after which Mr. John Date was called upon to give an account of his visit to the convention. He was courteously received by the American brethren, and found their meetings interesting. About 397 delegates were present, as well as a number of visitors. It was moved by Mr. Gordon, seconded by Mr. Sexton, that the thanks of the association be conveyed to Mr. Date for his services, which was carried unanimously.

After considerable discussion among the members, it was resolved to suspend the regular meetings of the association until September, leaving to the Executive Committee all business arising during the interval, but should it be found necessary, a special meeting may be called at any time.

The hope of those engaged in the building trades has been deceived, for although the outlook last spring for this season's work was satisfactory enough, it appears that, notwithstanding the improvement recorded in trade in general, speculators and money investors are more cautious and prudent than previously, and do not wish to launch themselves in any undertaking of importance until the complete revival of business is assured.

The only buildings of any importance being built this year number only two, the Canada Life buildings at the corner of St. Peter and St. James streets, which has now reached its third story, and the Bell Telephone Co.'s building, at the corner of Notre Dame and St. John streets, which has just been commenced.

PERSONAL.

We regret to announce the death, on the 10th inst., of Mr. Warden King, senior member of the firm of Warden King & Son, Montreal, and one of the most prominent business men of that city. He had been in somewhat delicate health for some time past, but serious results were not anticipated until a short time previous to his death. Mr. King was born in Scotland in 1823, being 72 years of age at the time of his death. In 1852 he entered into business with the late Mr. Rogers, as hardware manufacturers and iron founders, the firm being known as Rogers & King. After Mr. Rogers' death, Mr. Jas. C. King became a partner, and under the name of Warden King & Son the business has since been successfully carried on, the Chanteloup estate being recently purchased by them. In religion Mr. King was a Presbyterian, being the oldest elder in Erskine church, and one of the founders of the Y. M. C. A. He was a Conservative, but took no prominent part in politics.

USEFUL HINTS.

White lead and zinc whites are valued according to their whiteness, fineness and opacity or density. Blacks according to their tone, lustre, density and staining capacity.

In the manufacture of cement mortar about eight parts of furnace ashes, slag, or coke, four parts of slaked lime, and one of clay, are taken and mixed dry so as to form a cement, which, on mixing with water, sets in the ordinary way. The proportions of the materials may be varied so as to produce either an aerial or hydraulic cement.

French polish, as used in France, is made as follows:—A solution of gum acacia and the whites of two eggs is made by beating these ingredients in a mortar until they amalgamate; then half-a-pint of raw linseed oil, the same quantity of the best vinegar, eight ounces of methylated spirits of wine, one ounce of hydrochloric acid, and two ounces muriate of antimony are added.

A writer in one of the English architectural papers gives what he terms "a very simple method of rendering a wood factory building of greater resistance to fire." It consists in filling the spaces between the studding with "a grout made of sand, lime and a large proportion of sawdust, mixed with water to flow slowly. It becomes quite hard; is a poor conductor of heat, and will not ignite, though it is charred by exposure to an intense fire. This applies to a building already constructed, where it would be a difficult task to remove the sheating or lath and plaster already on the inside walls. Where the studding is already exposed on the inner side, the space is frequently filled with brick, masonry, or large tiles made for such purposes.

CODE OF PRACTICE FOR SUB-ESTIMATING AND SUB-CONTRACTING.*

THE Master Builders' Association of the City of Boston, recognizing the importance of defining the rights and obligations of Principal and Sub-Contractors for Building Work, in their relations to each other in estimating, contracting for, and carrying on work, hereby approves and adopts the following Code of Practice as a declaration of what it will recognize as honorable methods in the conduct of business.

ARTICLE ONE.—Obligation of Principal Contractor to Sub-Contractor.—A principal contractor is under obligations to treat upon an equal basis all estimates which he "received," prior to putting in his own bid. Estimates must be considered as "received" when they come into a principal contractor's possession, either by his direct solicitation or by being accepted by him. The opening of a bid, knowing it to be such, constitutes receipt of the same.

A principal contractor is under no obligation to use a bid which he has not solicited, accepted, or received, but if he does not wish to use the estimate of a sub-bidder he should decline it, if proffered personally, or should return it unopened if sent to him by mail or otherwise. The retention of a bid should be constructed as a receipt of the same.

All bids should be considered "confidential," and a principal contractor revealing any bid received by him to any person whomsoever, without consent of the sub-bidder, will be liable to complaint and discipline under Article X of the By-laws of this Association.

A principal contractor, when making up his estimate, is not entitle to receive bids from sub-contractors if he is at the same time making himself their competitor by figuring their portion of the contemplated work. It is legitimate for a principal contractor to figure all proportions of work, depending upon no one for what are usually know as sub-estimates, but it is not legitimate for him to receive bids from others for sub-work if he is himself figuring those portions independently.

ARTICLE TWO.—Award of Sub-Contracts.—The principal contractor having been awarded a general contract, should immediately award the sub-contracts to the lowest bidder in each branch.

ARTICLE THREE.—Penalty for Not Awarding Contracts to Lowest Sub-Bidder.—A principal contractor, failing to award a sub-contract to the lowest sub-bidder to whom he is under obligation as previously provided, should be liable to pay damages to the said lowest bidder, in amount not less than ten per cent. of the amount of the estimate.

Payment of such damages will not relieve the principal contractor from liability to discipline under provisions of Article X of the By-laws of this Association.

ARTICLE FOUR.—Contracts with Sub-Contractors.—The principal contractor, immediately after executing a general contract with the owner, should, for his own protection as well as the protection of the sub-bidder, execute some satisfactory form of contract or agreement with each lowest sub-bidder.

ARTICLE FIVE.—Payments to Sub-Contractors.—Unless the contracts made with sub-contractors otherwise provide, payments during the progress of the work should be made by the principal contractor to the sub-contractors upon the same basis of payment, in relation to the amount of work performed, as is prescribed in the contract made by the principal contractor with the owner.

Final payment to a sub-contractor should be considered as due at the expiration of thirty days after the completion of his work and its approval by the architect or owner, unless otherwise provided by the sub-contract or agreement.

ARTICLE SIX.—Submission of Bids by Sub-Contractors.—Sub-contractors in submitting bids to principal contractors should enclose them in the envelopes prepared by this Association and kept on hand for the use of sub-bidders, or should endorse the envelopes in which they are enclosed in such manner that principal contractors may know whom the bids are from, what portion of the work they comprehend, and the particular building they apply to.

Sub-contractors who fail to so enclose and endorse their bids cannot claim protection or redress under the first article of this Code.

ARTICLE SEVEN.—Obligation of Sub-Contractor to Principal Contractor.—Should a sub-contractor refuse to contract at the amount of the estimate he has given to a principal contractor who had used the said estimate in good faith, he then should be liable to the said principal contractor for damages in amount not less than the difference between the amount of the estimate which was submitted by him and the amount at which the principal contractor may be obliged to contract the work.

Payment of such damages will not relieve the sub-contractor from liability to discipline under provisions of Article X of the By-laws of this Association.

ARTICLE EIGHT.—Obligations of Sub-Contractors to Each Other.—Any sub-contractor suspected of unfair treatment of his fellow sub-contractors will be liable to complaint and discipline under Article X of the By-laws of this Association.

ARTICLE NINE.—Trading Sub-Bids.—Trading upon sub-bids will be considered sufficient cause for complaint and discipline as provided by Article X of the By-laws of this Association.

ARTICLE TEN.—Bids to Architects or Owners.—When bids for separate departments of work on a building are solicited by the architect or the owner, they should be submitted with the understanding that they are direct estimates, for which direct contracts are to be made by the owner with the lowest bidder, and no other disposition of such bids should be permitted without consent of the bidder submitting the same.

Sub-bids should be given only to the principal contractors who are estimating the work in question, and should not be left with architects or owners for the inspection and information of principal contractors. Sub-contractors must understand that bids thus left with architects or owners are in great danger of losing their confidential character, and that if they so leave them they cannot claim protection or redress under the first article of this Code.

SUGGESTIONS.—Members of this Association having sub-contracts to let or material to buy should, as far as may be consistent with business principles, deal only with members of the Association, or at all events give their fellow-members an opportunity to compete, and then give them the preference, other things being equal.

All bidders should take cognizance of the danger they may be subject to through the practice, so prevalent in some architects' offices, of making changes in plans or specifications, or in both, during the progress of estimating. Correction of this prenicious practice can only be obtained through refusal by contractors to estimate under such conditions.

[A true copy.]

Attest: WM. H. SAYWARD, Secretary, M. B. A.

* [In adopting the Code the Association acknowledges its obligation to the National Association of Builders for valuable suggestions in relation to this important matter.] Adopted August 2, 1891.

GLASS COLORING IN GERMANY.

THE beautiful coloring of certain varieties of glass, now produced in Germany, and which is said to far excel some of the most noted French specimens, is an art practiced by the glass blower at the furnace, by means of an apparatus consisting of a sheet iron cylinder, twenty inches long and eight inches diameter, standing vertically, and having a similar cylinder riveted across the top. Kuhlow's German Trade Review says that in the lower cylinder is an opening into which an iron ladle can pass, and the horizontal cylinder is provided with doors at either end, the one nearest the operator being so arranged that the blowpipes can be supported, when the door is closed, in a horizontal split running to its middle, the object to be treated being held inside. While the glassblower is reheating his work for the last time in the furnace, an attendant takes the long-handled iron ladle, which has been heated red hot, shakes into it about a spoonful of a specially prepared chemical mixture, and places the bowl of the ladle quickly in the opening provided for it in the vertical cylinder. The mixture immediately gives off vapor, which rises to the horizontal cylinders, where, meanwhile, the blower has placed his work, supported by the blowpipe and heated to an even red, turning it rapidly in the vapor. In a short time the object is covered with a changeable lustre, is removed from the pipe and tempered like other ware in an ordinary oven, then cut, engraved, painted, or gilded as desired.

The corner stone of a new English church has been laid at Fergus, Ont.

THE ABUSE OF CEMENT.*

By D. B. Butler.

The treatment which cement sometimes has to undergo at the hands of inexperienced users, makes it a matter for wonder that failures are not more frequent. One of the most prolific causes of failure is insufficient attention to the setting properties of the cement under treatment. In very hot weather it is no uncommon thing for a cement to have a very quick initial set, and in using such a cement, therefore, in order to obtain its full strength, it must be mixed and in its allotted position within a very few minutes of adding the water. This often entails the mixing of very small quantities at a time, and if due precautions are not taken, a larger quantity is mixed than can be manipulated before setting commences. This generally results in the use of additional water, and the serious detriment, if not total destruction, of the setting properties of the cement. Many cases of failure have occurred in which the cement being a good quality, though somewhat quick setting, point strongly to over-manipulation or "killing."

Another frequent cause of unsatisfactory work is a dirty and unsuitable aggregate. The admixture of a very small proportion of dirt or loam is quite sufficient to materially deteriorate the strength of a concrete, and too much stress cannot be laid upon the necessity for seeing that all aggregates are free from any foreign dirty matter. A case of structural failure came under the notice of the author a short time back, in which the cement used was perfectly good, but the finer portions of the aggregate consisted of very fine sand, so fine that .60 per cent. passed through a sieve having 70 holes per lineal inch, and 80 per cent. through a sieve having 50 holes per lineal inch. The structure of which it formed part had to bear a considerable thrust, and to aggravate matters, instead of this sand being properly mixed, large patches occurred in which there was no cement at all. In addition to this, the sand contained a considerable portion of loam or foreign matter, and it is not to be wondered at that failure resulted.

The neglect of the proper cooling or aeration of a cement is a frequent cause of trouble, and to ensure satisfactory work, proper cooling cannot be too strongly insisted upon. Of course cement may give good results when used hot from the mill, and the author has manufactured cement which has turned out satisfactorily under these conditions, but to use cement in this state is to court failure. It is sometimes specified that the manufacturer shall store the cement in his warehouse at a stated thickness of say 3 ft., for a certain period, and have it turned over three or four times at regular intervals before being supplied for use, but if this had to be done with the entire output of every factory, it would necessitate an enormous increase in warehouse room, to cover the first cost of which would entail a largely increased price to the consumer. It it therefore advisable, where cement is being used in considerable quantities, to construct temporary cooling sheds, with a good, dry, boarded floor, where the cement can be turned out in sacks or barrels and thoroughly aerated before use. It is sometimes contended that the cement, even if shipped hot, cools sufficiently during transit. Although it undoubtedly cools to a certain extent, it is doubtful if, when tightly packed in barrels, or closely stowed in sacks, it cools sufficiently to allow of its being immediately used with safety.

The exposure to extremes of temperature has perhaps more to answer for in the shape of unsatisfactory work than is generally recognized. If exposed to a summer sun immediately after being gauged, naturally a great deal of the necessary moisture is evaporated, leaving the cement without sufficient to complete the crystallization already set up. The result frequently is that the work crumbles, and shows signs of failure. On the other hand, exposure to frost acts on the water, and by expansion destroys the surrounding concrete. The author once had occasion to investigate a case of failure in which frost was the undoubted cause of the mischief, as there was no fault to be found either with the cement, aggregate, or manner of manipulation. The concrete flooring of an outhouse in some new farm buildings was commenced late in December, and left partly completed owing to the Christmas holiday. As frost set in with unusual severity during the interval, the work was not revisited until the return of milder weather, three or four weeks afterwards, when it was found that that portion which was laid immediately before the frost, was utterly destroyed, while the proportion previously laid, which had sufficiently hardened to prevent total destruction, showed signs of flaking on the top where it had been floated or trowelled. In this case the cement had to bear the blame, although the destroyed portions, afterwards relaid with the same materials, gave perfectly satisfactory results. During severe weather, therefore, proper precautions should be taken to protect freshly laid concrete from the effects of frost.

To summarize the preceding remarks, the chief points requiring attention in the use of cement, in order to obtain the best results, are the following :—(1) Sound, well ground cement, of steadily increasing strength. (2) Due attention to the setting properties of the cement. (3) Clean, well-proportioned aggregate. (4) Proper maturing of the cement before use. (5) Protection from extremes of temperature. If these points always received the amount of attention due to their importance, failures in cement work, apart from defective design, would very rarely be heard of.

*From a paper read before the Society of Engineers.

APPROXIMATE ESTIMATES.

We have devoted much space in our columns, says The Building News, to estimating buildings, and to the methods in use for taking out quantities; but for the architect's purposes a more expeditious mode of calculation for obtaining approximate estimates is necessary. The ordinary cubing process is open to some objections. The pricing of the voids or spaces with the solid portions is not altogether satisfactory; indeed, without some attention to the proportion between the two, and the character of the building, it is eminently unscientific. Every architect is aware that the open spaces of rooms very materially affect the estimate. A building like a large hall or a place of worship, inclosing one large room, and a building of the same dimensions divided into small rooms, give very different results, and if cubed at a price that would be fair for the first, would be disproportionately inadequate for the latter. It is true that the practical man may so regulate the price per foot in each case as not to go far wrong; but this knowledge requires a large and varied experience. In buildings like hospitals and barracks the proportion of the voids to the solid structure ought to be ascertained before the ordinary price per foot can be arrived at. The author of a paper on this subject, Mr. S. Alcock, surveyor of the Royal Engineer Civil Service, has written some sensible remarks on the question worthy of attention, his remarks bearing more particularly on barracks. He shows that if the cubical contents of the rooms were deducted from the contents of the whole structure, the remainder would represent the cube contents of the actual building materials in the walls, floors, ceilings, and roofs, and a price per cubic foot on this remainder would be a much closer and more reliable approximation to the cost; but as these several parts vary considerably in price, as, for instance, the walls being less per cube foot than the floors, this plan still leaves much to be desired. He suggests a method that has been used by some, that "a much more reliable approximate estimate of the cost might be made by pricing the enclosures or envelopes to the rooms or apartments at so much per hundred square feet, taking the walls according to their thickness and manner of finishing each face, including all digging, concrete footings, plastering, papering, coloring, lime-whiting, etc., in fact, all work and material expended on the walls; and for the dimensions (1) the length, and (2) the height from the bottom of foundations to the eaves if the wall maintains the same thickness throughout, or to the change in thickness if the thickness is changed, and making no deductions for doors, windows, or other similar openings." The floors are similarly to be taken by the square of 100 ft., including all joists, boarding, bridging, hearths, the upper floors to include lathing and plastering, and the ground floor dwarf walls and any concrete to the ground under the boarded floor. The roof covering should include not only the slate or tile, but leadwork, rafters, boarding, trusses, skylights, etc.

This mode of estimating the constructional envelope, instead of taking solids and voids together, is much more reasonable, as it takes into account the materials and labor in a more precise and definite form. By using a schedule of prices calculated for each of these main superficies—namely, for the walls, the floors, and the roof—we can obtain a very approximate idea of the total cost.

STUDENTS' DEPARTMENT.

STUDENTS' EXAMINATIONS.

Following are the subjects for the students' examinations of the Ontario Association of Architects for 1896:

FIRST INTERMEDIATE EXAMINATION.

Every candidate must, at least one week prior to the date fixed for the examinations, send to the Registrar the following drawings, which must be certified by his principal to be his own work :

Five sheets of drawings, one of each of the Roman orders. One sheet of the mouldings and ornaments of those orders drawn to a larger scale. (Each sheet to be of the size of a half sheet of Whatman's Double Elephant paper, i.e., 20 in. by 26 in.)

The subjects for examination will be :

Elements of Construction.—Text book : Mitchell's Building Construction.

Mathematics.—Euclid : Books I, II and III. Plane Trigonometry : Including the solution of plane triangles. Algebra : Including quadratic equations.

Technical Terms.—A knowledge of the terms neces ary to understand the description of a monumental building and its parts.

History of Architecture.—To the close of the Roman period. Books recommended : Stevenson's House Architecture, Vol. I, as an introduction ; Rosengarten's Architectural Styles ; Fergusson's History of Architecture.

SECOND INTERMEDIATE EXAMINATION.

Every candidate must, at least one week prior to the date fixed for the examination, send to the Registrar the following drawings, which must be certified by his principal to be his own work :

One sheet of Romanesque architecture ; two sheets of Gothic architecture ; one sheet of drawings measured from existing examples ; one sheet of constructional details. (Each sheet to be of the size of a half sheet of Whatman's Double Elephant paper, i.e., 20 in. by 26 in.

The subjects for examination will be :

Statics, Graphical and Analytical.

Strength of Materials.—Text book for both the above heads : Lessons in Applied Mechanics, by Cotterill & Slade ; Part II.

Practical Knowledge of Building Trades.—Masonry (excluding cut stone work), Brickwork and Plaster. Text book : Mitchell's Building Construction ; advanced course.

Structural Iron Work.—The candidate will be required to draw details of the forms of iron construction in use in ordinary practice, viz.: the construction of columns and girders, and the framing of beams and trusses. Text book : Mitchell's Building Construction ; advanced course.

History of Architecture.—From the close of the Roman period to the present time. Text books recommended : Fergusson's History of Architecture ; Rosengarten's Architectural Styles ; Parker's Introduction to Gothic Architecture.

FINAL EXAMINATION.

Every candidate must, at least one week prior to the date fixed for the examination, send to the Registrar a perspective drawing which must be certified to be his own work. Drawings to be on a sheet of paper, 20 in. by 26 in., and not mounted on cardboard.

The subjects for final examinations will be :

History of Architecture.—The candiate will be expected to know the history of the development of Architecture.

Mouldings, Features and Ornaments.—The candidate must be able to draw the characteristic mouldings, features and ornaments of any style.

Design.—As illustrated by drawings for a building of moderate dimensions, from particulars given, with details of construction and ornament.

Nature and Properties of Materials.—Limes, cement, stones, bricks, timber. Text book : South Kensington Notes on Building Construction.

Foundations.—Text book : Foundations, by George T. Powell.

Architectural Jurisprudence.—Text book : The law relating to Civil Engineers, Architects and Contractors, by Macassey & Strachan.

Practical Knowledge of Building Trades.—Sufficient for the purposes of ordinary building. Text book : South Kensington Notes on Building Construction ; Building Superintendence, by T. M. Clark.

Strength of Materials.—Designing structures of an ordinary kind from data, with computation of the strains involved. Text book : South Kensington Notes on Building Construction.

Heating and Ventilation.—Text books : Ventilation and Heating, by John S. Billings ; Steam Heating for Buildings, by Wm. J. Baldwin.

Sanitary Science.—Text books : Gerhard's House Drainage ; Bayles' House Drainage and Water Supply.

Steel and Iron Construction and Protection.—Text book recommended : Skeleton Construction in Buildings, by W. H. Birkmire.

PLASTER CASTS.

Plaster of Paris may be hardened so as to bear a more perfect polish than ordinary stucco-work, and not be very readily scratched. This is effected, says the Builders' Reporter, by the addition of certain saline substances, such as alum, borax, silicate of potash, or soluble glass. If an object in plaster, such as a bust, be soaked for a month in a solution of alum in twelve to thirteen parts of water, and then wiped and allowed to dry fully in the air, it will become so hard that it can no longer be scratched with the nail, and will lose much of the brittleness of ordinary plaster casts. Casts treated in this way become stained, and are always liable to attract moisture from the atmosphere. If baked gypsum be moistened with a solution of alum, or raw powdered gypsum be well mixed up with a similar solution and exposed to a red heat, a mass will be obtained of a dull milk-white, or more usually a slight cream color, which may be readily pulverized, and will set quite as well as ordinary gypsum, especially if a weak solution of alum be employed in making the paste. Casts prepared of the compound thus formed, although taking a longer time to dry, are unusually hard. They may be exposed to the weather for some time and may be washed with a sponge without injury, and even immersed in boiling water without diminishing their hardness. Those prepared by steeping in a solution of alum, on the contrary, will become quite soft ; so much so as to receive the impression of the fingers if soaked for a few hours in cold water. Keen's cement is a plaster prepared in this way. If carbonate of potash or pearl-ash be mixed with the alum, so as to form a basic alum, we have Martin's cement ; and if for the alum we substitute borax, we have Parian cement. Common plaster of Paris casts resemble, in many respects, the dense gypsum from which a good deal of the plaster of commerce is made ; and as this differs from alabaster only in its molecular structure, many persons have imagined that it might be possible to convert plaster into a material resembling that beautiful substance. The nearest approach which has yet been made to the solution of this important problem is Cheverton's invention of the so-called protean stone or plastic ivory. This substance, which is well adapted for carvings in imitation of ivory and the manufacture of various ornaments, is made by exposing the plaster cast or block of the same substance to a temperature varying from 250 deg. to 350 deg. Fahr., during twenty-four hours, by which the whole of the water combined with the sulphate of lime is driven off, and the material reduced to the condition of plaster of Paris. After undergoing this operation it still retains its form, but is exceedingly friable.

The following makes a good gasfitter's cement :—Take 4½ parts by weight of resin, 1 part of beeswax, and 3 parts of Venetian red. Melt the resin and wax together, then stir in the red pigment, and pour the mixture into moulds made of oiled paper or iron.

Brick-dust Mortar.—The use of brick-dust mortar as a substitute for hydraulic cement is now recommended on the best Spanish engineering authority, experiments made with mixtures of brick-dust and quicklime showing that blocks of one half inch in thickness, after immersion in water for four months, bore without crushing, crumbling, or splitting, a pressure of 1,500 lb. per sq. in. The use of brick-dust mixed with lime and sand is said to be generally and successfully practised in the Spanish dominions, and is stated to be in all respects superior to the best cement in the construction of culverts, drains, tanks, or cisterns.

SOME EXPERIMENTS WITH MORTARS.

It is a common belief amongst builders, especially amongst bricklayers and foremen, that it is much more advantageous to mix lime-mortar some days before it is wanted, rather than to mix it immediately before the bricks have to be laid.

To test this popular superstition—if we may be forgiven the expression—says the British Clay-Worker, samples of mortar have recently been taken on successive days from two separate heaps of larger size. Small cubes of bricks were moulded from these samples, and set aside for a definite period of weeks, and then broken, in order to estimate their tensile strength.

The following were the results :—

Simple	Days in heap after mixing.	Days exposed to air as a small brick.	Average breaking stress in lbs. per sq. in.
Mortar No. 1	3	50	34·6
" "	4	49	38·6
" "	6	48	38·1
" "	7	46	39·3
Mortar No. 2	4	48	36·0
" "	5	47	38·0
" "	6	46	41·2
" "	7	45	41·5

The amount of calcium silicate formed was found to be exceedingly small, even after very long intervals of time.

Another notion which is very common amongst those who have to deal with the building of bricks into brickwork is that sugar and blood are very good things to mix with the mortars, especially with hydraulic mortars. Consequently, experiments were undertaken to test these views.

Hydraulic mortar tempered with sugar and water, at the rate of half a pound of sugar to a gallon, was found to be considerably stronger than the same mortar tempered with water alone. This was found to be true only if the mortar were allowed to harden exposed freely to the atmosphere. If the mortar were used for sub-squares brickwork, no advantage was found to follow upon making the extra expenditure and taking the extra trouble with sugar.

The same mortar was also tempered with bullock's blood, diluted with one-third of its volume of water. The mortar was then moulded in a brick mould, and was found to set somewhat more quickly. It also showed a considerable increase in strength, both when exposed to the air as well as when laid under water.

Here are some experimental data :—

	lbs per sq. in.
1. Tempered with water alone	63 00
2. " " sugar solution, and exposed to water during 38 days	62·75
3. " " sugar solution, and exposed to air during 38 days	65·4
4. " " diluted blood, and exposed to water during 37 days	68·3
5. " " diluted blood, and exposed to air during 37 days	69·8

So it seems that there is some truth in these old notions ; and those who hold them will now be able to give scientific reasons for their faith.

HOW TO PREPARE MORTAR.

Mr. Edward Wolff writes on the above subject to Engineering, New York, showing defective methods of mortar making employed by builders, and giving the proper method of slacking lime, preserving it in good condition after slacking, and preparing from it strong, adhesive mortar :—

"The slacking operation should be done in a water-tight box made of boards, and so much water should be mixed in that the contents will never get dry, and a sheet of water will remain on top to prevent access of air. If the box will not hold the entire quantity of lime required, the contents may be emptied into a cavity made in the ground close to the pan, and this process may be repeated. This should be done at least two weeks before sand is added, or before the mortar is prepared for use. Slackened lime prepared and kept as stated has been found free of carbonic acid after many years, air and gas having not been able to find access. Instead of following the procedure in slacking lime recommended above, we see in this country, or at least in the neighborhood of New York, a faulty process adopted, which consists in loosely mixing the sand with the slacking lime immediately after water has been added, and forming a dry heap on the surface of the ground, which is left lying there several weeks to give time for complete slacking before the sand is worked in evenly and the mortar considered ready for use. This heap arrangement is perfectly adapted to circulating air through a material which should be guarded against contact with air. The sun heats the surface of it, makes the air escape after it has given up its share of carbonic acid gas, while at the base of the heap and at the shady side, a fresh supply enters to fill up the vacuum after it has circulated through the heap and has been robbed of its share of carbonic acid gas. That this procedure really happens in such a heap we can easily see when we place a lump of freshly slacked lime in a wineglass, and in another glass place a small quantity of material taken from a heap such as described, and which has been prepared a few days before ; fill both glasses nearly up with water, and add a few drops of muriatic or sulphuric acid to each In the first glass nothing can be observed, while in the second glass we will see in the shape of small bubbles the carbonic acid escape, which has been absorbed by the lime from the atmospheric air circulating in the heap."

THE TROUBLES OF INEXPERIENCED CONTRACTORS.

Here in this northern country, writes Mr. Fred. T. Hodgson, of Collingwood, in the Brickbuilder, the winters are long and severe, and bricklayers and masons have necessarily a long spell of idleness, and of course when spring does set in they are anxious to go to work at the earliest moment possible, and in their anxiety frequently contract for work much below its actual value. A case in point has just come under the writer's notice, one of a great number, and was as follows : A strong company in town desired to erect a large brick building for a sort of annex to their extensive meat-curing factory. Plans and specifications were prepared during the winter, and the contracts were advertised to be let about May 1. Nearly all the legitimate contractors tendered for the work, and a bricklayer who had never had any experience with large contracts tendered also. His figures were so low that the company, who thought the regular contractors wanted to swindle them, gave him the work. Everybody knew, who knew anything about such work, that if the successful tenderer went on with the work it would ruin him. He commenced operations, however, engaged his men, and purchased some of his material, when all at once it dawned upon him that he had taken the work too low. Fortunately the papers had not been completed, and he threw the job up. The company tried to keep him to his bargain, and at last offered him a big sum more if he would go on with the work. He concluded to try it again, did so, this time under the knowledge that he was tied down on paper to complete the work. He discovered the other day that even with the addtional sum allowed him he would lose money, so abandoned the work a second time. The company was obliged to have the work done, so were compelled to fall back on the regular contractors, who now command the situation, and the owners have to pay the piper. The first contractor has now got into trouble that may sweep away a lot of money, and he has missed several smaller jobs that were within his capacity as a contractor.

This is one of many like cases that I have met with in my forty years' experience. Men are too anxious to become contractors, and fail to recognize the fact that special qualities are required in a man to make a successful contracor.

PUBLICATIONS.

The frontispiece of the June Review of Reviews—"Prince Bismarck in His Home"—is a striking representation of the family group at Friedrichsruhe.

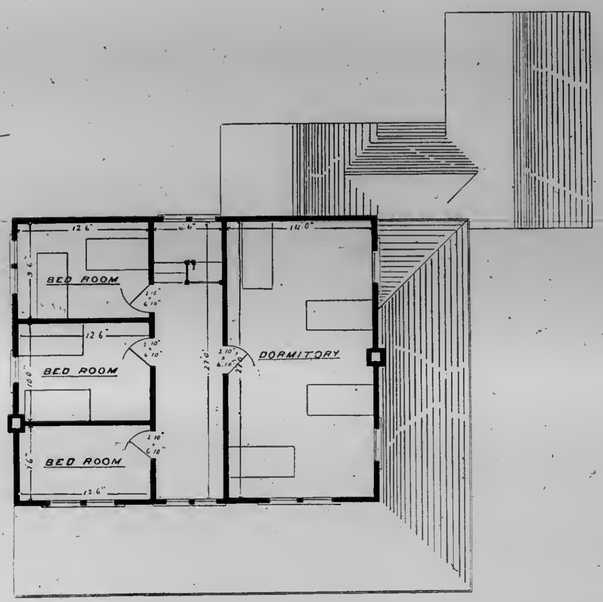
"Property" is the title of a new monthly publication, the first number of which has reached us. It is declared to be published in the interests of investors in all lines. The publisher is Mr. H. Bragg, Montreal.

The Laughlin-Hough Drawing Table Co. has recently been formed in Guelph, Ont., with a capital stock of $55,000, to manufacture patent drawing tables and boards for architects. The company have just completed arrangements for manufacturing, and the goods will shortly be placed on the market.

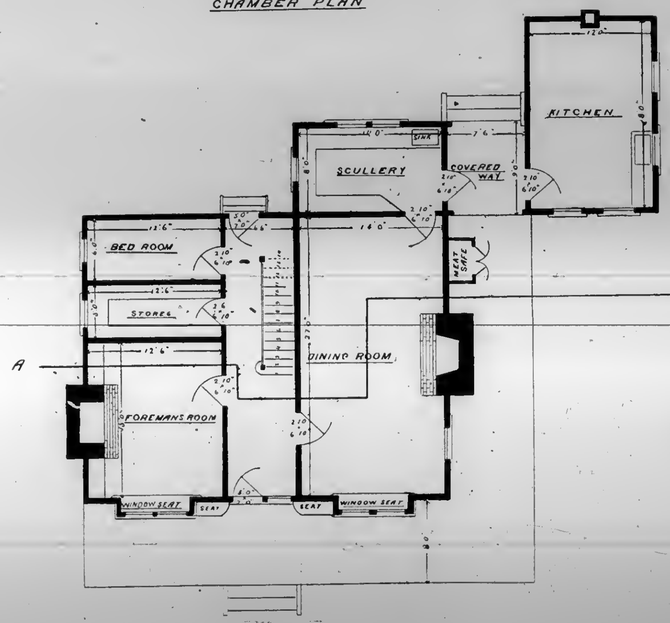
An association has been organized by the master painters and decorators of Montreal, with officers as follows : president, John Murphy ; French vice-president, A. Laurin ; English vice-president, J. B. Owens; treasurer, C. T. Charlebois; English secretary, W. T. Castle ; French secretary, F. E. Meloche.

INSANE ASYLUM BUILDINGS, BROCKVILLE, ONT.

MR. KIVAS TULLY E., ARCHITECT.



CHAMBER PLAN



GROUND FLOOR PLAN

SECTION ON A.B

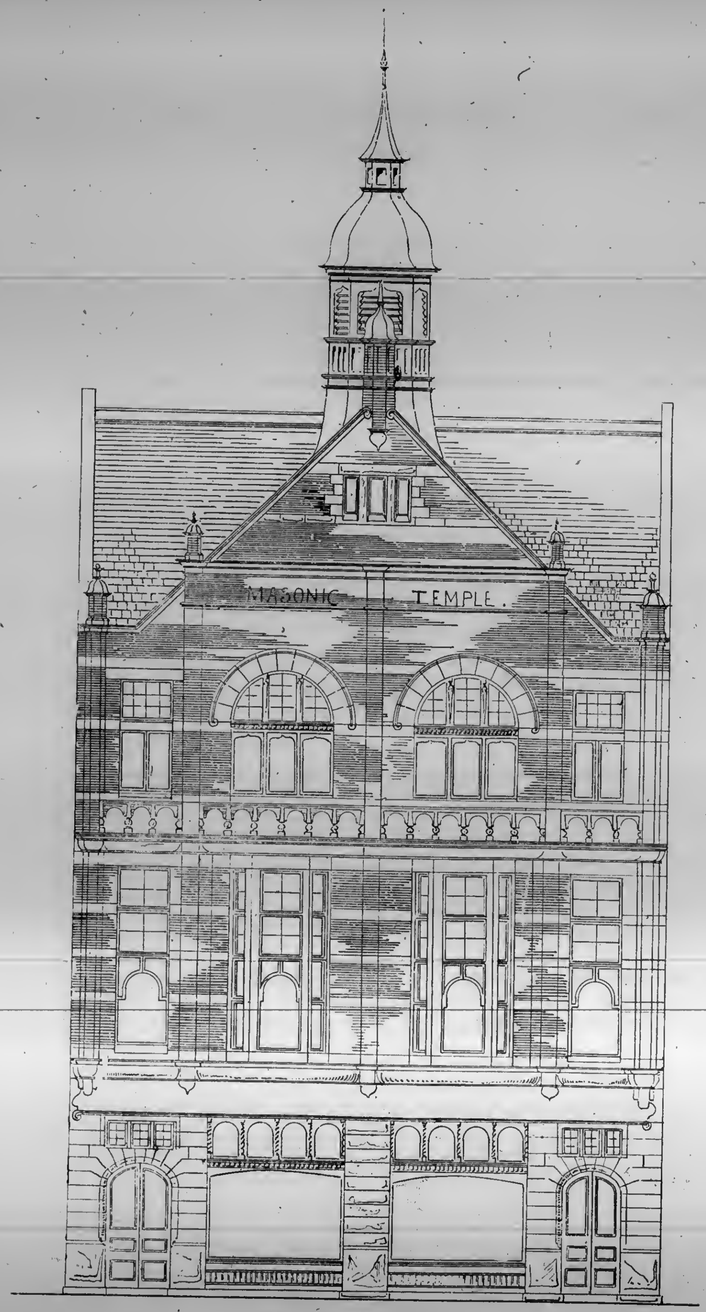
1/8th OF 1 INCH TO 1 FOOT

WESTERN ELEVATION

FOREMAN AND WORKMANS HOUSE
TO BE ERECTED ON THE COLDSTREAM
ESTATE NEAR VERNON B.C.
FOR
HIS EXCELLENCY
THE GOVERNOR-GENERAL OF CANADA

R MACKAY FRIPP FRIBA
ARCHITECT
VANCOUVER, BC.

ELEVATION TO NORTH



MASONIC TEMPLE.

R. MACKAY FRIPP, F.R.I.B.A., ARCHITECT, VANCOUVER, B.C.

CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—No. 8. AUGUST, 1895 PRICE 20 CENTS $2.00 PER YEAR.

THE
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

D. B. DICK	Toronto.
W. A. EDWARDS	Hamilton.
F. J. ALEXANDER	Ottawa.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON	Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

J. Z. RESTHER	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
ROBT. FINDLAY	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. MCLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.
JOHN ALDRIDGE, 1st Vice-President.
WM. PARK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JAS. CRANG.
WM. PEARS.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
H. MARTIN.
THOS. CANNON, Jr.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

CANADA is the scene of some of the greatest engineering triumphs. It is therefore not surprising to learn that an official of the Russian Railway Department visited Ottawa recently by direction of the Czar, with the object of obtaining information touching the best practice in bridge construction.

THE amendments which were suggested by the Master Plumbers' Association to the Toronto plumbing by-law, cannot be incorporated into the by-law at the present time, owing to a recent decision given by Judge McDougall in the Toronto Courts. This decision is to the effect that the City Council has no authority to regulate the size and weight of pipe which shall be used in the plumbing system of a building. In view of this decision, it is understood to be the intention of the City Council of Toronto to make application to the Ontario Legislature at its next Session for authority which will enable a by-law to be passed to govern the manner in which plumbing shall be done.

WE regret to have to record the death on the last day of July, of Mr. Richard M. Hunt, the distinguished American architect. Mr. Hunt held the foremost place among the architects of the United States, and was the recipient of high honors from foreign societies. His art training was received at the School of Fine Arts in Paris, and for a time he practiced his profession in that city. He afterward returned to America and opened offices in New York city. In New York, Boston and Newport are to be seen many examples of his skill. He was the designer of the Administration Building at the World's Fair. He more than once occupied the position of President of the American Institute of Architects, was a corresponding member of the Institute of France, and the recipient quite recently of the Royal Gold Medal of the Royal Institute of British Architects.

IT is reported that in Duluth, recently, lumber dealers threatened to boycott any builder or architect who should specify Washington fir in any public buildings. The purpose, doubtless, was to make it necessary that home timber should be used. So far as lumber is concerned, it is almost impossible to talk of excluding any particular class of lumber from any particular district or country. No article of merchandise is so thoroughly cosmopolitan in its character as lumber, and the trade is becoming more so every year. Washington fir, or what is known in this country as the Douglas fir of British Columbia, is especially suited for certain work, and the world over, those who want the best lumber for shipbuilding, and in other cases where great strength and endurance are required, will be obliged to secure Douglas fir. In the Transactions of American Civil Engineers is published the following tests of woods: White pine broke at 3,872 pounds, all same sizes. Norway pine broke at 4,008 pounds, all same sizes. Douglas fir broke at 6,214 pounds, all same sizes. In other words Douglas fir was shown to be by a large percentage stronger than the strongest woods. This wood is becoming well known lately in its uses for bridges and other public undertakings. Some unusually large pieces have been sent east to Montreal to be used for dredger work there.

THE Montreal Masters Plumbers' Association have recently issued a circular to the trade, calling attention to the unsatisfactory conditions which prevail in the business as the result of master plumbers purchasing direct from the manufacturers instead of from wholesale dealers and jobbers, and the manufacturers and dealers selling direct to the general public. As a means of bringing about a more satisfactory state of things, the trade are asked to conduct business in future on the lines laid down by the resolution on this subject, adopted recently by the National Plumbers' Association of the United States, known as the Baltimore Resolution.

A VISIT to the site of the new Simpson building, at the corner of Queen and Yonge Sts., Toronto, serves to impress one with the change which has taken place in the methods and materials employed in the erection of large buildings. This building will rest almost entirely on iron supports. Even if the footings, on which rest the supports, are of iron, instead of stone, as heretofore, wood, stone and brick will be conspicuous by their absence, at least in the exterior of the building. In looking at the many tons of structural iron assembled for use in this building, the writer was led to remark that as the result of the change from stone, brick and wood, to iron construction, manufacturers of structural iron must be reaping handsome profits. The architect to whom this remark was addressed replied that such was not the case, but that on the contrary the cutting of prices amongst manufacturers and dealers in this material had apparently been carried to an extent which left but little room for profit.

DEFECTIVE construction of chimneys has not a little to do with the unsatisfactory working of heating furnaces, and as a rule, fault is laid at the door of the furnace manufacturer instead of being placed at the designer or builder of the chimney with which the furnace is connected. The two faults most commonly found in chimneys are, interior irregularity and flues of too small diameter. It is surprising what a large proportion of chimneys are defective in these particulars, and as a consequence hundreds of tons of fuel are being consumed every year to no purpose. Thus the builder of a chimney who aims by putting in a small flue, to save a few dollars on the cost of construction, thereby entails upon the occupant of the home a large unnecessary yearly expenditure for wasted fuel, and injures the reputation of the manufacturer who supplies the heating system. Architects should take notice of this matter, and see that chimney flues are sufficiently large and that they are carried up straight from bottom to top of the building.

THE Management Committee of the Public School Board of Toronto have under consideration the question of manual training. It is proposed that the forenoon of the last day of each week be set apart for the special study of subjects and designs in this branch ; that the scholars have worked assigned to them suitable for their capacity ; and that courteous discussion over their work be permitted the pupils during their exercises. The subjects included under this head are : Drawing, modeling in clay, plaster, cardboard, wood, cloth, metal or any other suitable material. An not unfrequent complaint against the school curriculum of the present day is that it covers too wide a field, and that pupils are being over educated in a direction that will render them little practical help in after life. To some extent, at least, there would seem to be reason in this charge. Where the future of the pupil is likely to run along professional lines it is important that there should be a breadth and comprehensiveness in the subjects studied. It is doubtful whether the man or woman, who will follow any of the leading professions, will not find help in almost any of the branches of study on the time table of the public and high schools of to-day. It is a different matter, when it will become necessary, either from choice or necessity, for the pupil to take up, what is sometimes termed, the more practical lines of work. And in the case of a large percentage of the pupils who attend the public schools it may be expected that they will, from natural bent, as the children of those engaged in mechanical pursuits, follow in these lines ; and where the professions are so terribly over-crowded we do not know but what this would be a wise course for others to pursue. Here the plan proposed by the School Board Management Committee would be exceedingly helpful, and if the success that has attended the schools of technology in Toronto and other places in Canada, Great Britain and the United States is to be taken as a criterion there is good reason to suppose that the School Board are following along a line that would not alone be popular but productive of the most satisfactory results.

MANUFACTURERS of furnaces, radiators and heating supplies are said to be considering the advisability of increasing prices, in view of the heavy advances which have recently taken place in the price of raw material. As an illustration of how prices have advanced, it may be mentioned that within a very short period the price of pig iron advanced $3 per ton, and within a period of one month, manufacturers were notified of five successive increases in price of iron pipe. Galvanized iron is another article used in the construction of furnaces, the price of which has advanced fully 30 per cent. It is difficult to see how manufacturers can continue to sell at old prices under these greatly changed conditions. It is a well known fact, that last year the iron producing establishments sold material at a loss, and this led to a corresponding reduction by manufacturers. Now these conditions are entirely reversed, so far as the far mills are concerned ; instead of shutting down operations during the summer, as they have been accustomed to do, they find it necessary to run full time and over time, in order to meet the demands, stocks having been almost exhausted at the commencement of the present year. The sudden and large increase in the demands, and the impression which has got abroad that prices are on the up-grade, has created a sort of panicky feeling among buyers, which has resulted in forcing prices up to a point which possibly may not be long maintained.

SEVERAL protests have appeared in the London Timber Trades Journal—one by Mr. Carl Zeidler, recently of Toronto Junction, whose firm carried out the contract for interior woodwork in the Ontario legislative buildings—against the action of the architect for the new legislative building at Victoria, B. C., in awarding to a Chicago firm a large contract for oak lumber. Mr. Zeidler states that the specifications for the Toronto buildings called for Canadian lumber, just enough foreign timber being used to make a contrast, and adds that Canada has enough of its own timber to make the finest interior wood work without going out of the country. The Timber Trades Journal, in commenting on the matter, says : "There is as much sense in bringing oak from the east to use in any kind of a building on this coast, as there would be in bringing salt water from the Atlantic to Puget Sound to bathe in. Tacoma, Seattle and Portland have each paid heavily for imported stock to finish buildings that could as well have been completed with native lumber." Without professing to know anything about the circumstances of the present case, we are strong advocates of the use by Canadian architects of native materials, wherever these are to be had approaching in fitness and quality imported materials. On the same principle that Canadian architects object to commissions being given to foreign architects for the erection of buildings in Canada, the specifying of foreign materials in preference to native material by Canadian architects is an injustice.

TRADE IN WOOD-WORKING LINES.

A STUDY of the figures contained in the report of the Department of Trades and Commerce, for the fiscal year ended June 30th, 1894, now published, furnishes some suggestive thoughts as to the possibilities of extending Canadian trade in wood-working lines.

The export trade in doors, sashes and blinds during the past five years has grown at a satisfactory rate, the business for 1894 being more than double that of 1890. The figures are as follows : 1894, $158,196 ; 1893, $130,349 ; 1892, $123,144 ; 1891, $86,450 ; 1890, $60,474. Let this increase continue in the same proportion for another five years, or why not at a greater ratio, and the trade will have assumed a very considerable size.

The difficult matter in building up an export trade is to obtain entry into foreign markets, but having done this then time will establish the merits of the goods imported. Furthermore, it take some years for manufacturers to ascertain what class of goods particular localities require, and this now done, the business in doors, sashes and blinds of Canadian manufacture ought

to grow apace. It is unnecessary to remark that no goods in these lines are imported into Canada, shnwing that the home goods are of a class that meet fully the requirements of our people, even those who may be deemed specially fastidious in their tastes, or who consider it the proper thing to look abroad for what is wanted.

If reference is made to the trade in mouldings it will be learned that the exports in this direction have since 1891 grown largely. The figures are : 1894, $36,558 ; 1893, $23,164 ; 1892, $7,083 ; 1891, $5,153. There was imported during 1891, mouldings to the value of $31,745.

THE NEW COURT HOUSE ROOF.

WORK on the new Toronto Court House will be sufficiently advanced before the close of the year to permit of covering in, and the question now is, shall it have an iron roof? The matter came before the Property Committee of the City Council a week ago, and has given rise to considerable newspaper discussion since then. At the committee meeting Ald. Dunn objected to an iron roof on the ground that it provides no absolute security from fire in a building full of wood. This view has found expression in several newspaper communications. Is the objection well founded ?

Architect Lennox, who, as might be expected, has given a good deal of study to the question, favors an iron roof. He argues that with a building costing one and a half millon dollars, it would be poor economy to cover it with a roof of the ordinary kind. In his judgment, and experience, there is no doubt about the fire protection an iron roof affords. It must be remembered that the Court House roof will be about 1,400 feet around, and from 50 to 70 feet wide, and towering as high as this building does, it would be a ready target, in case of fire, not only from the buildings immediately surrounding it, but from fire even some reasonable distance away. In the case of some of the worst fires that have occurred in the city and elsewhere these have resulted through flying embers lighting on an inflammable roof, or finding their way through inflammable material surrounding the roof. Because Knox Church steeple was covered with metal the argument was that it could not catch fire and yet a flying ember from the Simpson building found entrance somewhere and fire was started.

One newspaper correspondent has stated that a fire starting in the building would work its way up to the roof, and then by the immense heat the iron would become warped or melted. If the building were one immense furnace, as it were, with no means of egress for the flames this might be the case, but separated by brick partitions and no lack of windows it is hardly possible that a fire could get under way to the extent suggested. It is also urged that the immense weight of the falling iron would bring down the walls with it to the extent that it would do them tremendous damage, so that not only would the roof be lost, but to a large extent the walls also. The writer of the letter containing this sentence may be a "Taxpayer," as he signs himself, but he can hardly have a practical knowledge of building. The view is not alone that of Mr. Lennox, but is very generally endorsed by architects, that the effect of the falling of the iron roof would be to go down and it would really serve as a means of burying and extinguishing the fire.

Experience in the erection of buildings of a similar character, though in many cases not involving nearly so large an investment, is emphatically in favor of an iron roof. The best public buildings, and those of a semi-public character belonging to monetary and kindred institutions throughout the United States, have the protection of an iron roof. The Freehold Loan Building, on the corner of Victoria and Adelaide Sts., Toronto, constructed under the superintendence of Mr. Lennox and costing less than three hundred thousand dollars, has an iron roof and is absolutely fire proof. The view of Canadian architects is almost generally with Mr. Lennox. To quote the language of one of the most prominent in Toronto, when spoken to about this matter : "The placing of an iron roof on the Court House would add nearly 75 per cent. to the fire protection."

The additional cost of an iron roof is the main, apparently, if not the only substantial, argument that has been employed. It seems, however, to be forgotten that it might be the worst of economy to expend the large amount of money that the new Court House will cost, and then for the sake of perhaps forty thousand dollars additional, place the entire investment in serious jeopardy. The Court House is not built for to-day, but practically for all time, and every precaution necessary, and that experience would suggest, ought to be exercised to make it a building that may last for all time by being protected from every possible risk, and especially that of fire.

ROOFING TILES.

AMONG builders, certain technical names have been applied to different kinds of tiles, most of these names being derived from the shapes.

Plain or crown tiles are such as have a rectangular form and plane surface. In England a statute provides that they shall be 10½ in. long, 6¼ in. broad, and ⅝ in. thick, and are manufactured with two holes in them, through which, by means of oak pins, they hang upon the laths. In use one tile laps over another, or is placed over the upper part of the one immediately below ; that part of the tile which then appears uncovered is called the gauge of the tiling. The so-called Italian tiles differ somewhat from these, as, instead of being flat, they are slightly curved, fit easily one into the other, with a horizontal indentation across the upper part, to prevent the wind drifting the rain over the tile head ; they have either wide or narrow vertical rolls.

White glazed tiles are used for lining the walls where reflected light is needed.

Three courses of plain tiles laid in cement and well bonded have been for many years employed for slightly curved roofs to form terraces, roofs for cellars under paving, as roofs over small back building, and for similar purposes. It has been asserted that the tiles should not be covered with cement. Portland or other cement laid on brick arches, or on tile, or on a flat concrete roof, supported by iron joists, also asphalted roofs, all generally cracked and let in wet, especially when there is any traffic on them, or their foundations are not perfectly stable. In England tarred roofing is formed of plain tiles in three courses rendered on the top to the thickness in all of about 4 in., carried over by arches slightly cumbered, spring from small brick piers, and tied by light iron rods, which form their cord line. These flats have an immense weight upon them, and are cast in one piece, as it were, there being no perceptible joint ; they are completely water-tight, and can be easily cleaned.

Plain tiles are laid on different gauges ; 210 plain tiles, laid flat, will cover a square of tiling. Pan tiles are generally pointed in mortar, which, if it be not very strong, will not stick ; in consequence of this the roofs require fresh pointing every few years, especially in exposed situations. Many tilers have a practice, when plain tiles are set in mortar, not to peg more than about one hole in ten. This is bad practice, as, with the decay of the mortar, the tile will slip down. In some parts of the country the ancient custom prevails to bed the tile in hay or moss, and when the roof is of the full pitch, this suffices without mortar. They may even then be laid dry. But with any less pitch some precaution must be used to keep out drifting snow, and such wet as may be blown up between the tiles, lifted by the force of the wind. In lieu of oak pegs, extra large flat-headed wrought nails, made of pure zinc or of zinc and copper, have been used, and it has the advantage of allowing a tile to be replaced from the inside of the roof by lifting up the others to place in the tile and drop in the nails in a few seconds.

Pan tiling is laid to a 10 in. gauge, and 180 pan tiles will cover a square.

Glass tiles have been used on roofs where a small modicum of light is required.

Tiling is measured by the square of 100 superficial feet ; a square will require 800 at a 6 in. gauge, 700 at a 7 in. gauge, and 600 at an 8 in. gauge. The gauge necessarily regulates the distances of the laths, and at the same time must be dependent on the slope of the roof, which, if flat, should not be less than 6 in., as, for instance, above the kerb in a kerb roof, and not more than 8 in. in any case. A square of plain tiling requires about on an average a bundle of laths, two bushels of lime and five of sand, and at least a peck of oak pins. A bundle of laths 3 ft. long contains 160 ; 4 ft., 120, and the 5 ft., 100. The nails used are fourpenny. A square of pan tiling requires 180 tiles laid at a 10 in. gauge.—Illustrated Carpenter and Builder.

ILLUSTRATIONS.

COPY OF ORIGINAL DRAWING FOR THE ROOF OF UNIVERSITY CONVOCATION HALL, TORONTO, SUBMITTED IN THE O. A. A. EXAMINATIONS BY MELVILLE P. WHITE, TORONTO.

ENTRANCE TO A HOUSE—ERNEST WILBY, ARCHITECT, BUFFALO, N. Y.

NEW LIBRARY BUILDING, McGILL UNIVERSITY, MONTREAL.—A. T. TAYLOR, F.R.I.B.A., ARCHITECT.

Several exterior and interior views of the new library building in connection with McGill University, Montreal, are presented in this number. The building is one of many gifts presented to the university by Mr. Peter Redpath. The foundations were laid in the spring of 1892, and the completed structu e formally opened by their Excellencies the Governor-General of Canada and Countess of Aberdeen, on the 31st of October, 1893.

The construction is as nearly fire-proof as possible, and the stack room is entirely so. The whole of the main floor is of steel beams and porous terra cotta arching. The other floors and the roofs, where not of this material, are of solid oak beams, and flooring on the slow combustion principle. The stairs are of iron and slate. Externally, the building is constructed of the Montreal limestone, of a whity-grey color in dressed ashlar work, except the basement, which is of rock-faced ashlar. The roofs are of blue Rockland slates and copper. The doors are of polished oak with wrought-iron grille work and fittings. The style adopted is a free treatment of Romanesque, which lends itself to the requirements of such a building, as being at once dignified and yet picturesque. The tower rises to a height of about 90 feet. The salient points of the design are accentuated by stone carving, embracing suitable subjects such as the symbolic figures of the four Evangelists, the College arms, the crest and motto of the donor of the Library. Convenience of arrangement and suitability for its purpose, combined with substantiality and solidity of construction, were the desiderata; afterwards came in the elements of beauty, proportion and grace, in some measure all of which have been attained without the sacrifice of one to the other.

STACK ROOM, NEW LIBRARY, McGILL COLLEGE, MONTREAL.

After much consideration, the architect adopted the "stack" system as the best arrangement for the books. Stacks were selected of the "Library Bureau" type, with uprights of grooved steel, in which bracket ends slide up and down, being fixed at the required height by a wedge easily adjustable. The pattern of the bracket ends was specially made for this library; the shelving is of polished oak. This stack room has four storeys, with straight stairs, and a lift for books; on each storey there is a wide bay window, back and front, for special privileged readers, where they can consult any of the books on the spot, and not obstruct the passage ways between the books. In the future, when the stack room requires to be enlarged, these bays will form the centre of the stack, and the accommodation will be thus nearly doubled.

In the basement or lower floor, which is entirely above ground with the exception of a small portion on one side, five studies or seminary rooms are arranged for special studies, fitted up with tables, chairs, and book-cases for books bearing upon these special subjects. These can be reached by a separate door from the campus, or by the main entrance. At the other end of the building is a wide entrance for the reception of boxes of books, which opens into the unpacking room. From here the books are then taken to the cataloguing room immediately above, by a lift in a small projecting wing in which also a staircase is arranged, for the exclusive use of the librarians. The rest of this floor is occupied by the caretaker's house, lavatories, heating chambers and coals.

On the main floor the principal feature is the great reading room, 110 feet long, 43 feet wide, and 44 feet high to the top of inner roof, with a high open timber roof having the hammer beams ornamented by carved heads of grotesque animals. At the further corners are lofty oriel windows with seats round same. In the centre of the S. E. side is a recessed fireplace or inglenook, with a red stone mantel inside, having the following motto cut in relief in a panel: "Cease not to learn until thou cease to live." At the entrance to the inglenook is a large massive carved oak mantel-piece about 14 feet high, with the following quotation from the Proverbs, cut on the carved frieze: "Happy is the man that findeth wisdom, and the man that getteth understanding." On the opposite side of the reading room is a lofty square recessed window with seats round. A large wide level gallery has been arranged at one end, which may be used for the display of rare illuminated books, manuscripts and missals in glass cases, and other purposes, and from which visitors can obtain a good view of the reading room, without disturbing the readers. Below this gallery, the Librarian's room and the cataloguing room are obtained, divided by an ornamental glass screen from the reading room. This is the working department of the building, where all the books are catalogued and arranged; contiguous to this is the attendant's counter for the distribution of books, and from this is the entrance to the stack room already referred to, protected by steel fire-proof doors. Between the cataloguing room and the reading room are placed the Card Catalogue cases, opening on both sides, so that the cards may be placed in the drawers from the one side, and consulted by the readers from the other. The remainder of this floor is taken up by a well-lit room for periodicals, and by cloak-rooms. In the tower is placed the staircase, opening into the entrance hall and into the reading room by ornamental arches. The vestibule and entrance hall have marble and oak dados respectively, and both have marble mosaic floors. There is also a special Muniment vault for the care of precious books and muniments. On the upper floor, in addition to the gallery, are a Professors' room, and a large room or hall with a high ceiling for architectural casts, sculpture, etc. The fittings of the reading room are all of oak, of a substantial character and polished, the tables being arranged across the room so as to have the light right and left. Round the walls are arranged

book cases for reference books. The windows are glazed with leaded lights in geometrical patterns, having panels in same for quotations and inscriptions. It is the intention to have all these panels filled in with suitable mottoes painted on the glass as soon as a selection can be made. At present only a few have been painted on in the vestibule, entrance hall and staircase.

ENTRANCE HALL AND STAIRCASE, NEW LIBRARY, McGILL COLLEGE, MONTREAL.

Special attention has been given to the three-light windows facing the campus, and to the five-light window at the other end of the reading room. These have been filled in with beautiful painted glass, the gift of Mrs. Peter Redpath. The three light window is specially elaborate, having a number of groups of the men great in art, poetry and music. The five-light window is not so elaborate as the other, and the colors were purposely kept lighter, so as to obstruct the light as little as possible. These windows are respectively dedicated to law, history, philosophy, astronomy, medicine, and have medallion portraits of the great masters in each subject.

For artificial light, electric lamps are used entirely, and in addition to handsome polished antique-brass electroliers suspended by chains from the roof, the reading room is lit by standards, with green shades, placed on each table. The walls of the reading room are colored a soft shade of green, relieved with gold, so as to be restful to the eye, and yet not too absorbous of light. The walls of the entrance hall and staircase are colored a dull soft red. All the floors are covered with cork carpentering to deaden the sound. The heating is entirely by hot water on the direct radiation system.

MORTAR.

It was found by Berthier after an analysis that Roman cement is composed of carbonate lime 657, carbonate magnesia ·005, carbonate iron ·063, carbonate manganese ·019, clay silica ·180, clay alumina ·066, water ·013. Berthier considered that with one part of common plastic clay, and two and a half of chalk by weight, a very good hydraulic lime could be made, which would set as speedily as the English one; but it is not probable, he allows, that we can obtain by mixtures hydraulic lime which will acquire as great hardness and solidity as the natural mortar, because these qualities depend, not only on the composition, but also on the state of compactness. The greater density the material possesses, and if it slake without changing its volume, the greater facility will its particles have in becoming aggregated, and the less shrinking will there be during its consolidation. Berthier drew the following conclusions from a numerous set of experiments. A limestone which contains 6 per cent. of clay affords a lime already perceptibly hydraulic. When the lime amounts to from 15 to 20 per cent., it is very hydraulic, and when from 25 to 30, it sets almost instantly, and may therefore be considered as Roman cement. He conceives that the iron and manganese have no effect whatever in occasioning the hardening. In a mortar which owes its solidity to the adhesion of the lime to the alloys, or substances with which it is mixed, there is evidently an advantage in multiplying as much as possible the surfaces of contact. Thus alloys with large grains do not afford mortar so solid as the pulverulent ones, because there are spaces filled with pure lime which do not present the same resistance to fracture as the other parts. On the contrary, allovs in powder, though they present the greatest surface, yet require a very large proportion of lime. To obtain, then, with the smallest possible quantity of lime, mortars possessing the greatest solidity, alloys must be used containing particles of different sizes, avoiding always the mixture of argillaceous substances, which form a paste with water, but have no coherence. These opinions have been put to the test of experiment on a large scale, the sand usually employed in Paris affording a better mortar when merely washed than when the fine particles are removed by a sieve.

BLACK BIRCH FOR INSIDE FINISH.

BLACK birch for doors, wainscoting, and other interior work, is being introduced to a considerable extent, and is certainly one of the handsomest of the many varieties of woods that are being introduced into new houses, while the cost is much less.

Black birch is a close-grained wood, and is as easy to work as walnut, and is much cheaper than either walnut or cherry. There is a great difference in the quality and color of birch, that growing upon high and dry land being hard and susceptible of good polish, while the growth on swampy land is soft, and therefore not well suited for the purposes the upland product so admirably fills.

Birch grows in our northern latitude, and the trees attain considerable height and size in localities, and there is a species of bird's-eye birch which is well calculated for furniture. It resembles bird's-eye maple, and when polished it possesses that sheen which renders satinwood so pleasing to the eye. We predict for black birch an important place among the fancy woods for house finishing and furniture.

FIRE-PLACE AND MANTEL IN READING ROOM, NEW LIBRARY, McGILL COLLEGE, MONTREAL.

A convent to cost about $42,000 is now in course of erection in the parish of St. Louis de France, Montreal, at the corner of Cadieux and Roy streets. The building will be of brick and stone, two storeys, with mansard roof and basement.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

THE AUGE BILL AS AFFECTING BUILDERS.

The amendments commonly known as the Augé Bill affecting that section of our civil code concerning builders and others engaged in the building trades, interest in such a degree the readers of this journal that it is probably opportune to say a few words about it. Mr. W. A. Baker, advocate, in a very able article in a recent issue of "La Revue Legale," exposes the situation in its true light and suggests several amendments, the principal of which are the restoration of the "proces-verbaux," and a restoration of the redemption system under the Augé Bill.

Article 2013 of the civil code as it existed before the late amendments, gave privileges on immovables to builders or other workmen, and architects, over the vendor and all other creditors upon the additional value given to their immovables by their works, provided an official statement (proces verbal) establishing the state of the premises previous on which the works were to be made, had been previously made by an expert appointed by a judge of the superior court in that district, and that within six months from the completion of such works have been accepted and received by an expert appointed in the same manner, which acceptance and reception were established by another official statement containing also a valuation of the work done. In this manner builders or workmen and architects were privileged to the amount of valuation ascertained by the above said second statement, and was reducible to the amount of the additional value which the immovables had at the time of the sale.

Article 2013 is now changed to read as follows:—"The laborer workman, furnisher of building materials and the builder (principal contractor) have on the immovables a right of preference to the amount of additional value given to the estate by works or materials furnished, etc."

As it will be noticed, the architect is excluded amongst the privileged and takes rank amongst other creditors. What is the reason for excluding him? Does he not contribute to create the additional value of the estate as much as the builder or any one else. And as to the supplier of materials, he certainly ought to come under the clause regulating traders and the general commerce, as if he sells to a contractor and has any doubt as to his responsibility, he has but to require of him the payment of his goods c. o. d., as is done in other lines of trade. The right of preference or privilege exists in the following manner: During the whole time that the work last, and with registration if effected within 30 days of the completion of the work, but for a period not exceeding two years unless there are arrangements to the contrary stipulated in the contract or a judgment to that effect. The conservation of the privilege is subject to the following conditions: The laborer and workman have to inform the proprietor in writing, or verbally, before a witness at every term of payment due them, that they have not been paid, and the furnisher of materials declare to the proprietor the contracts passed between the contractor and himself for materials, before they are delivered, and also their cost. The sub-contractor shall also declare to the proprietor the contracts made between himself and the principal contractor. What is the meaning of this clause? It is the most obscure in the bill. If it is deemed necessary to declare to the proprietor the contracts he closes with the principal contractor, is it that he has a right of preference or a privilege? It is not probable, as article 2013 ignores entirely the sub-contractor and mentions as privileged only the laborer, workman, supplier of materials and the principal contractor. It is a mere mine of exploitation for lawyers, as it is almost impossible to foresee the result of a law-suit based on this cause.

Another source of law suits in the Augé Bill is that there are no longer any "proces-verbaux." It would be well to advise those engaged in the creation of the additional value, to make use of the "proces-verbaux" as in the past, but with this difference that each of the two interested parties should appoint an expert to guard their interests, as it is the best means of protection for all, and the foundation of the privileged credit.

In his article Mr. Baker concludes by saying that what prevents the Augé Bill from working is that all the accessories indispensable for its proper working have been ignored, and suggests that the sale by right of redemption be restored by an amendment to its former popularity, as according to him the right of redemption is an indispensable accessory for the security of the loaner who by the transaction has all the privileges of a proprietor, and has a right to the notices of the Augé Bill, and can therefore keep an eye on the transactions between the proprietor and the contractor. The falling into desuetude of this system is to be attributed to an amendment made a few years ago which declares that if the seller fails to bring a suit for the enforcement of his right of redemption within the stipulated term, the buyer remains absolute owner of the property. This scares all speculators, as for unforeseen causes they might not have realized the cash wanted at the required period and therefore lose all their rights.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The semi-annual examinations announced for the 25th, 26th and 27th July, were held as announced in the rooms of the association, but lasted only two days, the 25th and 26th, there being no candidates for the diploma. Four candidates presented themselves for matriculation examinations, all of which passed in the following order of merit:—1st. F. Dubreuil; 2nd. L. A. Venne; 3rd. L. Lionnais; 4th. J. L. Morin. The examiners were Messrs. A. C. Hutchison, 1st vice-president, A. T. Taylor, 2nd vice-president, and J. Venne, secretary.

MASTER PLUMBERS' ASSOCIATION.

The Montreal Master Plumbers' Association have petitioned the City Council to permit the use of tile drain pipe in certain cases, which is now forbidden by the drainage by-law inside of houses from two feet of outside of exterior stone foundation wall. The Association of Architects in revising the building by-law have attached a drainage and ventilation by-law to it, and have confirmed the existing by-law. It is thought that the Board of Health, to whom the matter has been referred, will not alter the present state of affairs, as the use of cast iron pipe is recognized the best, and is being now more extensively used than ever in large cities.

Montreal importers of drain pipe are about to make and organize a more suitable appraisement of this class of goods by the Customs Department, individual efforts in this direction not having met with success. The importers claim that the arbitrary basis upon which the duty is levied at present was adopted at a time when abnormal prices obtained in the European market as the result of the great coal strike a few years ago, and that consequently the standard of valuation does not correspond in any way to prevailing values. A prominent dealer whom I interviewed said: "Mr. Douglas, the appraiser, examined two or three dealers in this city, but the enquete came abruptly to an end for unknown reasons. The arbitrary scale on which the prices are based are about double to what is being paid for the material. Invoices shown by manufacturers in Scotland are shown to Customs officials here, but are not accepted."

PERSONAL.

Mr. W. H. Carrick, manager of the Gurney Foundry Co., Toronto, accompanied by Mrs. Carrick, sailed a fortnight ago for Europe on a pleasure tour.

We regret to announce the death from paralysis, of Mr. Wm. Elliott, of the firm of Elliott & Son, wall papers and stained glass, Toronto. The sad event occurred at his residence on Sherbourne St. about the middle of July. He was born in Ireland in 1829, and came to Canada when a boy, locating in Toronto, where he has been in business for nearly forty-five years.

We are pleased to learn that the enterprise displayed by Mr. J. A. Pearson, of the firm of Darling, Sproatt & Pearson, architects, Toronto, in opening an office and taking up his residence for about two years in St. Johns, Nfld., immediately following the great conflagration in that city, has brought him large reward, not only in the shape of commissions, but in the form of one of the fair daughters of the ancient colony, whom he has recently brought home as his bride. Regardless of the opinion of the majority, there is a minority who believe that the great St. Johns fire was a most fortunate occurrence, it being the means of introducing to one individual both a new-found-land and a new-found-happiness. May the latter continue as long as the former.

The firm of Arnoldi & Calderon, architects, Ottawa, has been dissolved, Mrs. Calderon continuing for the present.

The Toronto Steel Clad Bath and Metal Co. have published in pamphlet form a number of excellent testimonials from architects and others as to the merits of their steel clad baths.

The idea that ten cents for the Cosmopolitan means inferiority from a literary point of view is dispelled by the appearance in the August number of such writers as Sir Lewis Morris, Sir Edwin Arnold, Edgar Fawcett, Tabb, W. Clark Russell, Lang, Sarcey, Zangwill, Agnes Replier, etc.

STUDENTS' DEPARTMENT.

PHOTOGRAPHY IN NATURAL COLORS.

A. AND L. LUMIERE point out that the indirect method of photographing in natural colors has not received a proper practical application, because of the difficulty experienced in selecting the colors, and in preparing and superposing the monochromes. They recommended the use of orange, green and violet screens for preparing three series of negatives presenting a maximum of sensibility to the rays which the respective screens allow to pass. Specimens of photographs so prepared were exhibited before the Paris Academy of Sciences. The printing and superposition of the monochromes have been successfully accomplished by employing birchromated gelatine to which are added substances insoluble under certain conditions. If, for example, five per cent. of ammonium bichromate, and five to ten per cent. of silver bromide in the form of emulsion, be added to a ten per cent. solution of gelatine, and the preparation be spread in a thin layer upon a plate of glass, a surface is obtained which can be exposed under a negative, and will reproduce the picture by the action of light. After exposure, the plate is washed with cold water, and the portion of the film acted upon by light being rendered insoluble, remains and serves to print the image form on the application of suitable colors. The silver bromide, which, by the way, may be replaced by other insoluble precipitates, is easily removed by the action of sodium hyposulphite, and proofs can then be printed from the plate in any color, showing all the graduations of tint present in the negative. Polychrome prints may be obtained by receiving on the same plate monochrome red, yellow, and blue images successfully, by means of three corresponding negatives, and isolating each image from the preceding one by an impervious layer of collodion. By employing dyes of greater or less concentration, or by simple decoloration with water, variation in the relative intensity of the monochromes is readily obtained.

USEFUL HINTS.

A GIVEN number of feet of radiating surface properly placed, will be found more effective than a greater amount located to save floor space or be out of the way.

CHLORIDE of zinc paint, although virtually a water-color, dries quickly and hard, so that it can be washed with soap and water when necessary, and will be found a preservative of wood, rendering it almost incombustible.

WIRE nails for joining dressed boards or barrel heads by being driven into the different edges, will be made by machinery and the price greatly reduced. This will dispense with the use of the brace and bit and wedge-plug for that use.

FOR filling up the pores of the wood before commencing to polish: For white wood, equal proportions of whiting and plaster of Paris, thinned to a paste with turpentine and well into the grain of the wood; for mahogany, add rose pink, or whatever the color of the wood is, and dry color to match up to same.

A NOVEL engineering scheme in the construction of a foundation we have heard of is the one recently used in New York—to freeze a bed of quicksand which impeded the work. A row of 4-inch pipes was sunk to a depth of 40 feet. These pipes were capped at the bottom, and contained inside similar pipes opened at the bottom. From a large condenser cold air was forced through these smaller pipes into the larger, from which it returned to the condenser. The air was cooled to a temperature of about 45 deg., thus freezing the surrounding mud and wet sand, and checking their flow into the excavations.

WE have long had slag paint and pavement, but the latest is a slag brick chimney. According to L'Industrie, this plan was adopted by the Courrieres and Ortricourt companies, and their example is followed by the works of Arbel and Douai. The latter establishment planned a chimney 164 ft. high, and to weigh but 379 gross tons, about half the weight of a brick chimney of the same dimensions. A special cement was to be used which would bind together the blocks composing the chimneys so firmly as to require no chain or iron band for strengthening. This is an interesting application of a cheap industrial by-product, which, should the experiment prove a success, will be appreciated by metallurgists.

THE scientific journals describe a series of tests lately made to determine the loss of heat from steam pipes due to radiation, three distinct conditions being observed in the calculations, namely, bare pipes, pipes covered with 1 inch of composition, and pipes over-laid with 1 inch of composition and three surfaces of hair felt, each ½ an inch in thickness. The steam pressure used was from 45 to 60 pounds, and the result showed that with 1 inch of composition out of a possible loss of 100 per cent., 83½ per cent. was saved, and with the extra felt covering, 8¼ per cent. additional marked the saving. It is marked that if a single pound of coal is required to evaporate 8 pounds of water into steam at 60 pounds pressure, then six and a half hundredweight of coal would be needed every year to make good the loss of heat for every square foot of uncovered steam pipe.

PROCESS OF GALVANIC BRONZING.—By means of a recent French improvement, the process of galvanic bronzing is said to have been made not only more simple, but capable also of giving every tone, from that of barbedian bronze to antique green, governed by the length of time that the copper is allowed to remain in contact with the liquid; after the piece has been well scoured, it is covered by means of a brush with a mixture composed of twenty parts of castor oil, eighty of alcohol, and forty parts each of soft soap and water. Thus treated, the piece left to itself for a period of twenty-four hours becomes bronzed, and if the duration of contact be prolonged, the tone changes, a very great variety of tones, pleasing in their appearance, being obtainable in this manner. The drying is finally effected with hot sawdust, the only remaining operation being then that of coating the piece with colorless varnish largely diluted with alcohol, thus insuring work of the finest character.

PRESERVING WOOD BY LIME.—On the preservation of wood, a Canadian experimenter writes: "I have for many years been in the habit of preparing home-grown timber of the inferior sort of fit, Scotch spruce and silver, by steeping it in a tank, or a hole dug in clay or peat, which was fairly watertight, in a saturated solution of lime. Its effect on the sapwood is so to harden it and fill up its pores that it perfectly resists the attack of the little wood-boring beetle, and makes it, in fact, equally as durable as the made wood. I had a mill which was lofted with Scotch fir prepared in this way in 1850, and it is in perfect preservation. The timber is packed as closely as it will lie in the tank, water is let in, and unslaked lime is thrown on the top and well stirred about. There is no danger that the solution will not find its way to everything in the tank. I leave the wood in the solution for two or three months, by which time an inch board will be fully permeated by it. Joists and beams would, of course, take a longer time for saturation; but in practice we find that the protection afforded by two or three months' steeping is sufficient, if the scantlings are cut to the sizes at which they are to be used."

WEATHERING OF NAILS.—Mr. Samuel Cabot writes as follows to the American Architect:—When a plain iron nail in any structural woodwork is so placed that water can gradually work between the nail and the wood, a hydrated peroxide of iron is formed by the oxidation of the surface of the nail. This oxide acts rapidly and very destructively upon the fibre of the wood, which in chemical parlance is almost wholly cellulose, the same material which we find in cotton and linen. The action of this hydrate upon the cellulose, seems to be a completely destructive one, resulting finally, in the case of a nail, in its becoming so loose in its place that it can be frequently removed with the fingers, as you draw a pin from a cushion. If the examination is then made, all the adjacent parts of the wood will be found to be deeply tinged with the red-brown color of the hydrate of iron, and to be completely disintegrated and decayed by the oxidizing effect of the hydrated iron oxide. This, of course, tends to gradually diminish the structural strength of the part so effected, and in such cases, for instance, as piazza rails and posts, may result in dangerous fickle support and so in perhaps serious accident. Of course, the means of avoiding these objections are quite obvious: The first is to shun, as far as possible, the exposure of the nail head or point in a position where water can trickle upon it and follow down between the nail and the wood; but a still more radical, though more expensive cure, is the use of galvanized nails, or still better, composition nails, in all such cases, and it is the writer's conviction that such construction would be a great economy in all cases such as above cited. If any of your readers will carefully observe the conditions that obtain in such cases, they will need no better testimony than their own eyes.

CEMENT AS A SAFE MATERIAL.—The Improvement Bulletin gives the following interesting test of the fire-proof and non-heating conducting qualities of cement: A safe constructed of cement, with steel wire netting placed in between, was tested by order of the Reichsbanks, the German Government's banking establishment. The question to be decided was whether it is practical to build vaults of this material for safety against fire. A safe was placed upon a pyre of logs drenched with kerosene, which, after being set on fire, kept the safe for half an hour exposed to a heat of about 1,800 degrees Fahrenheit; that is, a heat in which iron will melt. Two hours after the safe was opened and the contents—silk paper, draft blanks and a maximum thermometer—were found to be absolutely uninjured. The maximum thermometer showed that within the safe the temperature at no time during the test rose above 85 degrees. This seems to prove that cement safes within buglar-proof steel vaults fill all the requirements that can be possibly expected.

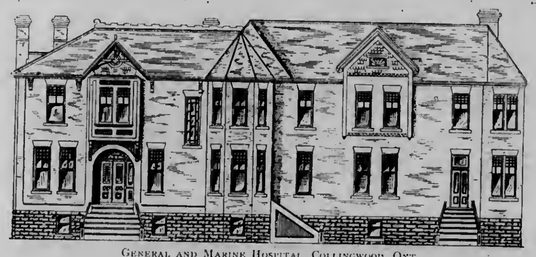
COLLINGWOOD GENERAL AND MARINE HOSPITAL.

By the munificence of Mrs. Lett, the Trustees have been enabled to erect a large addition to the Collingwood General and Marine Hospital. The new wing will contain upwards of twenty rooms, including wards, corridors, operating room, mortuary chamber, lavatories and offices, and will be fitted with a fair supply of modern hospital appliances.

The building has a frontage of eighty, and an average depth of forty feet; it is constructed of cream colored bricks on a rubble stone foundation, and is three stories high, including basement.

The whole building throughout is to be heated by steam and is to be fitted up for electric light, bells, etc. The kitchen, dining room, laundry, furnace room, buttery, vegetable cellar, and fuel rooms are in the basement, which is well lighted, airy and dry. All the wards, operating room and convalescents' parlors, are well ventilated.

The illustration shown herewith presents a front view of the building with the new wing added. When completed, this hospital will be one of the best equipped in the Dominion, outside the large cities, and in its own way will do an immense service to suffering humanity in this part of the country. The management of the institution is in the hands of a number of charitably disposed ladies of the town, to whom much credit is due for the efficient manner in which the hospital work in the past has been pursued. The generous gift of several thousands of dollars by Mrs. Lett, one of the most assiduous workers in behalf of the hospital, will extend the sphere of usefulness of the institution, and enable the management to still further diffuse its blessings.



General and Marine Hospital, Collingwood, Ont.

The new building will be ready to receive patients sometime this month (August), when an efficient staff of trained and experienced nurses will be retained for service if required.

The contractor for the building is Mr. John Peterman; the designs for the new work were prepared by Fred. T. Hodgson, architect, who is also supervising the work.

MOVING A STONE DWELLING.

A rather interesting piece of work in the way of moving a dwelling house was recently completed in the city of Brooklyn, N. Y., where an old stone mansion covering an area of 58×68 feet in size, and weighing about 1,300 tons, was carried a distance of about 50 feet and placed upon new foundations. The work was of such a nature, says Carpentry and Building, that many were skeptical as to its successful performance, but such progress has been made in late years in the methods of moving buildings that the structure was transferred without the development of any visible cracks in its walls. One of the difficulties encountered in the execution of this piece of work was the lack of solid side walls to the house, these being composed of rock faced ashlar with a backing of broken stone. There were also window openings on all four sides which had to be taken into consideration in the moving.

The first step was the cutting of a large number of openings in the stone foundation walls so as to admit the timbers which were to support the building and carry it to its destination. The blocking used was of spruce and yellow pine measuring 10×10 and 12×12 in cross section and cut in lengths of four feet each. This was arranged in position under the building, and by means of hydraulic jacks and screws the structure was lifted from its foundations. Immediately under the first tier of floor beams were placed 12×12 inch timbers, the ends of which pierced the front and rear walls. Under this tier of timber and at right angles to it was another tier of 14×14 inch pieces which pierced the two side walls, these two tiers of timber being the ones having an immediate bearing on the walls of the house. Under these was placed a tier of 14×14 inch timber to serve as sliding ways, these moving on 14×14 inch pieces placed upon the ground and extending in the direction of the new site of the building. These were known as "ground ways" or skids, and between them and the sliding ways lubricants were placed for the purpose of reducing friction to a minimum. When this had been done 10 screws were placed in position along the side of the house, one end of each screw abutting against a piece of heavy timber secured to the ground ways by means of heavy chains, while the opposite end of the screw worked in a hollow log called a "pump," which pressed against the timbers upon which the building rested. In moving the structure two men took position at each screw and upon a given signal by the foreman the screws were given a quarter turn. This was continued until the screws had been run out practically to the full length, when the chained pieces were moved forward and again made fast, the operation being continued until the building had been forced forward 20 feet. The bearings were then changed and the structure moved in a direction at right angles to the first for a distance of 30 feet. Such care was taken in the moving that one day was required for the 20 feet and nearly two days for the 30 feet. When the building had reached its destination 100 screws and 10 hydraulic jacks were placed under the timbers and the house raised to an elevation to correspond with its new foundations. The latter were left with openings to correspond with the position of the projecting timbers under the building, so that when it was lowered in place the blocking could be removed and the timbers easily withdrawn.

The work was done by B. C. Miller & Son, of Brooklyn, N. Y., who, our readers will recall, successfully moved the brick railroad station at Mott Haven, a description of which appeared in these columns some months ago. The scheme there employed was followed in all its essential features in the moving of the Brooklyn house.

Not far from this stone house was a frame building which was moved by the same concern in nearly a half circle, so as to change the front around and make it face on another street, running parallel with its original position. The work was done by laying the "ground ways" in such a way as to describe a semi-circle and employing capstans operated by horses instead of jack screws. The method of timbering was practically the same as in connection with the stone house, except that less material was required.

PRESERVATION OF WOOD FROM DECAY.

A special committee of the American Society of Civil Engineers, detailed to investigate the subject of the preservation of wood from decay, has spent four years in practical experiment and observation, besides inquiry into the experiments and conclusions of others extending over a period of more than thirty years. Their investigations included all the established methods of preservation, such as treatment with creosote, zinc salts, etc., and also with the products of petroleum. The latter have been claimed by many to be strong in preserving properties; and as they are very cheap, the substantiation of these claims was of special importance. Below are given some extracts from the report of this special committee, showing the conclusions deduced of the comparative value of petroleum products, and the best of the established methods:—

"Experiment proved that oil of tar, or creosote, was perhaps the most powerful coagulator of the albumen (of wood), while it, at the same time, furnished a waterproof covering for the fibre, and its antiseptic properties prevented putrefaction."

"There seems to be no question that when creosoting is well done it is effective."

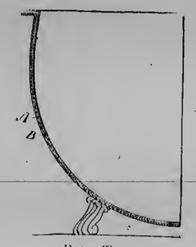
"It thus appears that there is no process of wood preserving the efficacy of which, when well done, is better established than creosoting."

"The conclusion drawn was that crude petroleum, by excluding moisture, would prove a preservative as long as it continually saturated the wood; but that if merely injected once for all, its volatile nature would result in its evaporating and leaving the timber unprotected."

RECENT CANADIAN PATENTS.

The following patents have recently been granted to Canadian inventors:—

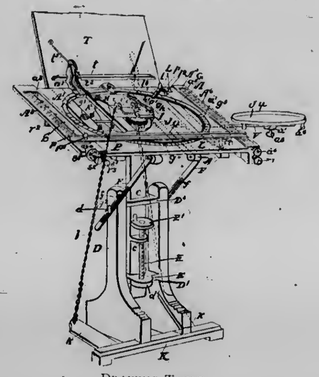
No. 48,804, for a bath tub, to George Booth, Toronto, Ontario, Canada, 1st May, 1895; 6 years.



Bath Tub.

A bath tub made in three sections, each section of which is composed of a sheet metal outer casing having an inner casing of copper, aluminum or other light, flexible material, and a lining of asbestos or other non-conducting material placed between the two casings substantially as and for the purpose specified.

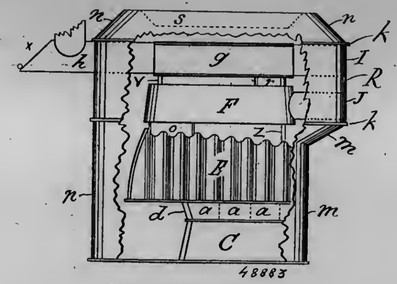
No. 48,825, for a drawing table, to Samuel John Laughlin and James Hough, both of Guelph, Ontario, Canada, and May, 1895; 6 years.



Drawing Table.

The combination with a circular drawing board G, the arc-shaped clasps O, pivoted at o, on the edge of the board and designed to fit between the bent retaining pin o', and the edge of the board over the turned down corner of the paper, a spindle H, journalled in the bars H, H, extending between the central cross-bars A', A', and having a square upper end extending into corresponding hole in the plate at the bottom of the board, a pulley I, on the spindle h, guiding pulleys i, i, on the spindle i', extending between the cross-bars, a chain secured to the pulley I, and extending over the guiding pulleys i, i, the lower end of the chain being connected to the forward end of the pedals k, and the cross-bar K, secured to the lower portion of the standard, and extending out each way, and having the pedals hinged to it, a catch g^4 in its edge and means for rotating the table of stops adjustably held at each side, and within the sweep of the catch, the stops being located at approximately ninety degrees apart so as to permit of a ninety degrees swing to the board, screw pins I' extending through blocks I^2, provided to adjust the stops to a nicety, a pivoted spring clamp secured at the rear of the table and having its free end extending over the board, a screw pin extending from the top of the table through the clamp, and a pressure knob screwed upon the screw pin above the clamp. The combination with the table A, provided with cross-bars and pivotally supported upon the spindle B, having bearings beneath the cross-bar upon the upper enlarged end of the vertical single standard C, the standards D, D having cross-bars D', through which the standard C extends, the bracket d' forming part of the cross-bar D', the bracket c forming part of the standard C, the screw spindle secured in the bracket D' and extending through the bracket c, and provided with a hand wheel, the slotted stays F, F' pivotally connected to the cross-bars A', and secured to the standards D, D by the thumb screw d, d, extending through the slots having the raised ends A^2 and A^3 and a circular opening a, and circular board G, rotatably supported within the opening and having its surface flush with the surface of its raised ends of the rule P, extending across the board and raised ends and connected at both ends to cords by depending blocks and means whereby the cords are given a uniformity of movement, so as to keep the rule when being moved parallel to the rear and front of the table, the cords being endless and extending around front and rear pulleys r and r', and wound around central pulleys r, which are secured at each end to the common spindle B, the scale A^6 held securely within the longitudinal recess a^5, in any definite position by the adjusting screw a^6, rotatable bar journalled in the recess a^3 and provided with longitudinal ratchet shaped notched strips and grooves longitudinally arranged, a catch tooth P depending from the rule and designed to engage with a notched strip of the bar when underneath the tooth, the scale marked collar s' on the supporting spindle s, the pointer S^3, knob s^4, toothed wheel s^5, and dog s^4. In a drawing table in combination a circular drawing board rotatably supported having a pointer on the edge of the board and a protractor arranged around half of the circumferential edge of the board, suitably divided and indexed from nought to ninety from the centre outwardly to each end, a spring clamp for holding the board in any desired position and a rule arranged to have a parallel movement to a straight line between the ends of the protractor.

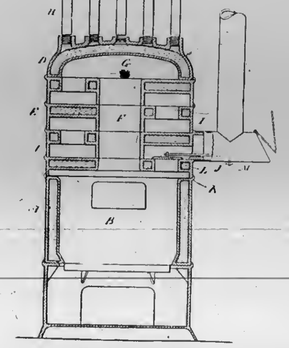
No. 48,883, for a domestic heating furnace, to John Albert Crossman and John Alfred Laws, both of Amherst, Nova Scotia, Canada, 8th May, 1895; 6 years.



Domestic Heating Furnace.

The combination in a domestic heating furnace of the ash-pit C, with the fire-pot d, and the body E, the combination of the body E with the radiator substantially as described.

No. 48,927, for a hot water boiler, to John Galt, Toronto, Ontario, Canada, 13th May, 1895; 6 years.



Hot-Water Boiler.

In a hot-water boiler, a series of water sections, each of the water sections provided with an upwardly curved lip extending into the outflow to prevent the upflow of the water, from the lower water sections, interfering with the outflow of the water from the said section, and provided with a downwardly curved lip extending into the inflow, to direct the water from the inflow into the respective water section. A downward passage from the secondary chamber to the outlet to the chimney, a central partition separating the upward passage from the downward passage, and the outflow pipes connected to the topmost water section substantially as specified.

There is a tendency toward stronger colors in paperhangings, says the New York Upholsterer. For several years the protest against the very delicate shades has been in progress, till now really dark colors can be used. This, of course, gives the decorator an opportunity to employ rich reds, vivid greens and glowing yellows. It gives him a better opportunity, also, to consider appropriateness in decoration. The rooms are different, and used for different purposes; hence, even in the cheap styles of decoration, he may select colors, not simple tints, to suit Radical colors, even, are coming into vogue.

The new Wesley College building at Winnipeg has been completed. It is the largest building devoted to educational purposes in the province, and cost $85,000.

The following is the Board of the Sydenham Glass Co., of Wallaceburg, Ont., for the ensuing year: Capt. J. W. Steinhoff, W. DeC. O'Grady, John Scott, George Mitchell, J. C. Shaw, J. H. Fraser, and D. A. Gordon.

The Winnipeg Commercial states that one of the features of the recent Industrial Exhibition, in that city, was a stove built specially for burning our native lignate coal. It is the invention of a resident of St. Paul, Minn.

P. A. Lariviere, W. E. Blumhart, Henry C. Bellew, and others are projectors of a scheme for the erection of a building to be known as the Auditorium, to be leased for use for opera, concerts, theatricals, exhibitions, etc., in Montreal.

Messrs. McCaskill, Dougall & Co. are erecting on St. Patrick and Manufacturers streets, Montreal, a large building for their varnish works and warehouses. It will be most complete and mordern in every respect, the latest English methods being adopted.

The striking plumbers of Buffalo are said to have played an ingenious trick on the master plumbers of that city. The fine in the United States for importing alien labor under contract amounts to $1,000 for each offence. Several Toronto plumbers obtained from the Buffalo bosses an agreement with their signatures attached engaging them to take the place of the strikers, and almost immediately on their arrival in Buffalo communicated with Inspector DeBirry, with the result that action was at once taken by the authorities against several plumbing firms.

TO ARCHITECTS

WANTED—Situation with view to PARTNERSHIP; eight years' experience in England; small salary.

Box 483, GALT, ONT.

TO ARCHITECTS, BUILDERS AND CONTRACTORS

We are prepared to furnish from our quarries in New Brunswick

BROWN AND OLIVE
FREE STONE
of the finest quality and of any dimension.

Samples forwarded free and quotations given on receipt of inquiry . . . . .
Correspondence solicited.

WM. HOOD & SON 10 Richmond Sq. MONTREAL.

CREDIT VALLEY BROWN STONE

From Carroll & Vick's No. 6 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure	Height.	Crushing Load.	Crushing Stress per sq. in.	Average Crushing Stress per Square Inch
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	2⅞ × 3	2⅞	131,000	15,188	
C	2⅛ × 3	2⅞	130,000	14,751	
D	3 × 3	2⅞	133,000	14,777	14,905

14,905 pounds is the average crushing strength per square inch of our Credit Valley Brown Stone.

The highest standard of test attained by any pure Sandstone in America.

IN confirmation of the facts above stated, we have pleasure in directing your attention to the accompanying table, showing the result of the test of our stone, in connection with the series of tests of building stones conducted in 1892 at the School of Practical Science, Toronto, under the direction of a committee of the Ontario Association of Architects.

By referring to the results of the tests above mentioned, it will be seen that the average crushing stress of the majority of Canadian and American sandstones is far below that of ours, the difference in our favor ranging from 75 to 50 per cent.

The Credit Valley Brown Stone, owing to its modest tone, harmonizes beautifully with red or cream colored brick.

It has been reported that there is difficulty in obtaining Credit Valley Brown Stone. To correct this mistaken notion, we wish to state to architects and the public that we have a large quantity of stone ready to ship on the shortest notice, which can be followed up with an unlimited supply. Last year we made extensive additions to our plant and opened up new quarries and mines, and will supply promptly all orders given to us or our agents.

CARROLL & VICK

Quarries: Credit Forks, Ont. Office: 84 Adelaide St. West, TORONTO.

Montreal Agents: T. A. MORRISON & CO., 118 St. Peter Street.

NEW BRUNSWICK BROWN STONE

.... FROM ....

Clark's Quarries, Sackville, N. B.

For character of material see . . new City Buildings, Toronto

WRITE FOR PRICES TO

WM. CLARK
SACKVILLE, N. B.

Residence of Jas. Ross, Montreal—Built of Miramichi Sandstone.

MIRAMICHI STONE

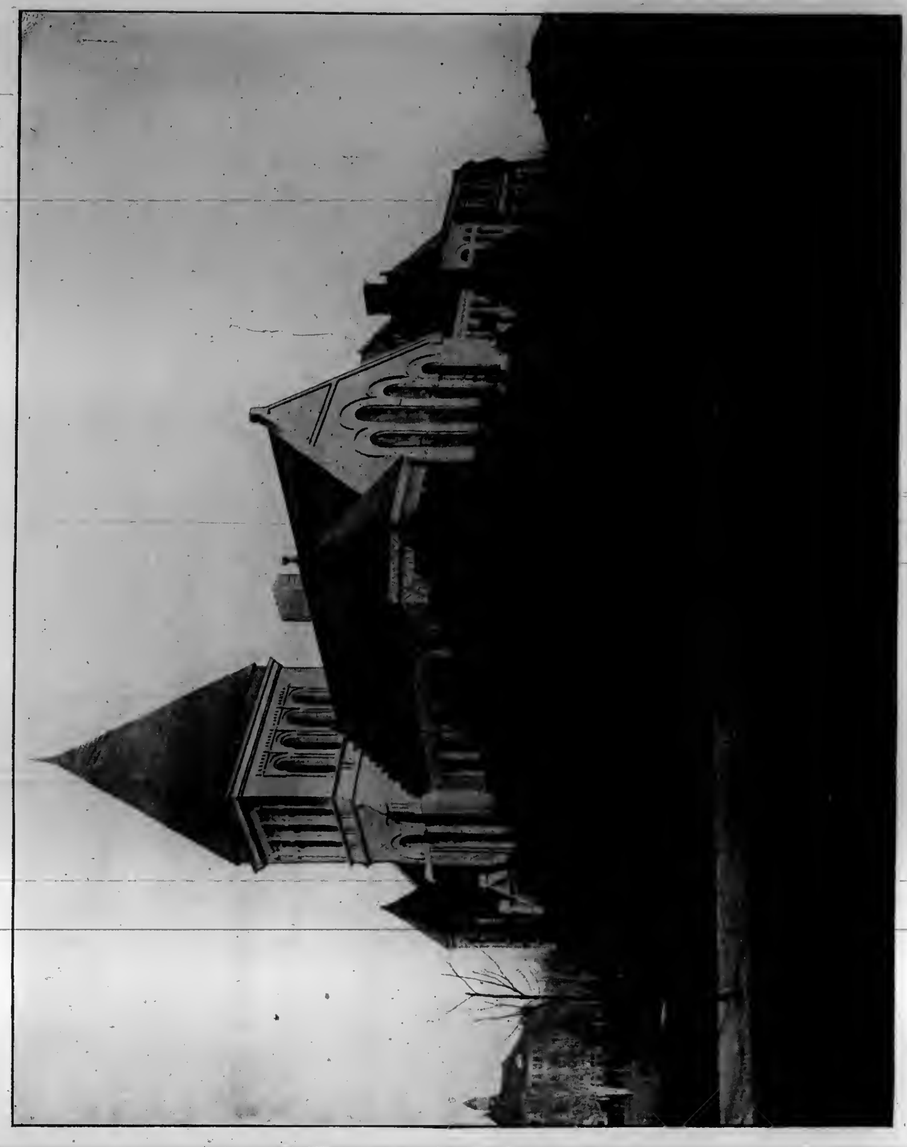
ONE of the most popular sandstones in the market—of a rich olive color—great durability, easily wrought, and moderate price.

SAMPLES ON APPLICATION

Address

C. E. FISH

French Fort Quarries, • Newcastle, Miramichi, N. B.



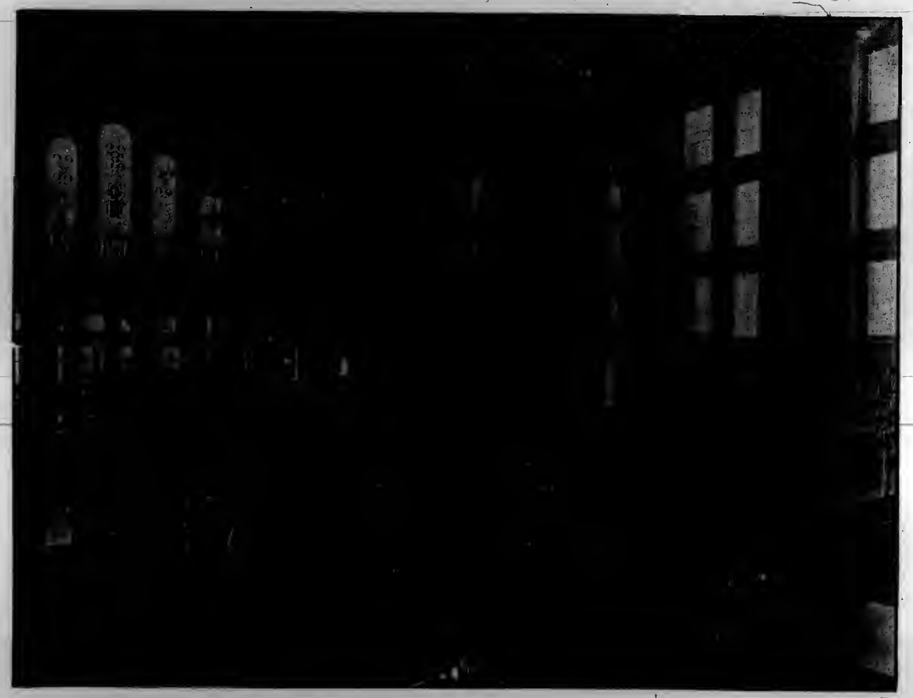
NEW LIBRARY, McGILL UNIVERSITY, MONTREAL.

A. T. TAYLOR, F.R.I.B.A., ARCHITECT.

AN ENTRANCE TO A HOUSE.

ERNEST WILBY, ARCHITECT, BUFFALO, N. Y.

LIBRARY—VIEW FROM MUSEUM.



READING ROOM.

NEW LIBRARY, MCGILL UNIVERSITY, MONTREAL.

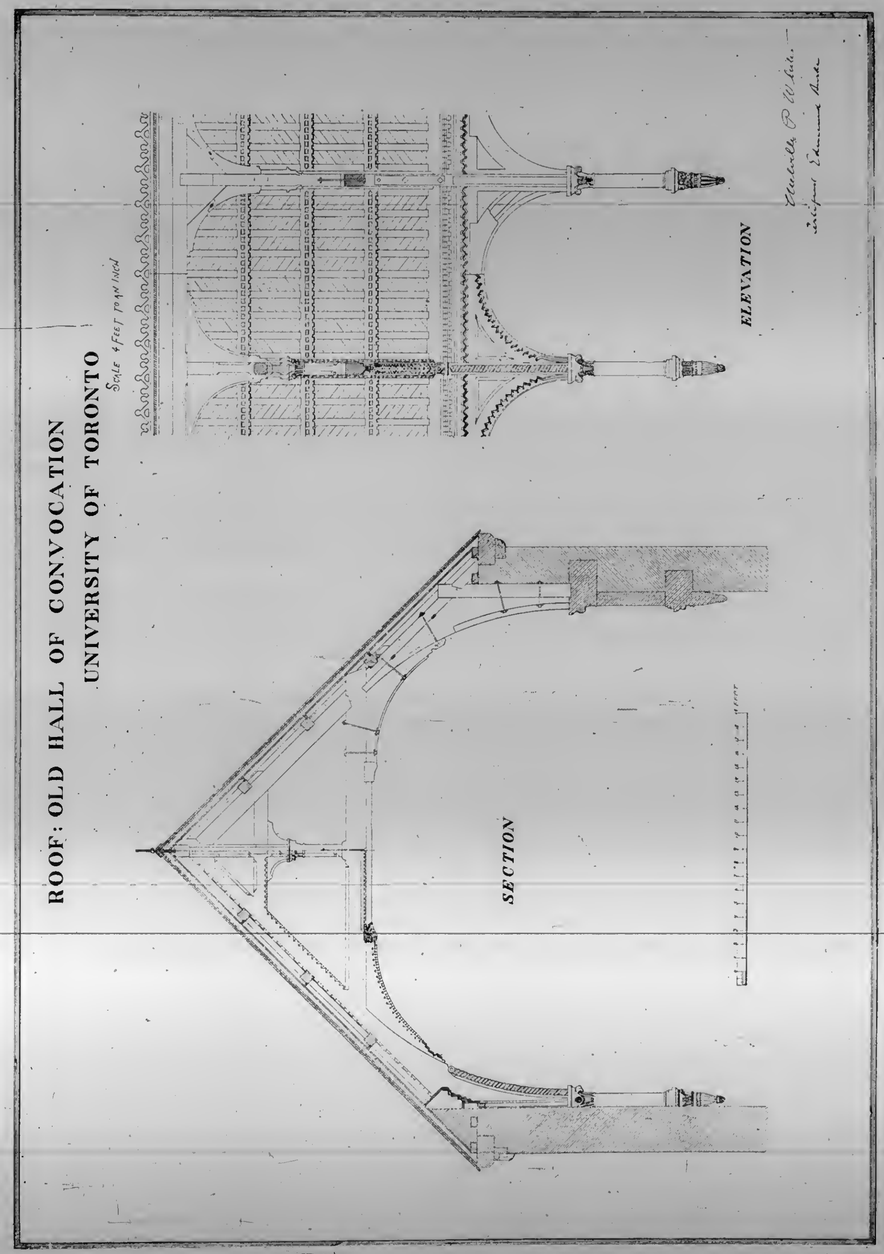
A. T. TAYLOR, F.R.I.B.A., ARCHITECT.

THREE LIGHT WINDOW.

CATALOGUING ROOM.

NEW LIBRARY, MCGILL UNIVERSITY, MONTREAL.

A. T. TAYLOR, F.R.I.B.A., ARCHITECT.


ROOF: OLD HALL OF CONVOCATION
UNIVERSITY OF TORONTO
SCALE 4 FEET TO AN INCH
ELEVATION
SECTION

CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—NO. 9. SEPTEMBER, 1895 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 14th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

D. B. DICK	Toronto.
W. A. EDWARDS	Hamilton.
F. J. ALEXANDER	Ottawa.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

J. Z. RESTHER	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
ROBT. FINDLAY	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. MCLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.
JOHN ALDRIDGE, 1st Vice-President.
WM. PARK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JAS. CRANG.
WM. PEARS.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
H. MARTIN.
THOS. CANNON, Jr.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

NOTWITHSTANDING the great advance in the price of iron, its use in building grows with rapid pace. It is estimated that the Carnegie Company has contracts on hand at present aggregating almost 1,000,000 tons of structural material, and no further contracts for delivery before three months can be accepted.

THE building permits granted in Toronto for August amounted to $95,215, as against $94,550 for the corresponding month of 1894. The total permits issued for the first seven months of the year were $1,094,065, and for the same period in 1894 they amounted to $774,895. This substantial increase is due largely to the re-building necessitated by the fires of last winter, but we believe there is a steady growth and that the city is slowly recovering from the disastrous effects of the boom.

BY the merest accident the cause of an acoustical defect, which had been attributed to faulty construction, was recently discovered in Trinity Church, Pittsburg, Penn. A magnificent organ had proved a disappointment, there being a lack of volume and a slightly muffled effect. This was ascribed to the position of the organ. It recently happened that the church was undergoing a thorough repairing and cleaning. The ingrain carpet and padding had been taken up. It was then noticed that the volume of sound from the organ was increased and that the muffled sound had entirely disappeared. The cause was thus, to the surprise of all, discovered to be in the carpet. It is probable a narrow strip of matting, or tiles, will be substituted for the carpet in the aisles. Perhaps the reason of defective acoustics in other buildings may be found to arise from a similar cause.

TWO native Canadians have just distinguished themselves and their country by their success in the competition for prizes offered for the best plans for two bridges over important waterways in the United States. Mr. Charles Macdonald, son of W. S. Macdonald, Esq., of Gananoque, of which town the former is a native, has won the prize for a design for a great railway bridge across the Hudson, between New York and Jersey City, to cost in the neighborhood of $25,000,000. The bridge will be shorter than the Victoria bridge at Montreal, and others in Europe and America, but it will surpass them in that it will have a single span of 3110 feet from one pier line to the other, which is nearly double the longest existing span in the world. It will be 125 feet wide, with six tracks, and is designed on the suspension plan, with steel towers 557 feet in height, and 12 cables supporting steel trusses, which rise 200 feet above the roadway. Mr. Andrew Onderdonk, the well-known contractor, is said to be associated with Mr. Macdonald in a company which will undertake the construction of the bridge, as soon as certain necessary preliminary arrangements are completed. Mr. Macdonald has already distinguished himself as a bridge engineer in Australia, and occupies the position of vice-president of the American Society of Civil Engineers. The other Canadian referred to is Prof. J. G. L. Waddell, a native of Port Hope, a noted bridge builder, and author of one of the best treatises

CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—NO. 9. SEPTEMBER, 1895 PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

D. B. DICK	Toronto.
W. A. EDWARDS	Hamilton.
F. J. ALEXANDER	Ottawa.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	CHAS. BAILLAIRGE, Quebec.
1ST VICE-PRESIDENT	A. C. HUTCHISON, Montreal.
2ND VICE-PRESIDENT	A. T. TAYLOR, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

J. Z. RESTHER	Montreal.
J. NELSON	Montreal.
A. RAZA	Montreal.
ROBT. FINDLAY	Montreal.
F. X. BERLINQUET	Quebec.
J. B. BERTRAND	Quebec.

AUDITORS—L. Z. RESTHER, W. MCLEA WALBANK.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.
JOHN ALDRIDGE, 1st Vice-President.
WM. PARK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JAS. CRANG.
WM. PEARS.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
H. MARTIN.
THOS. CANNON, Jr.
JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

NOTWITHSTANDING the great advance in the price of iron, its use in building grows with rapid pace. It is estimated that the Carnegie Company has contracts on hand at present aggregating almost 1,000,000 tons of structural material, and no further contracts for delivery before three months can be accepted.

THE building permits granted in Toronto for August amounted to $95,215, as against $94,550 for the corresponding month of 1894. The total permits issued for the first seven months of the year were $1,094,065, and for the same period in 1894 they amounted to $774,895. This substantial increase is due largely to the re-building necessitated by the fires of last winter, but we believe there is a steady growth and that the city is slowly recovering from the disastrous effects of the boom.

BY the merest accident the cause of an acoustical defect, which had been attributed to faulty construction, was recently discovered in Trinity Church, Pittsburg, Penn. A magnificent organ had proved a disappointment, there being a lack of volume and a slightly muffled effect. This was ascribed to the position of the organ. It recently happened that the church was undergoing a thorough repairing and cleaning. The ingrain carpet and padding had been taken up. It was then noticed that the volume of sound from the organ was increased and that the muffled sound had entirely disappeared. The cause was thus, to the surprise of all, discovered to be in the carpet. It is probable a narrow strip of matting, or tiles, will be substituted for the carpet in the aisles. Perhaps the reason of defective acoustics in other buildings may be found to arise from a similar cause.

TWO native Canadians have just distinguished themselves and their country by their success in the competition for prizes offered for the best plans for two bridges over important waterways in the United States. Mr. Charles Macdonald, son of W. S. Macdonald, Esq., of Gananoque, of which town the former is a native, has won the prize for a design for a great railway bridge across the Hudson, between New York and Jersey City, to cost in the neighborhood of $25,000,000. The bridge will be shorter than the Victoria bridge at Montreal, and others in Europe and America, but it will surpass them in that it will have a single span of 3110 feet from one pier line to the other, which is nearly double the longest existing span in the world. It will be 125 feet wide, with six tracks, and is designed on the suspension plan, with steel towers 557 feet in height, and 12 cables supporting steel trusses, which rise 200 feet above the roadway. Mr. Andrew Onderdonk, the well-known contractor, is said to be associated with Mr. Macdonald in a company which will undertake the construction of the bridge, as soon as certain necessary preliminary arrangements are completed. Mr. Macdonald has already distinguished himself as a bridge engineer in Australia, and occupies the position of vice-president of the American Society of Civil Engineers. The other Canadian referred to is Prof. J. G. L. Waddell, a native of Port Hope, a noted bridge builder, and author of one of the best treatises

on the subject. Some years ago he was appointed Professor of Engineering in the University of Tokio, Japan, but subsequently returned to the United States, where he now practises his profession. The bridge for which he has prepared the successful plans is to cross the Missouri river.

WIRE nails have to a very large extent supplemented cut nails for building purposes. Many carpenters and builders, however, declare that wire nails for shingles are a failure. Their life is not more than six or seven years, or even less where large quantities of soft coal are burned, or near the sea. Along the Atlantic Coast copper or galvanized iron nails are taking the place of wire nails for shingles. The blame for leaky roofs may not he so much in the shingles as in the nails.

THERE is a city by-law in force in Toronto, limiting the area in certain classes of building, without a fire wall, to 4,000 square feet. There is some difference of opinion as to the wisdom of such a law. As a precaution against fires it is well to have it, while on the other hand, it restricts the size of large shops at the expense of appearance and convenience. As a matter of fact, the law is set at defiance in many cases. We could point to buildings now being built or re-constructed in which much larger areas than the law allows, without fire walls, are found. Buildings of larger area should at least be fire proof. While the law is there it should be enforced. If it is objectionable let it be repealed, but it is not right that it should be ignored. Is it not the duty of the building inspector to see to this?

AMONG the papers which were read at the recent meeting of the Medical Health Association for Ontario, was one by Mr. H. J. Bowman, Town Engineer, c. Berlin, Ont., on the "Possibility of Simple and Safe House Plumbing." Mr. Bowman's paper is in the nature of a review of the by-law attached to the Medical Health Act of 1884, which by-law is in force in all municipalities where it has not been superseded by one of their own. Having been passed so long ago, it is defective in some respects, in the light of fuller knowledge on sanitary questions and improved methods of plumbing, and Mr. Bowman points out a number of ways in which it should be altered, which will probably be done at the next session of the Ontario Legislature. The paper is a valuable one, and we shall endeavor to publish it in full in a future issue.

IMPROVEMENTS IN HOUSE DRAINAGE.

IN a paper read at a meeting of the Architectural League, Mr. Gerhard, C. E., Consulting Engineer for Sanitary Works, brought out a number of points relating to improved methods of house drainage in America. Some of these it will be of interest to note.

At the outset Mr. Gerhard refers to a noticeable improvement as to drainage plans. The practice has been to indicate the location of plumbing fixtures on the floor plans, but beyond this to give very little information. In consequence of the plumbing laws which have been enacted, it is now the custom to prepare a special drainage plan, on which the drainage and soil pipes are shown in detail, with size, and all other information necessary to enable contractors to make their estimates in an intelligent way. The workmen are assisted in that they can find by reference to the plans where the pipes are to be run, and architects and building superintendents are saved, because they do not require to spend so much time at the buildings and in answering questions. Well considered drainage plans are therefore of great assistance, especially in the case of large and important structures. The same holds true as to plumbing specifications. When too general in their character the result is that the estimates for the work run widely apart. The more detailed and accurate they are the closer will the figures be, and the more will the finished work conform to the expectations of the architect and his client. Extras will be avoided, at least the extras which the architect finds himself compelled to order on account of omissions in the original specifications. Mr. Gerhard condemns the use of the printed blank specifications of the building department, which, while convenient and labor-saving for the department, are not sufficiently detailed for anything but small buildings, or simple warehouses.

Turning to the question of material, Mr. Gerhard condemns the use of earthenware pipes, and commends the practise of using the same grade of pipe for the soil, drain and vent pipe systems of any building. In some cities the use of extra heavy pipe is compulsory, and Mr. Gerhard approves of it being so, and he further suggests that, in order to guard against sand-holes or imperfect seams, only pipes and fittings should be used which have been tested by hydrostatic pressure. He further advocates the more extensive use of screw-jointed wrought iron pipe for drainage, more especially in the case of high buildings. Architects and plumbers are coming to look with more favor on this class of material. Protection against rust at the joints is provided for by the use of coal tar or hot asphalt, or by the application of a process which renders the pipes rustless, or galvanized pipe may he used. The use of drawn lead and brass traps, instead of cast lead and lead with hand made seams, is commended.

Mr. Gerhard next refers to to the improvement as to the size of drains, commending small-sized pipes in preference to large ones, so long as they are of sufficient size to do their work. Two small drains are preferable to one large one, the reason being that the smaller sizes are better self-cleaners. An instance is given where a large building in New York, with 205 wash-basins, 24 sinks, 52 urinals, 62 water-closets, all the roof water, and other wastes, are carried off by two six-inch pipe sewers, with a fall of one-fourth inch to the foot. We presume many architects will not agree with Mr. Gerhard in this matter, but he has given the subject much study and his opinion should be worth something. The same principle he applies to soil and waste pipes, which are made smaller than formerly.

As to the method of laying drains, Mr. Gerhard condemns the practise of burying the pipes in the ground. Rather, he says, incase them in concrete, with man-holes at suitable intervals for examination or cleaning, but he favors the plan of suspending them from the ceiling or fastening them to the cellar wall.

Another point of improvement is the non-separation of bath, lavatory and sink wastes from water-closet and soil pipes. The double system is complicated and expensive, without corresponding advantage, and was the former practise in England, whence it was introduced to America. It was also the practise to have separate soil pipes from the baths and water-closets of each floor, making a complication of plumbing, with added expense. The tendency now is to simplify as much as possible, to group plumbing fixtures, and to concentrate the drainage in a single line of pipe, thus securing a well flushed line and economy in construction.

The common-sense system of open plumbing is highly commended by Mr. Gerhard. How the old plan of placing the pipes in a house under floors, behind plaster walls, and in other out-of-the-way places, where they were quite inaccessible in case of accident, ever came to be adopted seems incomprehensible.

Mr. Gerhard sees a great advance in the methods of house drainage adopted during the past ten years, and while we can recognize what has been done in the way of improvement, we must all admit that there is much room yet, before we reach a full conformity with the laws which nature has laid down for us in such matters.

PERSONAL.

Mr. W. A. Langton, architect, of Toronto, will leave for England in a few days. Mr. Langton has promised to give the ARCHITECT AND BUILDER the benefit of what comes under his notice in relation to architectural subjects.

Messrs. Arnoldi & Calderon, architects, of Ottawa, recently dissolved partnership. Mr. Arnoldi has just formed a new partnership with Mr. J. A. Ewart, under the style of Arnoldi & Ewart. Mr. A. M. Calderon is practising on his own account at new offices, 45 Elgin street.

Congratulations are in order for Mr. Sproat, of the firm of Darling, Sproat & Pearson, architects, of this city. An announcement in the marriage columns of the papers is the cause. On the 14th of August he led to the altar Miss Annie E. Harris, daughter of Mr. John Beverly Harris, of Tyndall avenue. The ARCHITECT AND BUILDER joins in best wishes.

Mr. Richard Dinnis, contractor for the carpenter work on the new court house, Toronto, met with an unfortunate accident recently which will lay him up for some time. He was driving along Front street with his little grandson and a servant, when a runaway horse dashed into his buggy and overturned it, throwing the occupants out. Mr. Dinnis suffered a dislocation of the shoulder and some severe cuts. The little boy was not seriously injured and the servant escaped unhurt. Mr. Dinnis is one of our oldest builders, having been in the business some forty years, and has numerous friends, who hope he will soon recover from the effects of the accident.

LIFTING A ROOF.

HOW A NEW STORY WAS ADDED TO A SCHOOL-HOUSE.—RAISING AND MOVING BUILDINGS.

SOME time ago the Board of Public School Trustees in Toronto found it necessary to provide more school accommodation in Parkdale. They had a good school-house, known as the Queen Victoria, which they wished to enlarge, but how best to do it was the question. It was 115ft. × 57ft. in size, two storeys high, with a brick addition 57 × 57 in rear. After consulting an architect it was decided to lift the roof, and build another storey, and the services of I. Wardell & Son, who make a specialty of such work, were called into requisition. They agreed for $800 to raise the roof, and replace it on the building after the new storey, 14 feet in height, had been added. The accompanying illustration, with a brief description, will show how it was done.

The roof of the addition was sawed off in line with the brick wall of the main building. The floors were shored from the basement up with stout timbers. Timbers were set in and needle beams put under the plates. A strong scaffold was built on the upper floor, on which the jack screws were to be worked. As the stone and brick pediments were to be lifted with the roof, needle beams, 12 × 14, were placed under them. Fifty-five jacks were employed to lift the main roof and 24 the addition. The jacks were the ordinary bottle jack, except those at the four corners, which were of the pattern known as anchor jacks. The roof was raised 6 feet, 13 men being employed to work the jacks. The joists for the new floor were then put in, and the jacks placed on them. The roof was raised 8 feet more and the brick wall for the new storey built up, when the roof was eased down till it rested upon the wall again.

PROCESS OF RAISING THE ROOF, QUEEN VICTORIA SCHOOL, PARKDALE.

As the roof, when resting on the jacks, would be liable to sag in the centre, provision had to be made for such a contingency. Two principles run from end to end of the building. They are about 115 feet long, and are 12×14 in size, built up of 2×14 joist. They were fastened together with a tie timber at each end to keep them in place, and 16 jacks, on a scaffold in the hallway in the centre, raised them simultaneously with the jacks around the outside.

The upper part of the tower with its roof was raised at the same time. It was supported on frame work, which rested on timbers suspended by chains from the plate. Two guy ropes served to steady it. To guard against the roof being dislodged by the wind while the work was in progress, purchase screws were attached and made fast to the joists of the first floor. The purchase screws were let out as the roof went up.

So well were operations carried out that the plaster of the ceiling was not cracked. It was considered advisable subsequently to remove it and substitute a metal ceiling.

The whole job was completed within 21 days from the commencement of operations. Not an accident or hitch of any kind occurred.

Wardell & Son, who carried out this job so successfully, make a specialty of raising and moving buildings, and have performed some clever feats in this line. Their most risky undertaking was at Kemp's Stamping Works near the Don. The factory stands on a side hill, and they underpinned it and held it up while the old foundations were removed and two new storeys built under. Work in the factory went on as usual all the time. The building is of brick, about 200 × 40 feet, and contains some very heavy machinery. So hazardous did the undertaking appear that some men declined to work on it, but it was successfully carried out without accident.

Last winter the same firm moved the hotel at Hanlan's Point 400 feet from where it formerly stood, and raised it with 100 jacks, so that a new storey could be built under it.

When the new water-front was made along the Esplanade they moved 13 buildings out to the new line, including the club house of the Argonauts. The latter was lifted on scows and floated to its new position. It was a difficult and risky operation, but was successfully accomplished, during the early morning, when the wash of passing steamers would not interfere with the work. They frequently remove brick and stone buildings from where they stood and turn them around so as to face in a different direction.

The firm consists of Mr. I. Wardell, an old wrecker, and his son. The senior member has been engaged in the business for some 40 years, the junior for 14 or 15 years, during the last 7 or 8 years of which he has been a partner.

LIME COMBINE.

THE Manitoba Grey Lime Burners' Association has been organized. The association comprises the lime-burners of Stonewall, Stony Mountain, St. Andrew's Parish, Gonor, East Selkirk and Tyndall. There is a local society at each point. Each member is bound not to sell lime unless he receives an order from the local secretary, who first receives it from the head secretary in Winnipeg, who divides the sales proportionately among the different localities. The price of lime has been raised to 18c. a bushel. All the burners in the Tyndall district, except one, have joined the association, and Mr. James Pruden is now burning a kiln to fill the first order sent him.

AN electric storm and cyclone visited Kingston on the 11th inst., wrecking the cotton mill badly and destroying much of the machinery. The water pipes were twisted and broken and the mill flooded. It will cost about $80,000, and take a month to repair the damage. The erecting shop of the K. & P. railroad was also wrecked.

THE ADVISABILITY OF THE REGISTRATION OF ARCHITECTS.

WITHIN a short time I have heard read two suggestive papers upon the architecture of the past in America—one being merely a resume of the records of the Boston Society of Architects from its formation in 1867; the other an account of the methods of the layman in New England and probably elsewhere of obtaining architectural service in the early forties and fifties. The records of the society showed a small body of earnest men dealing with comparatively small things, that is to say, with things small as compared with the buildings of to-day; there was a freshness, a *naivete*, about these records that caused a smile upon the faces of the men who had made them thirty years ago in their youth, and who were sitting about the table as they were read. There was no sign of recognition from the public in them, no expressed hope that the society formed should be recognized as representing the acknowledged leadership of the profession in Massachusetts, only a desire for mutual support, interest and criticism, and incidentally for architectural welfare. The other paper told of the constant custom of clients who went to England, bought copies of one-eighth-scale drawings of actual houses which had been built by English architects, and had, on their return, houses built from these plans by local builders.

All this is not so very long ago; in fact I can remember eighteen or twenty years ago that a building that cost $100,000 was considered quite exceptional in Boston at least, and until the great fire in Boston by far the largest amount of work done by the architects of that city was in suburban houses of small cost and in alterations of already existent buildings. The builder was a recognized individual as he still is; the architect was an occasional luxury. Under such circumstances it was not to be expected that he should be anything else. But with the growth of our cities, the concentration and increase of wealth, came requirements which the builder could not meet; and it was found that the architect was no longer a luxury, but a very earnest necessity.

Naturally as the demand for the services of the profession increased, coincidentally there appeared pretenders in its ranks; that is to say, there were plenty of men who neither had the adequate ability or sufficient application to thoroughly train themselves, who presumed to practice a profession which certainly required considerable study and attainments. Inasmuch as what services they had been able to give were quickly and cheaply prepared for, they were willing to perform them at a meagre price, but what under the circumstances was more than ample compensation.

Architecture having a distinctly commercial side was to be done by the lowest bidders. Of this class of practitioners little need be said, except that they are a curse to any profession, but in addition to these there have been and still are a number of very worthy men who insist in making their livelihood by practising a business under the name of art. This is legal enough,—no one can prevent it, no matter how much they may wish to do so,—and it occurs oftener from ignorance than from intention, but it nevertheless exists, and under what appear to be compensating conditions. As it happens, the man who makes an art into merely an artless business, either from the concentration of his thought upon one object, or by the very nature of his personality, is very apt to give the impression of being a so-called business man, and as such he appeals to business men and to their likes and dislikes, to their prejudices; and architecture so called thrives under the conjunction of the "practical architect" and the "practical" man. It should not be understood that the business side of architecture can be neglected, but that it should occupy, both in the architect's and the client's mind, its relatively just position, that is, that it is the necessary method of action that makes architecture itself actual and not imaginary.

The architect, unlike the sculptor and the painter, is in some factors of his profession necessary to the public; he is needed to carry out work which otherwise could not become existent; but on another side he is dependent upon the public for an opportunity to express himself. He occupies, therefore, the position of an executive who is limited in his action by the will of the sovereign people. In governments such a condition has proved satisfactory in proportion as both ruler and people are intelligent. In architecture it may be assumed, the result would be the same. The object to be attained then is to insure that the architect shall be intelligent, to hope that the public may be.

The burden of the proof of intelligence and ability lies with the architect. His chief credential is not pre-eminence as a business man, or even as a constructor, but as an artist. He will be judged by the next generation by that credential, and by no other. He owes to his client that he shall honestly and conscienciously fulfil his desires as far as possible as to expenditure; and that his building shall be abiding he owes both to his client and himself; but both these facts will be ignored in some fifty years. The judgment of the future passed upon an architect will always be upon his work as an artist and upon nothing else, and his influence will be proportionate to his skill as an artist alone. But in the meantime that chief credential is ignored, and the public choose their architects indiscriminately, and in many cases ask no credentials whatever. As a result "fools have rushed in," and architecture, though in better favor since the World's Fair, is glanced at askance and not recognized by many people as a profession equal to that of law and of medicine.

With whom lies the fault? Certainly not with the public or clients, for they assume, with true business understanding, that to be called an architect implies a knowledge of architecture, just as to be known as a cobbler implies a knowledge of shoes. We cannot blame them for lack of discrimination in their choice. How should they discriminate between men who are devotees of an art which requires long study for its attainment? Is it then a question of protecting ourselves against the pretenders in our ranks? This would seem to be an acknowledgment of weakness, of a callow state of affairs, which would defeat its own object. Surely the skilful man in any profession can take care of himself and afford to ignore inefficiency in others. If the public choose to be satisfied with worse than mediocrity, so much the worse for the public; why should we "fash" ourselves about it? But upon analysis the offence is greater than it first appears. Architecture is the most conspicuous of the arts, it is man's constant environment; and as he is very susceptible to the influence of surroundings, architecture has much to do with his education. If the public insist on employing men calling themselves architects, but who put up buildings bad in plan, construction, and appearance, then the trained architects, as citizens, should insist upon it that such work is detrimental to the public taste, that it mocks architecture itself, and that it should not be permitted.

The surest way of eradicating an evil is to deprive it of opportunity of action. If it were possible to diminish the numbers of the inefficients amongst architects, there would be a very perceptible change in our buildings and cities. Apparently the only way in which to do this is to restrict the right to practise architecture to those who have gained such a right by certain attainment. The making of plans and being paid for them cannot be restricted, but certainly the architects themselves have the right to say who shall be considered their peers. Give a dog a bad name, etc., can be paraphrased by give a man a good name and crown him. If it is once an established fact that all architects are obliged to show certain ability before they can practice architecture, the public will be thankful for that amount of certainty. The public are very prone to accept any profession at its own valuation, provided it maintains its own standard of excellence as announced. What should that standard be, and how should it be maintained?

The professions of law and medicine have long since determined their own action. A lawyer must be a member of the bar of his country, and the physician must have received his degree from a medical school; the fact of being a member of the bar or an M.D. guaranteeing the public a degree of training in each. Both imply lectures attended and examinations passed. A very small proportion of the public fail to assure themselves of the standing of their doctor or lawyer before they employ him. The restriction has elevated the profession in the eyes of the public. Would not the same result follow in architecture? In one country, Austro-Hungary, architects are only allowed to practice after having passed certain examinations; elsewhere the same universal chance for charlatans occurs. It will be urged that the charlatan will always exist, which may be very true, but he will be forced to be a clever charlatan, and that is a great gain. It will be said that the American Institute of Architects already give sufficient credentials to whoever desires them; but the American Institute, though more in evidence than formerly, is not known or recognized by the public to a corresponding extent as is the title of M.D., and leaves many able men out of its ranks, and occasionally excites antagonism. It is one thing to base one's pretentions upon known attainments, and another to base them upon membership with a body which must necessarily be fallible, and which is only lately donning the purple. Besides which, holding up the American Institute as a shibboleth does not lop off the dead wood of the profession, and the insistence upon attainment before practice does.

There is still another objection which will be made, that is, that the registration of architects is an autocratic and high-handed proceeding. This is based upon exactly the same error which considers that the best government is one where universal suffrage is allowed. A democracy of any kind averages things down before it begins to elevate. But while a democracy may be the best government, there is no need of a democracy in the profession of architecture. A profession, by its very name, implies the assumption of knowledge. My contention is that this assumption should be made a fact and that the only method of making it a fact is, by only allowing by law such men to be called architects as have shown reasons for being so called; in fact, to the legal registration of architects, and the institution of penalties for illegal use of the name. This will accomplish two ends: first, it will protect the public against charlatans; second, it will elevate the character of architects throughout the country. To my mind this is much more important than whether perspectives should be sent in competitions, or whether one style or another of architecture is the best to be found.

Our worst enemies are always to be found in our own ranks; the purpose should be to make them as harmless as possible. In the present condition of affairs the architect is called upon more and more frequently in matters of importance, but he has up to this time acted, been asked to act solely upon the basis of his personal reputation. How much more powerful would be such action if it could be the unanimous action of a body of men, that is, in matters of laying out of public improvements, of conceptions of large public undertakings! But the architect will always be crippled in the undertaking of reforms until the standing of his professinn is fixed and acknowledged. By the requirements for registration a standard will at least be attempted.

Necessarily that standard will at first be low. The first thing which has to be recognized is, that all persons calling themselves architects at present must be allowed to retain that title. A law of this kind cannot be made retroactive.

Second, the laws will be State laws, as are those of physicians; and, as was recently forced upon the notice of the physicians of Massachusetts, all the quacks will emigrate to the State having the weakest law. That was what occasioned the recent registration of physicians in Massachusetts.

Next, graduates of architectural schools must be admitted, as no discrimination can be made between schools, although it would be well to supplement school training with office experience. So far proposed action may be indicated definitely.

But what is to be done with the large body of draughtsmen who do not go to the schools, and with the considerable number of people who attempt architecture with neither school nor office training of any account? It is not wise to accept the recommendation of architects in whose offices the draughtsmen have been. Manifest personal qualifications are necessary. To determine these, examinations will be required. At once the two different tendencies of architectural students are to be acknowledged—the one towards art, the other towards construction and mathematics. Examinations should be made in both, and honors should be given in both. If no honors are received, especially in design, the applicant should be debarred. And just here comes the question of assumption of titles conferred as an invitation of attainment. The result of examinations in construction, mathematics, strength of materials, etc., can readily be determined; that of the examinations in artistic ability requires much more consideration.

It has already been said that an architect is primarily an artist, and will be ultimately judged as an artist, therefore he should be tested as an artist. It may be urged that his faculties may develop late. This is not usual with so-called artistic temperament, but in such a case he can try again. The examination for testing the capacity of design of an applicant cannot necessarily be more severe than school problems. It need not be as exacting in the matter of rendering, but it should test capabilities of handling plans, masses, and details, and it should also test creative skill.

By whom should such examinations be made? By a board of architects, not local, but from all over the country, appointed by the art commission of the city or State, if it possesses one, otherwise by the officers of the nearest Chapter of the Institute of American Architects. The art commission is suggested first, as it is a body representing the public more than do the Chapter of the Institute, and is constituted usually of men in recognized high positions.

Finally, in regard to the ethics of the profession. The Institute has not yet an established a code of ethics, except that it does not tolerate thieves. When it produces a code, after its adoption it should be voted upon by the architects of the country, and as much of it as is approved by their vote should be made mandatory and a law, and those violating this law should be debarred from the exercise of their profession.

If there are any strong objections to be made to the suggestions here made, I have yet to hear them. If carried out they will go far to produce the following results:—

They will clear the profession of much undesirable material.

They will remove all vagueness in the minds of the public as to its purpose and the ability of its members.

They will tend to eliminate bad architecture and stimulate good architecture.

Once this has been done, the members of the architectural profession will be consulted in regard to the designing of all important buildings, as the physicians are in regard to public health. Confidence in the ability of its members once given, and the architects of America, who will then be worthy of the name as a body, as well as individually, can do more to make this country famous for its art than can any other body of men. We are establishing scholarships, schools, and prizes of architecture; let us make evident the purpose for which these are established by giving the men so honored worthy competitors in their practice. Only to-day, in talking this over with a lawyer, I remarked: "You lawyers went through this long ago. What do you find is the result?" His answer was this: "It never keeps out anyone who ought to be in; the only trouble with the legal restriction is, that it still lets a number in who ought to be out."—C. Howard Walker in the Architectural Review.

PRESERVING WOOD BY LIME.

SOMEONE who has been experimenting on the preservation of wood by the use of lime, gives the result as follows:—"I have for many years been in the habit of preparing home-grown timber of the inferior sort of fir, Scotch spruce and silver, by steeping it in a tank, or a hole dug in clay or peat, which was fairly water-tight, in a saturated solution of lime. Its effect on the sap-wood is to so harden it and fill up its pores that it perfectly resists the attack of the little wood-boring beetle, and makes it, in fact, equally as durable as the made wood. I had a mill which was lofted with Scotch fir prepared in this way in 1850, and it is in perfect preservation. The timber is packed as closely as it will lie in the tank, water is let in, and unslaked lime is thrown on the top and well stirred about. There is no danger that the solution will not find its way to everything in the tank. I leave the wood in the solution for two or three months, by which time an inch board will be fully permeated by it. Joists and beams would, of course, take a longer time for saturation; but in practice we find that the protection afforded by two or three months' steeping is sufficient, if the scantlings are cut to the sizes at which they are to be used."

As the summer season is well nigh over, the meetings of the Toronto Master Plumbers' Association will be shortly resumed.

The death is announced of Mr. David Mitchell, only son of Rev. David Mitchell, formerly a Presbyterian minister in Toronto, lately of Jersey City. The young man was only 22 years of age, and was employed in an architect's office in New York. His death was the result of an accident.

ILLUSTRATIONS.

NEW GRAND OPERA HOTEL, TORONTO.—HENRY SIMPSON, ARCHITECT.

STAIRCASE HALL IN A. E. KEMP'S HOUSE, WELLESLEY CRESCENT, TORONTO.—E. BURKE, ARCHITECT.

PROPOSED ADDITION TO THE LAKESIDE HOME, TORONTO.—CURRY, BAKER & CO., ARCHITECTS.

The building which we illustrate is designed to occupy a site separate from the Home proper, and is intended for the use of the nurses.

CONVENT OF THE SISTERS OF ST. CROIX, MONTREAL.—J. B. RESTHER & SON, ARCHITECTS.

THE building now in course of erection for the Reverend Sisters of the Congregation of "Ste Croix et des Sept Douleurs," is situated on the north side of Mount Royal Avenue, extending from Rivard street to Berri, a frontage of 150 feet. In plan, it is that generally adopted in buildings for educational purposes, with corridors on each storey, running the entire length of building, and large commodious staircases and elevators.

The corridors lead to large rooms used as class rooms, parlors, studios, etc. These are all well lighted and ventilated. The heating apparatus is the hot water system; the boilers being centrally situated renders the distribution easy and effective. All the most improved plumbing and other appliances have been devised to insure comfort to the inmates.

The main building is 150 ft. in length, 62 ft. wide and four storeys high, with an eastern wing 27 ft. wide, 42 ft. long, two storeys high; a western wing 33 ft. wide, 52 ft. long, three storeys high. All substantially built of Montreal lime stone; the front and sides are of rock faced ashlar, with cut stone bands, chiselled sills, lintels, quoins, trimmings and moulded course.

The beams and columns supporting the interior structure are of steel throughout; the interior partitions and furring to outer walls are of terra cotta lumber. The first floor is devoted to the infants' course refectories, kitchen, laundry, &c., while the second floor is restricted to the administration, the third floor is mainly composed of class rooms, the chapel in the western wing being 75 ft. long, 28 ft. wide, 17 ft. high in the clear; the fourth floor to be occupied as a general dormitory. The building to have improved fire escapes and to accommodate two hundred pupils, chiefly boarders.

ANNUAL CONVENTION OF THE PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE annual convention of the Province of Quebec Association of Architects is announced to take place on the 2nd of October, the place of meeting being the city of Quebec. At the time of going to press the program is as yet incomplete, and we are therefore unable to give full particulars, but it is anticipated that papers will be presented by several members of the Association. Some amendments to the charter, proposed by the Quebec members, will be considered, but it is said that should the said amendments be adopted, the position of the Association will not be altered. The members should endeavor to make the convention a success.

SUDDEN DEATH OF A WELL-KNOWN ARCHITECT.

MR. G. F. STALKER, a well-known architect of Ottawa, died suddenly the other day. He left his house in the evening apparently in his usual health, and soon after was found lying insensible on the steps of Rideau Club. A cab was called, but when he reached home he was dead. An inquest was held and the cause of death declared to be apoplexy.

Deceased was a native of Scotland, and was 54 years of age. He came to Canada in 1883, and except for one year, spent in the public works department, he has been in business for himself in Ottawa ever since. He leaves a wife and nine children, the eldest 20 years of age. Mr. Stalker was well known as an architect. He drew the plans for the cottage hospitals on Porter's Island, and his plans for the new central railway station at Ottawa had just been accepted.

PUBLICATIONS.

Fiction and travel are the strong points of the September Cosmopolitan, and it may be said that no more beautifully illustrated number of the Cosmopolitan has ever been given to the public.

STUDENTS' DEPARTMENT.

CONCRETE FLOORS FOR STABLES.

A SUBSCRIBER inquires how to lay a concrete floor for a stable.

The floor should consist of three layers, first, about three inches of broken stone and brick, in pieces that will pass through a three inch ring, second, 2½ inches of gravel, sand and cement, mixed in proportions of 4 of gravel and sand and one of cement, topped off with a ½ inch floated coat of clean sharp sand and cement, mixed in proportions of two of sand to one of cement (best Portland cement to be used). The floor is to be so laid to have proper fall to drain off all water, and provision is to be made for this. The usual method is to give it a slope to the rear, where there is a gutter to carry off the liquid matter. The surface of the top coat should be scored.

As concrete makes a hard and unyielding floor for a horse to stand on, planks may be laid down over it, which can be easily removed for cleansing and airing. Instead of the plank, sawdust may be employed. It makes good bedding, is soft under the horses' feet, and is cheap. What is soiled can be removed every day and replaced by fresh.

Vitrified brick is considered by some as making a better stable floor than concrete.

USEFUL HINTS.

A new kind of veneering material is reported from Germany. This is composed principally of infusorial earth mixed with various binding and coloring ingredients, and spread in layers over a wooden core; on the mass becoming dry, it is cut into sheets or blocks, which resemble, in effect that of figured wood.

The American Druggist recommends the following formula for waxing hardwood floors: Yellow wax, 25 ounces; yellow ceresin, 25 ounces; burned sienna, 5 ounces; boiled linseed oil, 1 ounce; spirits of turpentine, 1 gill, or about 30 ounces. Mix the wax and ceresin at a gentle heat, then add the sienna, previously well trituated with the boiled linseed oil, and mix well. When the mixture begins to cool add the turpentine, or so much of it as is required to make a mass of the consistency of an ointment.

The free circulation of water in steam or hot water heating boilers is one of more importance, says the Master Steam Fitter, than is generally considered, because where the circulation is obstructed a certain amount of power is required to overcome friction to produce the circulation necessary for the free development of steam. Restricted or otherwise obstructed circulation always calls for more fuel to produce a given heating effect. This is practically shown when comparing the action of two boilers of the same pattern but of different size, especially those used for heating purposes.

A safe, constructed of cement with steel wire netting embedded in it, was recently tested at the Reichsbank, the official bank of the German Government, in order to decide whether it is practicable to build safety vaults of this material, which will be proof against fire. The test, which was most severe, consisted in placing the safe upon a pile of logs soaked with kerosene, which were then set on fire, the safe being exposed for half an hour to a heat of 1,800 degrees F. Two hours later the safe was opened, and the contents, consisting of silk, paper, blank drafts and a maximum thermometer, were found to be entirely uninjured. The maximum thermometer showed that the temperature inside the safe at no time exceeded 85 degrees

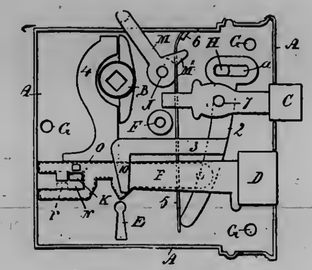
Buildings divided into offices, consultation rooms, dormitories, or "light housekeeping" apartments for the use of many occupants, require, says a contemporary, not only thoroughly deadened floors, but extra care in perfecting the partition walls. Two coat, or better, three-coat work in plastering should be specified, continued down close to the floors, to prevent the passage of air or sound. The first coat is usually neither very even nor smooth, partaking of the inequalities of the lathing, and purposely left rough as a foundation for the next or brown coat. Care should be observed in putting on this second coat, to make the walls straight and true by filling up and leveling out malformations visible in the first coat. The third, or last coat, the white finish, is too thin to hide any defects of this kind. On the contrary, it is understood that the finer the finish of the last coat, the more sensibly will the inequalities of the surface appear.

RUST OF STEEL AND IRON.—Iron and steel with a perfectly bright surface do not rust in absolutely pure water or air; carbonic acid, or similar agent, must be present. Moisture, carbonic acid and oxygen being present, oxidation is not produced so long as vapor of water is not condensed upon the surface of the metal. In rusting, carbonate of iron is formed, which is dissolved in the water charged with carbonic acid and transformed into bicarbonate. In the presence of air this is decomposed and gives magnetic oxide, then a hydrated oxide of iron. Polished iron and steel resist oxidation for a long time, but once started the rust forms rapidly and soon spreads over the entire surface. This is because the oxide of iron formed is electro-positive relatively to the iron, and is very hygroscopic, facilitating the absorption of moisture from the air. Steel and cast iron rust more easily than the purer metal; the more pure the iron is, the more it is subject to oxidation.

RECENT CANADIAN PATENTS.

The following patents have been granted at Ottawa to Canadian inventors:—

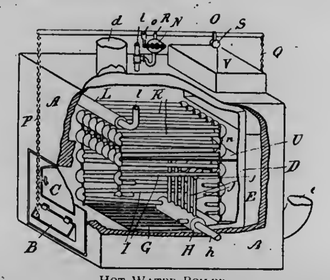
No. 49,420, for a combined Latch and Lock, to Alexander Watson, Kinmount, Ontario, Canada, 8th July, 1895; 6 years.



COMBINED LATCH AND LOCK.

Claim.—The combination, with the lock case, safety catch M, sliding latch C, locking bolt D, and tappet B through which the knob spindle passes, of the lever 2, having arms 3, 4, and a spring 5, engaging said lever near the free end, said lever pivoted slidingly to the lock case through an elongated eye a, and the arm 4 engaging the tappet and having frictional contact with the tail of the locking bolt, and the latch loosely connected to said lever, as and for the purpose set forth.

No. 49,547, for a Hot Water Boiler, to John D. McEachren, Galt, Ontario, Canada, 23rd July, 1895; 6 years.

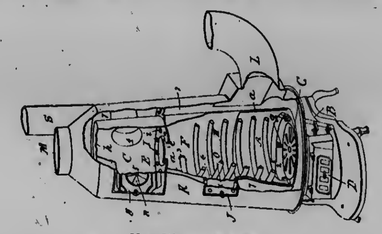


HOT WATER BOILER.

Claim.—1st. A hot water or steam boiler having an inner and outer casing, the said inner casing being of metal or other suitable material as ventilation may be required and the outer casing of brick work, a space between the said casings, an air inlet and an air outlet communicating with said space, a series of tubes forming the boiler, the said tubes forming the sides, end and top of the fire box, substantially as set forth. 2nd. In a brick set boiler, the combination with the brick work A, of the metal or other suitable material, lining D surrounding the boiler and furnace, substantially as set forth. 3rd. In a hot water or steam boiler, the combination with the fire box of the tubes or coils I, forming the sides of the said fire box, substantially as set forth. 4th. In a tubular boiler, the combination with the tubes forming said boiler of the counter bored fitings M, substantially as set forth. 5th. In a tubular boiler, the combination with the tubes forming the said boiler of the counters bored fitting M, having a hollow depending supporting lug n, whereby the said tubes are splayed and supported, substantially as set forth. 6th. The fitting M, being counter bored, and also threaded for the reception of tubes or pipes, as and for the purpose set forth.

No. 49,519, for a Hot Water Boiler, to John D. McEachren, Galt, Ontario, Canada, 18th July, 1895; 6 years.

Claim.—1st. In a portable hot water boiler, the combination with a boiler consisting of a fire pot, fire chamber and combustion chamber of a conical shape, a hot water coil contained in the said fire pot and fire chamber, of an outer casting jacket forming a ventilating space around the said fire pot, fire chamber and combustion chamber and an air inlet and air outlet connected with the space so formed, substantially as set forth. 2nd. In a portable hot water boiler, the combination, with the hot water coil H, of the supports g, in which the said coil rests substantially as set forth. 3rd. In a portable hot water boiler enclosed in an inner and outer casing, having a heating coil spirally arranged and fire pot enclosed in the said inner casing, the combination with the said inner and outer casing having openings situated above the said fire pot, and connected together, of the door J, and sliding-door O, substantially as set forth. 4th. In a portable hot water boiler, the combination with the fire pot, grate and fire chamber, having a spirally arranged conical shaped coil located therein, of the combustion chamber located above the said fire chamber, a diaphragm having a central opening and deflecting plate, separating the said fire chamber from the said combustion chamber. 5th. In a portable hot water boiler, the combination with the fire chamber and combustion chamber, of a diaphragm having a



HOT WATER BOILER.

central aperture and a series of perforations around the said aperture, and a movable deflecting plate over the said central aperture, substantially as set forth.

Patents have also been issued to R. H. Stilwell, of Detroit, Mich., for a form of matched board; to W. M. S. Garrison, of Elizabeth, N.J., for a portable elevator; to C. G. Davies, of Denton Harbour, Mich., for a brick machine; to Sam. Hughes, of Lindsay, Ont., for a window sash and sash frame, and to C. J. Cooze, Charterton, Wellington, New Zealand, for a window sash.

THE OLD CRYSTAL PALACE.—A REMINISCENCE.

MR. Edwards, Secretary of the Department of Public Works for Ontario, has been hunting up the history of the crystal palace, which stood so many years on the old exhibition ground, immediately south of the lunatic asylum in Toronto, and which was afterwards taken down and removed to the present exhibition park, where it still does duty as the upper part of the Main Building at the Industrial. It is quite interesting.

The corner stone was laid on the 15th of July, 1858, by Hon. E. M. Vankoughnet, Minister of Agriculture, the officers of the Agricultural and Arts Association being as follows:—

D. B. Stevenson, president; Wm. Ferguson and John Wade, vice-presidents; Richard L. Denison, treasurer; Prof. Ed. Buckland and Wm. Edwards, joint secretaries; Prof. Henry Croft, chemist, and James Fleming, seedsman. These gentlemen and the following formed the Toronto Local Committee: W. H. Boulton, Mayor; F. W. Jarvis, sheriff; W. B. Jarvis, Rev. Dr. McCaul, Dr. Daniel Wilson, Ald. Reid, Ald. Brunel, Ald. Bonmer, Ald. Ritchie, Ald. Carr, J. E. Pell, Samuel Walton, J. D. Humphries, Joseph Hartman, M.P.P., warden; Geo. T. Denison, Alexander Shaw, Prof. Buckland and all the members of the Board of Agriculture.

The only surviving members are:—Wm. Edwards, ex-Ald. Reid, ex-Ald. Ritchie, John E. Pell and Samuel Walton.

The architects were Fleming & Schreiber, now Dr. Sandford Fleming and Collingwood Schreiber, Deputy Minister and Chief Engineer of the Department of Railways and Canals at Ottawa. The amount paid the contractors, Smith & Burke, for the completed building was $20,804.92. The building was principally iron and glass, and was 256 feet in length, 144 feet in breadth and 56 feet in height. It contained 2,000 square feet of glass in the roof and 5,000 feet in the walls, its gross weight being twelve tons. There were only three kinds of castings in the building—the ground columns and the girders, each 16 feet long, and a shorter column from the gallery floors to carry the roof. The iron frame was then in 16 feet squares and was held in form by iron screw bolts and clamps, and the entire building—columns, girders and circular roof ribs—were unbolted and taken apart with the breakage of only three pieces of the castings.

AN ARCH COLLAPSES.

A FEW days ago the big brick arch forming the portal of the Toronto, Hamilton and Buffalo tunnel under Hunter street, Hamilton, fell with a crash, fortunately without injuring anyone. The chamber, or support, of the eastern half of the arch had been removed. The sides were not strong enough to stand the strain, and bulged out, and the unsupported part of the arch fell. The accident was also partly due to the sand in the cement not being strong enough. About 40,000 bricks had been used in the arch, all of which will have to be removed. The loss will fall upon Mr. Onderdonk, the contractor for the tunnel.

CONCRETE FLOORS.

THE subject of concrete opens a wide field for investigation and discussion, but in a series of articles on the subject, in the Contract Journal, Mr. Geo. H. Blagrove confines himself to the consideration of its uses in the construction of floors. Slabs of concrete, he says, supported upon girders or rolled joists of iron or steel, form a species of floor which is coming more and more into general use, and it is our present purpose to indicate as accurately as possible the capabilities of the material so employed and the best means of turning those capabilities to advantage.

It may be premised that the concrete referred to here is composed with Portland cement, not with lime. As regards the quality of the cement for this purpose, much that is instructive may be gathered from the writings of scientific experts. Practical men usually adhere to a few plain rules which occasionally receive modification when some newly-discovered fact meets with general acceptance. Thus, for instance, the specification for a recent contract required that the cement used in making concrete should be of such a degree of fineness that a sieve of 2,500 meshes per square inch should not reject more than 12 per cent. of the powder when gently shaken. Scientific tests have shown that great additional strength is obtainable with higher degrees of fineness, but anything beyond the ordinary degree seems rarely to be insisted on in practice. We shall assume that the cement with which we deal is of the quality stated, that it weighs at least 112 lbs. per striked bushel, or nearly 90 lbs. per cubic foot, and that a briquette of neat cement will have an ultimate tensile resistance of 400 lbs. per square inch after six days' immersion in water. To prevent any possibility of its being used hot, and so being liable to crack after setting, it may be required to be kept for a month or six weeks after being mixed, and may be spread out upon a floor and turned over daily during the last two or three weeks. The question of chemical analysis is rarely approached in ordinary practice. It is generally admitted, however, by experts, that the cement should contain about 60 per cent. of lime, about 24 per cent. of silica, and about 11 per cent. of alumina, the remaining 5 per cent. being made up of magnesia and alkalies.

Supposing the ingredients to be thoroughly mixed, we should obtain a concrete upon which some reliance could be placed for its resistance to transverse stress. But this thorough mixing embraces the requirement often insisted upon that every particle of sand and coarse aggregate shall be completely coated with cement. If there should be an absense of cohesion in any part of the mass, all calculations of strength may be at fault.

The question of the nature and proper proportions of the ingredients for making Portland cement concrete is indeed a wide one. As bearing upon the construction of floors, valuable information is afforded by the results of Mr. Darnton Hutton's experiments described in course of the discussion of Mr. John Grant's paper on "Portland Cement" at the Institution of Civil Engineers.* Mr. Hutton experimented with bars of concrete 4 ft. long and 1 ft. square, supported upon a 3 ft. span and broken by means of a load hung from the centre. The general proportions of cement to other materials was 1 to 9, though sometimes higher. With 1 cement, 5 shingle, and 4 sand, the central breaking weight was 2,656 lbs. With 1 cement, 5 shingle, and 3 sand, or a proportion of 1 to 8, the breaking weight was increased to 3,023 lbs., an increase of about 14 per cent. But on reverting to the proportion of 1 to 9, with 9 parts of shingle only to 1 of cement, the breaking weight was increased to 9,590 lbs. The inevitable conclusion is that for transverse resistance sand is a source of weakness, and should be omitted. But everything would appear to depend upon the careful mixing of the ingredients. Without sand, and with an unequal admixture of cement and water, the cement might have a tendency to honeycomb in the interstices between the particles of aggregate, and this would be less likely to occur if sand were used. As a general rule, therefore, with ordinary workmanship, it would seem safer not to dispense with sand. As might have been expected, experiments generally show that the greater the proportion of cement the greater is the transverse strength, and of course the tensile strength of the cement is an important factor. It is remarkable, however, that in some of the experiments of Mr. Alexander Fairlie Bruce, to which further reference will be made,† a higher degree of strength in the cement was accompanied by a lower transverse resistance in the concrete when the proportions of sand and coarse aggregate were unaltered. This is only one of many instances that could be cited of the capricious behavior of concrete under transverse stress.

Among several kinds of aggregate employed by Mr. Bruce, he found gravel to be the least absorbent, and therefore the most economical. But as regards transverse strength, the general results of his experiments tell in favor of hard sandstone. It is probable that the cement obtains a better hold upon an absorbent than a non-absorbent substance.

It is difficult to lay down any rule which would govern the proportion of thickness to span in concrete floors. But apart from the theory of transverse resistance, we may suggest that the proportion of the thickness to the size of the coarse aggregate ought to have an important influence upon the strength, especially if it be assumed that fracture is most like to take place in the joints between the cement and the aggregate. Other things being equal, the thicker slabs ought to show a higher degree of transverse resistance, as being relatively more homogeneous than thin slabs in which the pieces of aggregate are few in depth and have but little chance of breaking joint.

Among some of the earliest recorded experiments upon the transverse strength of concrete floors is one mentioned by Mr. Potter in his work on "Concrete: Its Use in Building." A slab of concrete, made with two bushels of Portland cement and nine bushels of crushed slag, was tested one month after manufacture. The slab measured 6 ft. by 4 ft. 9 in. and 5 inches thick, and its two longer sides were supported upon 2 in. solid bearings, the other two sides being left free. It was loaded with 550 bricks, and also subjected to considerable impingement, but did not give way, the weight supported being equivalent to about 140 lb. per square foot. In this case the thickness of the slab was less than one-tenth of the clear span, a proportion that would hardly be thought safe in practice An ordinary proportion for small spans is 11-sixths, as in the case of a 4 in. thickness for a 2 ft. span, or a 6 in. thickness for a 3 ft. span. With larger spans and greater thicknesses, the proportionate thickness might be reduced according to the load to be supported. If the laws of transverse resistance are to be applied to concrete slabs, it will follow that the strength will vary inversely as the span and directly as the square of the thickness. But when there is a certain stated load per square foot to be carried, the total amount of load will vary as the span, and the strength must be made to vary in the same proportion. Hence the square of the thickness should vary as the square of the span, or, in other words there should be a constant ratio between thicknesses and span for any stated load per foot.

* See Proc., Inst. C.E., vol. lxii.
† See Proc., Inst. C.E., vol. cxiii., or Contract Journal, August 23, 1893.

THE NEW LEGISLATIVE BUILDINGS, VICTORIA, B. C.

VICTORIA, B.C., Aug, 24th, 1895.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—Your reference in this month's CANADIAN ARCHITECT AND BUILDER in respect to the foreign oak used in the above building, rather exaggerates the case. As a matter of fact the whole of the numerous offices and rooms of the new Parliament Buildings are panelled and finished in British Columbia lumber —cedar, maple, alder, spruce and fir—except only two small rooms, which are partially panelled in oak; and also, when the rooms are finished in cedar, some of the doors which will be subjected to rough usage are of oak—the oak harmonizing with the cedar better than any wood I know of, the cedar itself being too soft for hard wear and tear. You will thus see that the amount of foreign wood used is comparatively trifling.

It has been the earnest desire of everyone connected with our new Parliament Buildings, to utilize as far as possible local and and native materials, and we have done so to an extent rarely equalled, I should think, in any building of similar importance.

Yours faithfully,

F. M. RATTENBURY, Architect.

THE Don Valley Pressed Brick Works have just turned out their first kiln of paving bricks, which are considered by experts to be equal, if not superior, to any made on the continent.

MANUFACTURES AND MATERIALS

QUALITIES OF BUILDING-STONE.*

By Maurice Thompson.

THE qualities necessary to the best possible building-stone are, workability, durability and beauty. It must also be cheap.

Workability includes in its meaning, accessibility, a ready yielding to quarrying operations, the absence of refractory qualities under the hammer and chisel, and a texture and grain that will hold decorative finish.

Stone that cannot be quarried readily has the disadvantage of great cost to begin with. If the "raw material" is expensive, the finished product must be costly. On the other hand, if nature has so deposited her stores that the stone is easily taken from the quarry, still, if the material is refractory in the final cutting and finishing; no matter what may be its other qualities, it cannot be a very cheap material for the builder, as it will demand an over amount of expense and delay in preparation. Still less will it be desirable if it obstinately refuses to hold finish or decoration. Stone that comes from the quarry soft, and yet somewhat tough, but hardening after a time, has the finest quality of workability. This renders it easy to quarry, very responsive to the tools of the cutter, and capable of taking easily, and holding permanently, the finish and decorative designs of the architect's specifications. It must be kept in mind, however, in axamining stone, that it comes from the quarry wet, and for that reason easily workable, it may again take up water after drying, which would be most objectionable; but if, in the process of drying in the first place, it passes through a chemical change which will render it ever afterwards impervious to water, the quality is just what could be wished for in this regard. Usually an examination of the outcropping surfaces of the stone in place will give a safe knowledge of its value as regards workability. Next, after the character of the stone, regard must be had touching the condition of its deposit. Too much overlying matter, whether stone or earth, will usually make the quarry work very heavy and expensive. This overlying matter, technically called "stripping," is, as a rule, quite worthless, and must be entirely removed before the stone can be worked with steam channelers or other quarrying appliances, hence the necessity of a careful examination to determine its nature and extent in each case before opening a quarry.

Durability, as applied to building-stone, includes every quality tending to make the material lasting and unchangeable after it is laid in a structure. These qualities are many, and often seemingly conflicting in their nature. Hardness, elasticity, tensile strength, power to resist the greatest crushing force, imperviousness to water, and invulnerability to the attacks of air and its corrosive and disintegrative burdens, are some of the qualities, but not all. Evenness and homogeneity of composition, unity of substance, so to speak, and the power to resist extremes of heat and cold, are quite as necessary. It will be seen at once that chemical analysis must be relied on to insure the best knowledge of some of these requirements. Some otherwise good and durable limestones will become corroded and discolored, and have their integrity destroyed by the effect of sulphurous smoke from the burning of impure coals; others will be injuriously affected by the action of rain-water, and still others by the oxidizing power of the air. Some sandstones bear too much iron in their composition; others lack sufficient cohesion of the particles, while others again are clayey, or unequal in grain or texture. Every test of practical science should be given to stone before it is used in any building intended to be a permanent structure. As a rule, if the outcropping ledges are found to be infiltrated with water, which makes the outer surface constantly damp, the stone will not be good, for this would indicate that it would take up too much moisture in the wall. Still, it is often the case that an apparently over-hydrous stone will dry out permanently after it is quarried and cut. Many of the sandstones, notably the better qualities of conglomerate, are of this character, and so soft when first taken out that they may be cut to any rough shape with a common axe or hatchet, but hardening after a few days' exposure so that water will not affect them.

The elasticity of stone may be tested by sawing it into long, slender strips, say two inches square and three feet long, when, if it be quite perceptibly flexible, its elasticity is good. If such a bar be suspended so as to hang free by a string, and is struck a light blow with a hammer, its evenness and solidity of fibre will be attested by a clear, sweet metallic note, not unlike that of a fine bell, or that of a well tempered steel bar. As a rule, the best stone will break with a direct line of fracture; but it may be conchoidal, or otherwise indirect, and still be unobjectionable. Parallel lines of cleavage, or of stratification, are always favorable indications where other features are promising.

Resistance to crushing weight may be pretty safely inferred from solidity of texture and evenness of grain; but it is always necessary, before a final acceptance, to submit the material to the severest tests of an apparatus designed for that purpose. This will be described in the proper place.

In examining sandstone, with a view to building purposes, the outcropping, if there be any, should be carefully scanned with a view to discovering what effect long exposure to the atmosphere and the rigors of winter may have had upon it. If the stone has "weathered" badly, this will be shown by one or another sign of disintegration or demolition, and a talus of fragments and sand will be found formed at or near the base of the outcropping cliff. Often the substance of the rock will give unmistakable evidence of inequalities of structural composition, such as horizontal cavities caused by the weathering out of seams or streaks, that, on account of bearing too much iron, have oxidized and crumbled away. Such stone, if used in a building, would prove worthless, and, therefore dangerous. It is often the case, as I have observed during a long experience, in civil engineering, that public bridges erected by counties are rendered unsafe by having their piers and abutments constructed of this kind of stone, and that, too, in places where most excellent material lay near at hand, and which a little knowledge of the nature of the stone would have pointed out to the superintendent. Too frequently it happens that appearances of the most untrustworthy kind are relied upon where an ignorant person is set to do work which ought to be in charge of a skilled and well-informed engineer.

In judging of the probable durability of limestone, before subjecting it to any test of science, the same observations should be made as in the case of sandstone, with a view to ascertaining its weathering qualities. Any unequal discoloration of the face of the exposed ledge should be scrutinized carefully. Usually these are caused by the presence of iron in the composition of the rock. But limestones are much more injuriously affected by hidden faults of composition than are sandstones, and for this reason they demand a much more careful examination before any extensive quarries are opened. It is often the case that iron in limestone will do no more than discolor the outer surface on exposure to the action of air and rain-water; but even this is a serious defect when the stone is to be used in any structure wherein beauty is a chief object. For the rough masonry of ordinary bridges, and for the hidden foundations of buildings, a cheap and durable stone is what is most wanted, and in these discolorations is not a fatal fault.

Beauty, when the term is applied to any building material, includes all the good qualities already enumerated, with the added value of a pleasing color, or combination of colors, and a general effectiveness of appearance when the structure in which it is used has been completed. The variegated granites undoubtedly are the most beautiful of all building materials. Next to granite, the red and brown sandstones are most pleasing to the eye, but the white, gray and blue limestones are very effective, and they have the advantage over granite in that they work much more easily in ornamentation, while they take figures in relief with far more clearness of action than do the sandstones as a rule. Architects have long since discovered the pleasing effects to be produced by using different kinds of stones in the same building, placing each where its particular qualities will best serve the general motive of the design.

As a rule, all else being equal, the stone which holds its native color best will be most beautiful in a building; and of the stones which change color, that will be most desirable which changes least and evenly. Some of the gray sandstones, however, change color unevenly, and give a striking and ofttimes picturesque cloudiness to the surface, which adds to its effectiveness of color in a wall. The nearly white limestones that take on by exposure a dark cream-brown hue, if they do not contain too much magnesia, hold that tint very well, and are quite beautiful. As a rule, the presence of many large animal remains in a stone is objectionable on account of the tendency of such a composition to crumble; but where the fossiliferous rock is durable, it will usually be found very beautiful when cut, the organic remains bossing it over with variegation, that greatly heighten its appearance. Stone which contains large fossils is not, however, the best for receiving raised ornamentations, such as figures in relief, no matter how durable and beautiful it may be, for the animal form will interfere with nicety of cutting and polish, as well as with the regularity of the figures. Fossils will usually be found harder than the matrix in which they are set; but this is not always the case, for quite often the form is that of a hollow cast or impress, filled in with material which crumbles easily. As a rule, fossils, though very hard, are but loosely set in sandstone, and often they are very large and rough forms of plants, extremely silicious and refractory. Blocks containing these are to be avoided as probably worthless for building purposes, however valuable and interesting they may be from a scientific point of view.

Many very beautiful stones that are not durable when exposed to the weather, are very valuable for the inside finishing of buildings, where they will last for ages, holding the finest tints of their coloring without perceptible change.

From what has been said above, it will be seen that every owner of

* From the Seventeenth Indiana Geological Report.

stone beds, should, before going to the expense of opening quarries, have his rock beds examined by an expert, whose report should show all the defects as well as all the good qualities of the material. Usually this can be done without any great outlay of labor or money, for the experienced geologist or engineer can quickly discover from the stone and its surroundings the nature of the deposit, and very simple chemical and mechanical tests will settle the question of strength and durability. There are beds of magnificent building-stone lying undeveloped in many places, simply for the reason that the owners are not aware of the treasure that they possess. In other places quarries are being industriously worked and the stone used in the erection of costly buildings, where, in fact, the material is wholly unfit for use on account of its lack of durability. I have examined many extensive structures whose stone was fast crumbling away. True, a few years will not show much decay, but in the long future the result will certainly be disastrous. The constant action of the atmosphere, the expansion and contraction consequent upon extremes of heat and cold, and the disintegrating effect of rain-water, slowly but surely tell upon the integrity of the exposed parts.

The invitation extended to visitors to the Toronto Industrial Exhibition by the Gurney Foundry Co., to visit their extensive show rooms on King street west, and inspect their Oxford boilers and radiators, and other heating appliances, drew a large number of visitors to their establishment during the Fair.

A new kind of insulating and non-conducting material for covering heating apparatus, etc., consisting of flakes of mica, enclosed between covers of wire netting and canvass, forming mats of any size or shape, has recently been placed on the market by the Mica Boiler Covering Co., of No. 2 Bay street, Toronto.

The high price of hard wall plasters heretofore has prevented the adoption of them generally in Canada. The Alabastine Company, of Paris, Ont., announce in another column their "Paristone Wall Plaster," which they claim to be superior to anything now on the market, and at a price within reach of all. Architects who are interested in bringing the cost of buildings within the amount of their estimates might do well to investigate this new plaster. Situated as they are near to the central Canadian cities, and having their own mills and mines, it would seem that this firm might be able to produce the goods at a low price. The agency for this city has been established with the Toronto Salt Works, 128 Adelaide street east.

TESTING STRUCTURAL MATERIALS.

THE following are the subjects which appear on the program of an international conference, at Zurich, Switzerland, to be held on September 9, 10 and 11, to consider the adoption of standard uniform methods of testing structural materials. The conclusions of the conference will be watched with interest by architects and builders all over the world.

1. Future promotion of uniform methods of testing materials and important technical products.
2. Establishment of uniform methods of testing rust-preventing processes.
3. Relation of chemical composition of natural stones and their resistance to climatic changes; influence of smoke and sulphuric acid upon stones.
4. Method of determining quality and climatic resistance of roofing slates.
5. Methods of securing normal consistency and uniform density of cement test briquettes.
6. Investigation of methods of determining the constancy of volume of hydraulic cements.
7. Quick methods of determining quality of cement.
8. Adhesive strength of hydraulic mortars.
9. Technical value and physical tests of puzzolanas.
10. Investigation of anomalous phenomena of cements, especially of time of setting.
11. Investigation of influence of fecal matter on hydraulic mortars.
12. Processes of testing ordinary wrought iron, uniform methods.
13. Comparative tests, most simple measurements and expressions for flexibility of metals.
14. Influence of corrosion, wire tests for corrosion,
15. Tests of microscopic structure of metals, uniformity of methods.
16. Investigation of effect of very low temperatures on wrought iron.
17. Experiments on solder and soldering.
18. Compression tests of iron.
19. Cast iron tests.
20. Tests of iron and steel railroad material, axles, tires, &c.

Our Exclusive Business

IS THE HEATING AND VENTILATING OF ALL CLASSES OF BUILDINGS

OUR "ECONOMY" FURNACES AND COMBINATION HEATERS

combine the great essentials of a satisfactory heating apparatus, viz.: Economy in fuel, Simplicity of Construction and Ease of Management, Efficiency, Weight and Durability . . . . . .

In Combination heating—with hot water or steam—our position is pre-eminent. Our Company ORIGINATED and perfected that class of heaters, and the numerous attempted imitations of our Combination Heaters only serve to emphasize their superiority . . . . . .

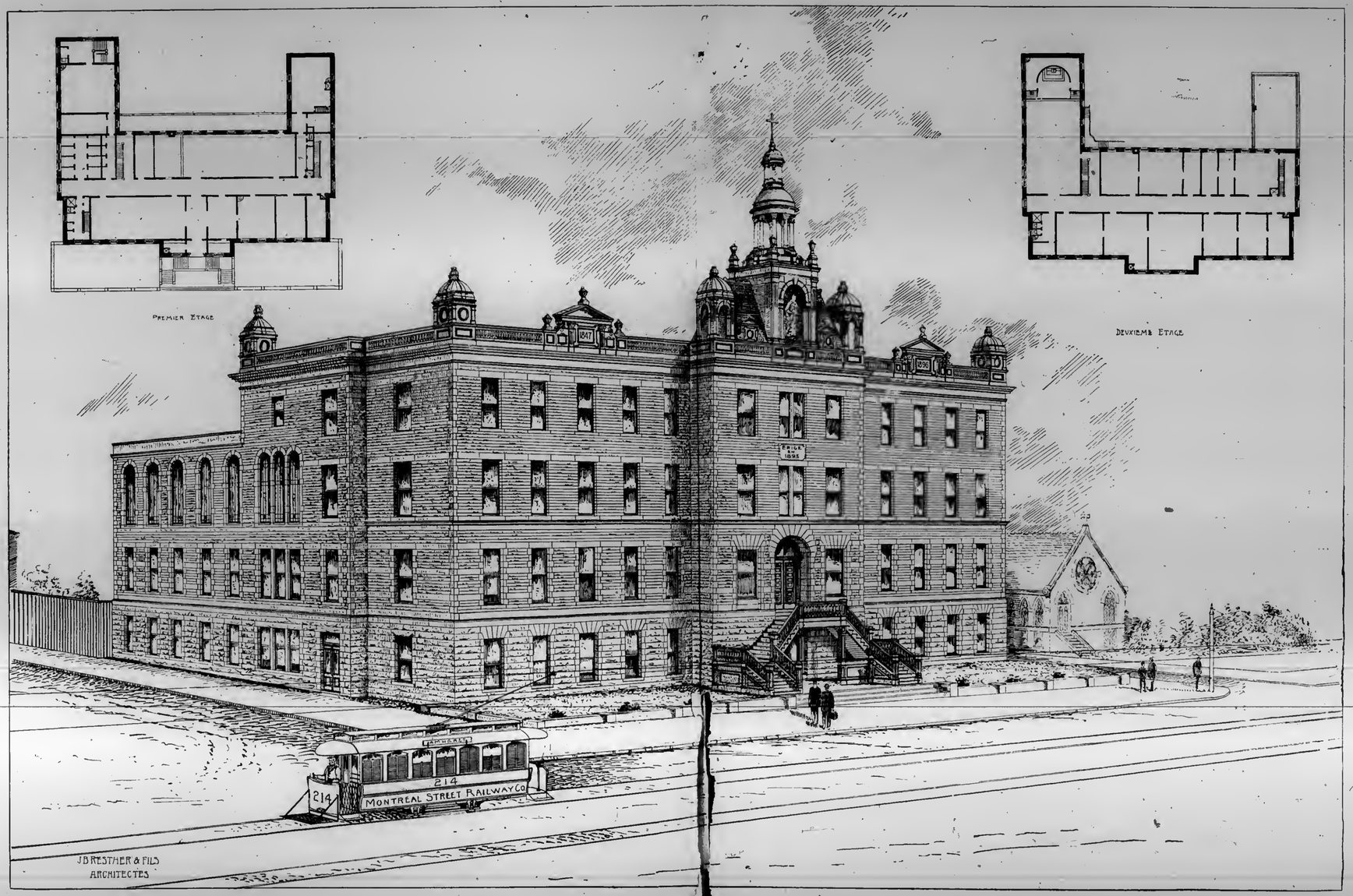
THE "ECONOMY" HOT WATER COMBINATION .. HEATER ..

SEND FOR CATALOGUE.

J. F. Pease Furnace Co.

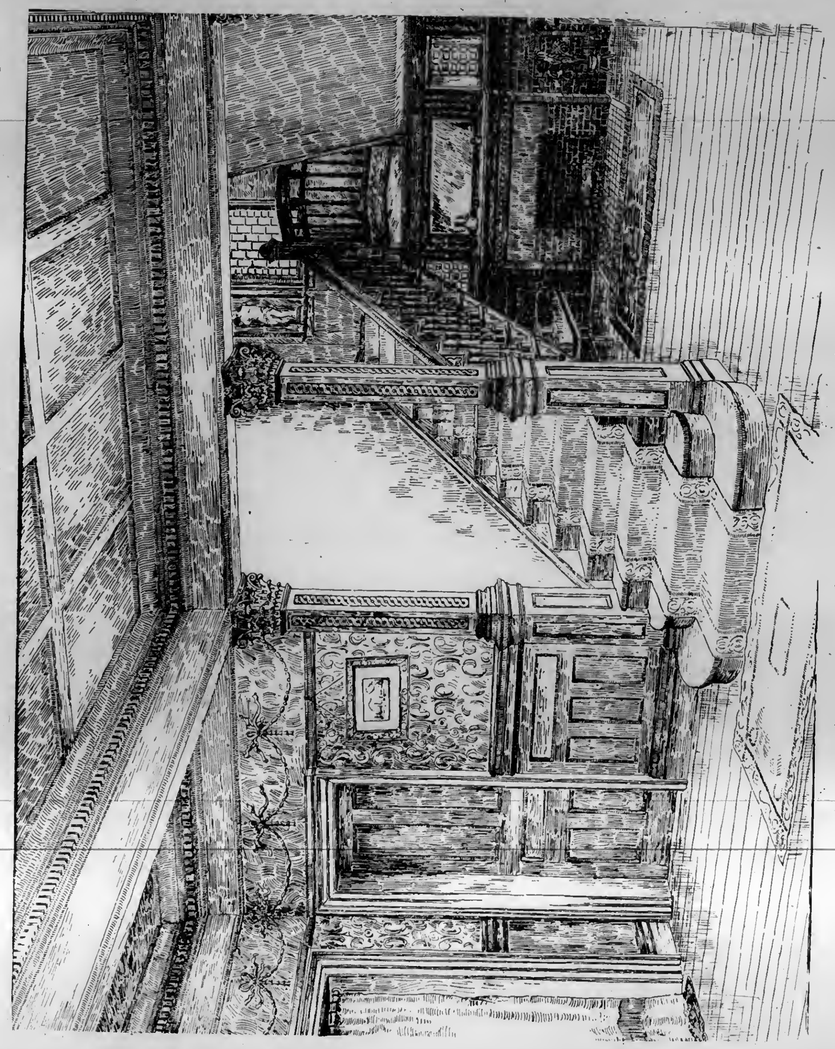
HEATING ENGINEERS

189-193 QUEEN ST. EAST, TORONTO



CONVENT OF THE SISTERS OF ST. CROIX, MONTREAL.

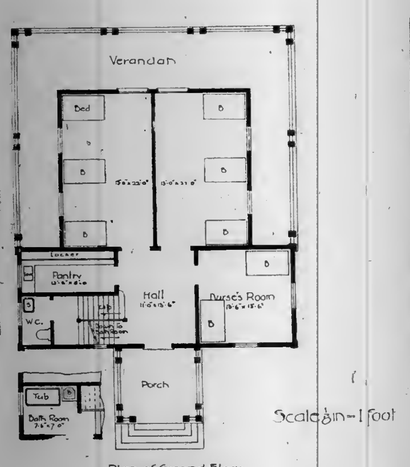
J. B. RESTHER & SON, ARCHITECTS.



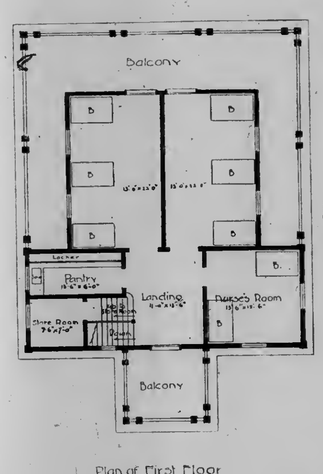
STAIRCASE HALL IN AEKEMPS HOUSE
WELLESLEY CRESCENT
E. BOURKE, ARCHITECT

NEW GRAND OPERA HOTEL, TORONTO
HENRY SIMPSON, ARCHITECT.

. PROPOSED NEW WING
. LAKESIDE HOME FOR
LITTLE CHILDREN
. TORONTO.

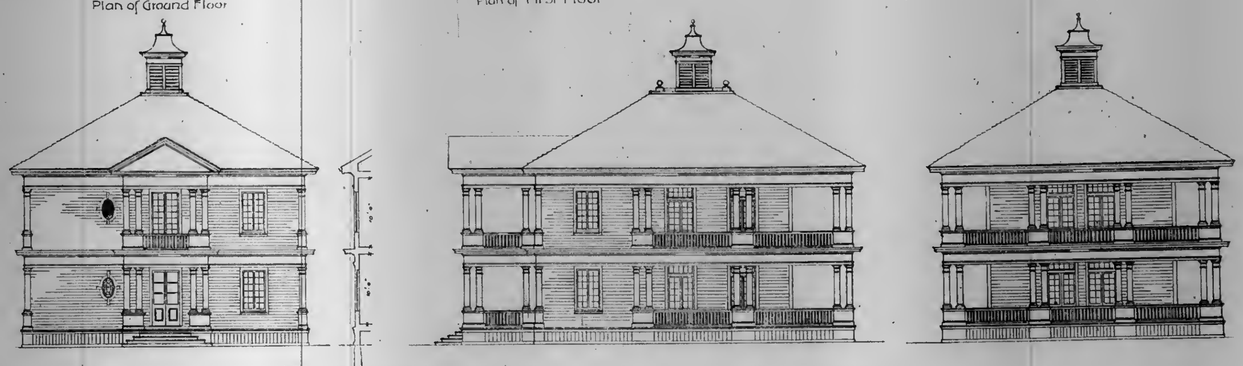


Plan of Ground Floor



Plan of First Floor

Scale 8in=1 foot



PROPOSED ADDITION TO THE LAKESIDE HOME, TORONTO.

CURRY, BAKER & CO., ARCHITECTS

CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—NO. 10. OCTOBER, 1895 PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

D. B. DICK	Toronto.
W. A. EDWARDS	Hamilton.
F. J. ALEXANDER	Ottawa.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. C. HUTCHISON, Montreal.
1ST VICE-PRESIDENT	A. T. TAYLOR, Montreal.
2ND VICE-PRESIDENT	J. E. PEACHY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

CHAS. BAILLAIRGE	Quebec.
ROBT. FINDLAY	Montreal.
J. Z. RESTHER	Montreal.
A. H. LAPIERRE	Montreal.
G. E. TANGUAY	Quebec.
THEO. DADUST	Montreal.

AUDITORS—A. J. FOWLER and C. CHAUSEE, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.
JOHN ALDRIDGE, 1st Vice-President.
WM. PARK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JAS. CRANG.
WM. PEARS.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
H. MARTIN.
THOS. CANNON, Jr.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this Journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

WHILE the present number of the ARCHITECT AND BUILDER is being printed, the American Institute of Architects is meeting in annual convention at St. Louis, Mo.

The Royal Institute of British Architects has raised a fund and secured facilities for the thorough testing of bricks and brickwork. The work will shortly be entered upon.

THE recent mishap to the conduit pipe of the Toronto waterworks should have a tendency to popularize the electric elevator, resulting as it did in stopping the operation of every hydraulic elevator in the city.

A MONUMENT is to be erected in Quebec to the memory of Samuel de Champlain, whose name is so intimately connected with the early history of Canada. Artists, sculptors and architects are asked to send in plans, models or drawings up to Jan. 2nd, 1896. The cost is not to exceed $30,000.

"THE manufacturers make more nails every year than can be sold," a Montreal manufacturer gives as the justification for a pool which has just been formed by the nail men in Canada. Combines among nail manufacturers have been in existence in the United States for years, but this is the first time, so far as we know, that a united move to diminish the output and increase the price has been made in this country. How long will it last?

IF the amount of building in a city is an evidence of prosperity, and no doubt it is, Chicago must be enjoying a return of good times. During May, June, July and August permits were issued for the erection of 3495 buildings, with a frontage of over 17 miles. The cost will reach $20,000,000. In 1894 permits were issued for the same four months to the amount of $11,539,065 and in 1893 for $7,638,455. The Windy City seems to be growing.

A POINT of considerable interest to contractors in Toronto is said to be likely to come up for decision at an early date. At the solicitation of the Trades Unions of the city, the Toronto Public School Board recently placed a clause in its specifications for work on public school buildings, providing that the contractor must pay his workmen the union rate of wages. On a recent contract, the contractor made an agreement with journeymen bricklayers to work at 30 cents per hour. It is reported that notwitstanding this agreement, these workmen propose to bring an action to compel the contractor to pay them at the rate of 36 cents per hour. Thirty-six cents was the rate which obtained under the recent agreement between the Bricklayers' Union and the Toronto Builders' Exchange. It will be remembered that this agreement lapsed on the 1st of May last, and the contractors contend that since its termination there has been no recognized scale of wages for journeymen bricklayers. This is the point upon which the decision is likely to turn should the matter be brought into the courts, and the outcome will be looked for with interest.

ACCORDING to a recent decision of the Court of Appeal in New York, builders of fire escapes are legally responsible for loss of life or limb which may arise from defects in their construction. In the case under review, a man while escaping from a burning factory was scorched by the flames issuing from a window and lost his footing, falling not on the platform of the escape, but to the ground. The Court held that the escape was not so constructed as to afford a safe means of retreat, and awarded damages.

THE galleries of the Parliamentary Library at Ottawa are floored with semi-transparent glass, which has the effect of shedding downward natural light in daytime, and upward artificial light at night. The Chief Librarian, Mr. Griffin, is of opinion that it is the material best adapted for the purpose. The problem now confronting the Librarian and Parliament is how to meet the requirements for increased accommodation without impairing the architectural beauty of the building. The only road out of the difficulty seems to lie in the direction of an additional and distinct building.

MR. Joseph Neilson, a well known engineer and railway contractor, of London, England, was in Toronto recently, and paid the city quite a compliment on the excellent condition of its streets. Nor is it the first compliment of the kind which Mr. Neilson has paid Toronto, for after a previous visit in 1868, and seeing our wooden block pavements on plank foundation, he offered to lay a similar pavement in London. The offer was refused, but subsequently block pavements on concrete foundations were adopted. In the moist climate of England asphalt is so slippery as to cause serious disadvantage. Jarrah wood from western Australia, which is very dense, is being substituted for pine and asphalt.

A WRITER in Architecture and Building puts in a plea on behalf of high buildings, but he seems to look at the matter largely from a selfish standpoint. He professes not to understand the agitation which has arisen against these huge structures—scientific monuments of the resources of our times, as he calls them—and condemns in no measured terms the enactment of laws against them. As we understand it, the agitation is based largely on sanitary grounds. A street lined with sky-scraping buildings can get little sunlight, and sunshine is a necessary requisite to health and comfort. It does not seem strange, to our way of thinking, that there should be a revulsion against these towers very early in their history.

IT is undoubtedly to the interest of the architect to seek a wide acquaintance in the community where he resides, as upon the number and character of his friends, combined with his own individual ability, will depend the volume of his practice. Attention has recently been directed to this phase of architectural practice by the fact that a commission has very unexpectedly reached a Toronto architect from Christiana, Sweden, to prepare plans for three dwellings of American type to be erected in that city. The client is a Swedish gentleman who for a couple of years occupied a position in one of the Toronto banks, but afterwards returned to his native land, accumulated money, is about to marry, and wishes to enjoy the comforts which the domestic architecture of Canada affords.

IN designing their buildings architects should endeavor to keep out of ruts. It is not unfrequently possible to distinguish the architect of a building by a single feature of design to which he has become partial, and which he has repeated over and over again in his practice. The writer has in mind a certain style of turret, the favorite of a certain architect, and which may be seen adorning the corners of half a dozen new residences, all within a quarter of a mile of each other. Because an architectural feature has been found to look well in a certain position is not sufficient reason for its unlimited reproduction. By working thus in a groove, architects are standing in the way of variety of architectural expression, and helping to perpetuate the monotony which marks to too great an extent the appearance of many of the business and residential streets of Canadian towns and cities.

WHEN we read in foreign architectural journals accounts of the conventions of the National Associations of Builders of the United States, Great Britain and Australia, we are led to wonder to what may be attributed the entire absence of organization on the part of Canadian builders and contractors. Are the conditions here so nearly perfect that there is nothing in the nature of reforms to be considered, either in methods of construction or as regards the relation of the building trades to other branches of business, or are the builders of Canada behind the times in the matter of organization?

A USEFUL little pamphlet entitled "How to construct and equip mills, factories and warehouses as fire hazards," has been issued by Messrs. Scott & Walmsley, fire underwriters, of Toronto. The authors regard fireproof construction as impracticable, but suggest means to bring about slow combustion, and facilities for extinguishing fires. Special stress is laid upon the danger of hollow spaces in walls, roof and floors, where fire may lurk unobserved, and which it is difficult to reach when discovered. If builders would follow the suggestions contained in this useful little work fires would be of less frequent occurrence.

THE rapid increase in the use of concrete for sidewalks, floors and other like purposes, has caused an unprecedented demand for cement. A large proportion of the cement is imported from England, Germany and the United States, but there is no reason why more should not be manufactured in Canada. We have the raw material, and a little capital and enterprise would keep some of the money at home which is now sent abroad. The main difficulty is that extensive experience is required, and that kind of experience which can only be acquired on the spot, for material from which cement is made varies greatly in quality, and unless properly worked the output is very liable to be inferior.

PARIS has hitherto been supposed to possess the largest theatre in the modern world, though our ancient friends could outdo us in this respect. But Ichabod, the glory has departed from the gay French capital, and the largest city in the world now possesses the largest theatre. It was opened in London, at Earl's Court exhibition, on August 31st. The building is 417 feet long and 220 feet wide, and the height of the roof 117 feet. The stage is 315x100 feet, large enough surely to accommodate any company. There are nearly 5,000 seats, and being without pillars, the view is good from nearly all of them. We are not told about its acoustic properties, but presume they are as perfect as can be secured. Compared with the Massey Hall in Toronto, this new theatre has considerably greater accommodation, the Massey Hall having seats for 3,500 in front of the stage.

IN the last number of the ARCHITECT AND BUILDER we referred to the by-law in force in Toronto restricting the area of certain classes of buildings to 4,000 feet, and the way it is ignored. Since then the matter has come before the City Council, a movement having been made to repeal the by-law. Ald. Shaw, Chief Graham, of the fire department, and Mr. Coatsworth, City Commissioner, went to Buffalo to inspect certain fire appliances, and took occasion to visit some of the departmental stores, where they found that there was no restriction, one shop there having an area of 32,900 feet. When they returned they recommended the repeal of the by-law, which recommendation the Fire and Light Committee passed on to the Council with its approval. But the architects of the city rose in arms, and when the matter came up the Council referred it back, so that the restriction continues in the meantime, but parties who have violated it will not be prosecuted. Our opinion remains unchanged. If an unlimited area is wanted the building should be made fire-proof. It is not right that any one should jeopardize his neighbor's property. Immense floor areas, filled with inflammable materials, whether goods in a departmental shop, or oil or other material in a factory, are hazardous, and the by-law is founded on a just conception of the situation We do not need to follow the example of Buffalo or New York in this matter

IN connection with improvements which are being made to Queen Victoria School, Toronto, Mr. Thos. Cruttenden, the contractor for the brickwork, was recently charged, at the instance of some of the workmen on the job, with having used inferior material in the construction of one of the walls. The Public School Board employed Mr. Siddall, architect, to examine and report upon the work, and his report entirely exonerated the contractor. The charge is alleged to have been prompted by spite on the part of some of the workmen who had been discharged on account of their irregular habits. Notwithstanding the annoyance and loss to which the contractor has been subjected, as the law stands at present he has no redress. He might bring suit for damages against the workmen who incited the charge, but the chance of securing compensation from such a quarter would be so extremely doubtful as not to justify proceedings on that line. Thus it appears that contractors are at all times in danger of being injured in reputation and put to financial loss whenever it may suit the purpose of an unscrupulous employee to fabricate a charge against them. It would seem but right that the law should be so amended that spite work of this character would be punishable with imprisonment.

THE ivy plant, which for centuries has lent attractiveness to the towns and cities of England, has within the last decade come largely into prominence in some parts of Canada, more particularly perhaps in Toronto, where in certain residential localities it may be seen clinging to the walls of almost every house. Judiciously employed, it greatly enhances the beauty of residence thoroughfares, but it should not be allowed to obscure the architectural beauty of our buildings. It is difficult to discover the wisdom of erecting costly buildings, displaying wealth of carving and other interesting features, to be hidden from view in a few years by the luxurious ivy. An English writer declares that there is no ground for the opinion which many persons hold, that ivy is a cause of destruction to buildings and of injury to the health of the occupants. On this point he says: "So long as such opinions prevail it cannot be too often repeated that the attachment of ivy to walls is an advantage altogether. If the walls are damp before the ivy is planted, the damp will disappear as the ivy overspreads their surfaces. If the walls are dry to begin with, ivy will keep them so by a double action, for should dampness occur through some accident, the ivy will suck out the moisture into its own substance, and in the event of driving rains, that occasionally act with force on walls, the imbrication of hard leafage will prevent the access of rain to the structure, and thus ivy is not only a remover, but a preventer of damp. As regards the integrity of the structure, however, the case is less clear. Fissures in walls clothed with ivy will sooner or later be discovered by the plant and filled up, and then mischief may be expected. When a shoot or root pushes through a fissure in the wall, and is left undisturbed, its natural growth soon begins to tell upon the structure. As the little nut tree carried the millstone, so the slender shoot of ivy will, by increase of girth, begin to push against the sides of the fissure, with the certainty of increasing it, and the probability of bringing the wall down. But where the wall is sound it is exposed to no such danger. Ivy does not make fissures, however quick it may be to discover them where they already exist. It follows, therefore, that, as a rule, ivy may be regarded as defending against time and accident, the walls that afford it support."

AN ARCHITECT'S VIGOROUS INDICTMENT.

WE are in receipt of a copy, in pamphlet form, of the address of Mr. C. Baillargé, C.E., etc., delivered before the Quebec Association of Architects, on the occasion of his vacating the presidency at the recent convention of that body. It bears the somewhat pretentious title, "Bribery and Boodling, Fraud, Hypocrisy and Humbug, Professional Charges and Pecuniary Ethics," and is a scathing indictment of the methods practised by some contractors and others to swindle the public and line their own pockets. We should be sorry to think that the practises Mr. Baillargé condemns prevail to any great extent—that they did would shake one's faith in the goodness of human nature—but we fear he is speaking by the book, and that in his city (Quebec) and province there has been far too much boodling and bribing in connection with contracts. Nor would we forget that recent events have shown that we cannot cast a stone at our neighbors in this respect. Mr. Baillargé's words of warning are therefore well timed, and though somewhat too forcibly expressed in places, and partaking to some extent of a personal character, should have the effect of putting architects, and others who heard them, on their guard against such practices. Want of space prevents us giving extracts, but we must express our appreciation of Mr. Baillargé's boldness in dealing with such a subject.

THE SIMPSON DEPARTMENTAL STORE.

THE Simpson building, now towering up at the corner of Yonge and Queen streets, in Toronto, taking the place of that destroyed last January, presents some unique features, which render it interesting from an architectural point of view. During the Industrial Exhibition, when its large iron skeleton stood out, without any covering, it attracted much attention, and few visitors passed without stopping to gaze on a structure, the like of which many of them had never before seen.

The building is considerably larger than the one whose place it takes. It covers an area of 118 feet on Yonge street by 157 feet on Queen street, with an annex 24 feet square on the south west corner, extending in the rear of the buildings on Yonge street. It is six stories high besides the basement, so that the total floor area, most of which will be utilized for selling goods, amounts in all to nearly 134,000 square feet.

The building is practically indestructible by fire. Should a conflagration occur in any flat among the goods, it can easily be confined to that flat, and the building itself would not burn. Stand pipes will be provided on every flat, with hose, available at all times. So-called fireproof buildings have shown that they are not such in great conflagrations. The iron beams and columns which enter into their construction will not burn, it is true, but they warp and twist with the heat, being thereby rendered useless, while their removal becomes all the more difficult and expensive. Measures have accordingly been taken in this building to fireproof the iron, if such a paradoxical expression may be allowed. The outside columns and beams are covered with stone and brickwork, those within are enclosed in concrete. Boxes were erected around the uprights and the concrete poured in, the boxes being removed when it had set. The beams are covered with slabs of concrete, and the joints will be filled with the adamant plaster put on for finish. This is a new method of fireproofing such a building, introduced into Canada for the first time. The work is being done by a firm in Pittsburg, Penn. The spaces between the floor beams will be filled in with hollow blocks of concrete, and on these the floors will rest. They will be of hardwood, and in the event of fire would only char, even if not flooded with water. The shelving and counters will of course be of wood.

The fronts of the first and second stories, facing on the two thoroughfares, will be filled in with plate glass. The four upper stories are of brick, built on to the iron frame. The rear walls are of solid brick, thick enough to resist any attack by fire from the outside. The roof will be of concrete blocks covered with felt and gravel.

The total weight of iron in the skeleton of this great building is about 3,000,000 lbs. The girders were prepared at the Hamilton Bridge Works, and had only to be assembled and riveted together when brought on the ground. So rapidly was the work done that in seven weeks from the time the first column was set the iron work was completed, and 13 or 14 weeks will see the building closed in ready for the inside finish.

The cost of the building will be in the vicinity of $250,000, and it shows what the departmental shop has become when Toronto can afford such a palatial structure in the retail trade.

Messrs. Burke & Horwood are the architects.

A nail combination has been formed which includes all Canadian manufacturers, and prices will likely be advanced.

THE City Council of Toronto will consider an amendment to the building by-law, to prohibit the erection of any dwelling house, on any street, lane or open space less than thirty feet wide, and providing that every dwelling house must have at least 300 square feet of land attached to it on which no building is maintained.

TORONTO CITY ENGINEER'S REPORT.

THE annual report of the Toronto city engineer for the year 1894 has just been distributed, and forms quite a bulky pamphlet. It contains full and complete information respecting the public works carried out during the year under review. A reference to some of the points brought out will be of interest.

We have had recent evidence of the extent to which the source of our water supply may be affected by the sewerage of such a city as Toronto. Perhaps it is not to be wondered at when we consider that 227¾ miles of sewers are constantly pouring their filth into the bay. It cost $5,146 to flush 112½ miles of sewer, a rate of $45.70 per mile, a reduction from $59.65 per mile the previous year. An extension of 2.67 miles of sewer costs $12,964.89, nearly all being built by contract. Private drains to the number of 489, making a mileage of 2.06, were also constructed from the main sewers to the property line.

The plumbing department made inspections to the number of 8,000. The number the previous year was 14,605, the falling off being doubtless due, in a large measure, to the restriction in building operations.

The question of roadways is and always will be an important one in Toronto. To find a paving material which will stand the traffic and resist the effect of climate, and at the same time not prove too expensive, has puzzled engineers and city councils everywhere. Asphalt seems to best meet the two first named requirements, but it is an expensive pavement, and has not therefore come into general use. If vitrified brick could be supplied at a cheaper rate it would without question be extensively used, and it will, we think, be one of the principal pavements of the future; but at present it is nearly as expensive as asphalt, and therefore cedar blocks, despite the objection to them on sanitary grounds, continue to be largely employed. The amount of new pavements laid last year was 8.15 miles, divided as follows:

Asphalt	3.067 miles.
Stone Setts on Concrete	2.563 "
Cedar Block on Sand and Plank	0.852 "
" on Concrete	0.826 "
Brick Setts	0.787 "
Scoria, Tamarac and Cobble	0.060 "

The total length of streets in the city is 253.48 miles, with roadways as follows:

Cedar Block	111.16 miles.
Macadam	35.95 "
Asphalt	13.70 "
Cedar with Asphalt on R. R. track	6.35 "
" " Brick " "	4.50 "
Stone and Scoria	0.81 "
Macadam with Stone Setts	0.54 "
Wood on Concrete	0.49 "
Unpaved	79.98 "

It will be observed that cedar blocks, which were put down so extensively a few years ago, still lead by a long way, though rapidly going out of favor. In 1890 there were fifteen and a half miles of cedar block pavement put down; in 1894 less than one mile. There are, however, over 24 miles of cedar blocks on which the time for payment of the local improvement tax has expired, which are in a bad state of repair and require to be renewed. This the engineer recommends should be done. Poor roadways mean a heavy tax for repairs and cleaning, to say nothing of wear and tear of horses, harness and vehicles. The strength required to haul one ton on a smooth pavement is between 16 and 20 lbs., on a broken stone road it is 60 lbs., and on a cedar block pavement in bad condition, from 100 to 150 lbs. That means that four or five horses are required to do the work that should be done by one. This aspect of having bad pavements does not perhaps present itself to the average mind with sufficient force.

As compared with other cities, Toronto's percentage of paved streets to the population shows up well. The following are the figures in a number of the leading cities:

	Per cent.
Toronto	68.5
Louisville	53.5
Buffalo	43.8
Detroit	41.8
Rochester	35.8
Jersey City	35.1
Kansas City	31.4
Milwaukee	12.6
St. Paul	11.9

But although Toronto has 54¼ per cent. of its streets paved, after deducting what is covered with cedar block there is only 10½ per cent. with anything like a durable covering.

As to sidewalks, during the year 1.148 miles of concrete and 18.03 of plank sidewalks were constructed. A small section of brick has been laid down on Gerrard St. East as an experiment. If it proves satisfactory brick will be more largely employed in the future. The mileage of plank sidewalk built has decreased each year since 1890, in which it was nearly 58 miles, showing that wood for sidewalks, as well as roadways, is rapidly going out of favor.

The asphalt pavements are kept clean on what is called the "orderly system," and it is carried on from May 1 till December. The cost is $1,236 per mile for the season. On the other streets the cost is $22.76 per mile. 59,172 loads of scrapings were removed.

The disposal of the waste of such a city is a serious matter. 103,333 loads of garbage were collected, of which 26,665 were consumed in the eastern and western crematories. A large quantity was deposited on the extension of the Esplanade on the water front. The removal of ashes and garbage from the outlying sections is now done by trolley car.

On the streets where railway tracks run the track allowance is watered by tanks mounted on trolley cars. Three such cars perform the service, for which the Railway Co. is allowed 65 cents per mile for the double track, sprinkled four times daily. The tanks hold from 2,500 to 2,800 gallons each. The company was paid for this service $1,972.42.

Mr. Ellis, the assistant engineer in charge of roadways, goes more fully into the question of brick pavements in his part of the report. In deciding on the best brick for the purpose, tests are applied for abrasion, absorption, crushing and transverse strength. Results are satisfactory as to our Canadian bricks, but the price rules them out. The lowest price quoted is $16 per 1000 for Canadian bricks, while in the United States they are laid down for $8.50 per 1000, and in some cases for less.

Mr. Ellis also gives some interesting facts as to the effect of water upon asphalt pavement, the latter sometimes rotting if the water is allowed to remain on it for any length of time, to such an extent that a knife may be inserted as far as the concrete. The cause of this is the destruction of the petroline, or bitumen, which becomes changed by oxydation into asphaltine, a substance resembling coke and of no value as a cement. Trinidad asphalt proved itself to be possessed of the greatest tensile strength. The concrete foundations of the asphalt pavements have stood the test well, in some cases having supported the roadway, under heavy traffic, where the earth had washed away below.

A somewhat curious and interesting test was applied to ascertain the effect of good roadways on the traffic. A census of travel had been taken on Yonge street in May, 1890, when it was block paved and in a very indifferent condition. The census was repeated in August, 1894, when it was asphalted. Though the number of street cars had increased from 818 to 1178 daily, the effect of which would be to drive ordinary vehicles to other streets, the average number of tons per day for each foot in width of roadway increased 24 per cent., or from 59.15 tons to 73 tons, and this notwithstanding a considerable decrease in the number of vehicles, proving that good roadways conduce in a very marked degree to economy in transport.

The report, which shows great care on the part of Mr. Keating in all that pertains to his department, contains much valuable information respecting works of construction in such a city as Toronto. The above references will give some idea as to the information it conveys.

PERSONAL.

Mr. James Snoddy, of Snoddy & Bros., plumbers, Hamilton, died last week.

Mr. Samuel Edger, secretary of the Owen Sound Portland Cement Company, died suddenly at that town on Sept. 23rd. He was 50 years of age, and an old resident.

Mr. James Herbert Marling, a talented young architect, who began his professional career in the office of Messrs. Darling & Curry, Toronto, died recently of apoplexy at Buffalo, N. Y.

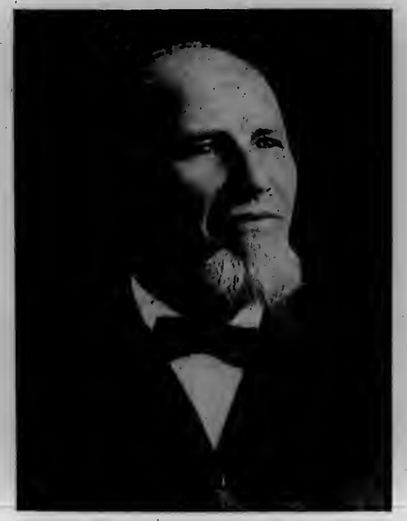
It is with much regret that we have to record the death of Mr. L. M. Bowman, who was formerly in practice as an architect at Lindsay, Ont., but latterly held a position in the Medical Health Department of Toronto.

MR. A. C. HUTCHISON, R.C.A.

ALEXANDER Cowper Hutchison, R.C.A., was born in Montreal in 1838. His father was a builder, and in company with James Morrison, erected some of the principal buildings in Montreal. Mr. Hutchison, after leaving school, entered as an apprentice to his father as stone cutter, also attending a private school during the first two years of his apprenticeship. At the age of twenty he was entrusted with the superintendency of the stone work of Christ Church Cathedral, known to be the finest example of Norman Gothic on the continent. He afterwards removed to Ottawa, where he was engaged for three or four years on the Parliament Buildings, in charge of the stone cutting. He then left the capital and returned to Montreal to take charge of drawing classes in connection with the Mechanics' Institute. He afterwards conducted the same classes in connection with the Board of Arts and Manufactures, and while engaged at this work he decided to commence practice as an architect in 1863, and soon secured a large practice. He was appointed a member of the Royal Canadian Academy by the Marquis of Lorne in 1880.

THE SIZE OF WINDOWS.

IT seems a self-evident proposition, yet one that is continually disregarded, says Aston Webb, that the size of the windows must be regulated by the size of the rooms that they are intended to light, yet nothing is more common than this example, where three windows all of the same size, "to preserve the uniformity of the elevation," as the speculative builder says, light three rooms of totally different sizes, the result being that one bedroom is fairly lighted, the other is very dark, while the dressing-room is so light that you hardly dare dress in it without the blind being drawn down, as you seem to be quite out in the open air. It is extremely difficult to lay down any law giving exact rules as to the proportion of lighting space necessary for a given room—much depends, for instance, on the position of the light. In the well-known example of the Pantheon at Rome the building is amply lighted by a small circular opening in the roof. The cubic contents of this building are given at 1,934,460 cubic feet, and the area of the circular opening only 572 feet, or about one-third the amount required had the lighting been from the side. The rule said to have been adopted by Sir William Chambers is to add the depth and height together and an eighth of the result will give the width of the window. Gwilt gives, as a general rule, 1 foot super. of light in a vertical wall to every 100 cubic feet in the room. Robert Morris says that the superficial area of the window should equal the square root of the cubical contents of the room. This, however, though no doubt approximately true, must evidently be open to large variations according to the width of the street, and especially according to the aspect and the climate, and the exact size of certain windows to suit certain shaped rooms can only be learned by observations and experience. It should also be borne in mind that certain rooms will require more lighting than others: a drawing-room more than a dining-room, a dressing-room more than a bedroom, and so on. And if this is carefully attended to (and, of course, taste and discrimination used), the elevation will at least be an honest and truthful one, and you will not find the principal window on the ground floor lighting, as is often the case, a cloak-room or a water-closet.—Carpenter and Builder.



MR. A. C. HUTCHISON, R.C.A.
President Province of Quebec Association of Architects.

MONTREAL.

(Correspondence of the ARCHITECT AND BUILDER.)

THE Canada Life Assurance Company's building, the most important building being erected in Montreal this year, is fast approaching completion. The contractors certainly deserve praise for the celerity with which they have conducted their work, affording a remarkable contrast to the slowness of completion of the unfortunate Street Railway Company's building, the structural iron of which is not even yet completed, although it was commenced long before the first named structure.

As the roof of the Canada Life Building is now being put on, it is safe I think to indulge in a few comments regarding it, as what remains to be done will not materially alter its exterior appearance. It is another proof of how an inferior design can be made to look well, and the influence it may have on the decision of unprofessional judges in competitions, when it is effectively rendered in perspective by an artist.

I hear that designs much superior in composition to the accepted design were submitted by Montreal architects in private competition, but unfortunately their authors overlooked the absolute necessity of rendering their drawings brilliantly and effectively in order to be successful under the circumstances.

In the upper storeys there are faults violating the most elementary rules of art, as, for instance, the idea of superposing two rows of columns on top of one another, with the lower row much thinner and weaker in construction, and more delicate in design than the one above.

The mouldings, although good enough in profile, are so placed and arranged as to make the building appear to have been erected in sections, and the parts present no relation to one another. The doorway is also much too low for a building of such importance. Altogether the design does not reflect any more credit on the architect than the Ontario Parliament Buildings, and it certainly does not seem to be necessary to look outside of this country for architects to design our most important buildings, if the public feels satisfied with such architecture.

An exhibition exclusively confined to artists and works of art will open in the Drill Shed on the 14th inst., for the benefit of Notre Dame hospital. Most of our painters in this province are represented, but unfortunately the architects did not see fit to avail themselves of the opportunity to bring their work before the public, which, I believe, is the only and surest way of elevating the architectural profession to the level of that of the painters in the eyes of the public. Artists across the ocean have gained their prominence by exhibiting their work constantly before the public, and by establishing permanent exhibitions; we must do likewise if we desire that art in all its branches be as honored and respected as it is in the old countries. Apart from the paintings are quite a number of water colors, but the architectural section will be represented only by "A Vestry," a school "projét" of the "Ecole des Beaux-Arts," by J. O. Marchand, who exhibits also a water color representing a racingyacht.

Messrs. Patterson & Wallace, architects and engineers, 217 St. James street, announce their intention of opening evening classes, in which students of architecture and engineering may receive instruction in drawing, mathematics and designing.

The Toronto Radiator Manufacturing Co. are said to have sold in one week in New Brunswick one hundred and ninety-five radiators.

Mr. D. L. Brown, formerly of Deseronto, Ont., has the contract for building a large school house at St. Johnsville, N. Y.

A new City Hall is being built at Quebec to cost $117,000. Sixty thousand dollars have already been expended, with only $130 for extras.

A quarryman named Fairweather has brought action against the Owen Sound Stone Co. for $10,000 damages, sustained by him when working for the Company. He was drilling out a charge when it exploded, causing the loss of his eyes. The case was tried once, but a new trial has been ordered.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE fifth annual meeting of the Province of Quebec Association of Architects was held in the city of Quebec, as announced, on the 2nd instant, at the "Chateau Frontenac." The morning session opened at 10:30 o'clock, at which were present the following members: Messrs. Chas. Baillairgé, President, in the chair; A. C. Hutchison, 1st Vice-President; A. T. Taylor, 2nd Vice-President; J. Venne, Secretary; J. Perrault, Treasurer; J. Nelson, R. Findlay, F. X. Berlinguet and J. B Bertrand, Councillors; and also S. Lesage, H. Staveley, J. F. Peachy, J. P. S. Dussalt, G. E. Tanguay, J. P. Ouellet, Geo. Bussières and D. Ouellet.

The President having taken the chair, the Secretary presented his report for the year just closing, which in substance is as follows:

SECRETARY'S REPORT.

"The Council of the Province of Quebec Association of Architects presents to the Association the following report of its transactions during the year 1894-95:—

The architectural exhibition held in connection with the last annual meeting, although quite an innovation, was attended with signal success, and we can only recommend that annual exhibitions of architecture, and perhaps in connection with arts and crafts, be held under the direction of the Association.

The most important work of the year has been the revision of the building by-laws for Montreal. A committee was appointed consisting of the following members: Messrs. A. C. Hutchison, A. T. Taylor, J. Nelson, A. Raza, J. Venne, J. Perrault, J. Z. Resther and W. E. Doran. This work has been completed and submitted to the City Council in last April, and has lately been returned to our Council for the revision of the French translation made by the civic authorities. It required over sixty meetings to complete the work, and we have good reason to believe that if these building by-laws are passed in Council, which we trust will be done, they will be an immense improvement on the previous ones, and be of great benefit to everyone concerned, and to the city.

The library is increasing slowly, and we beg to acknowledge donations from Messrs. Chas. Baillargé, A. T. Taylor and J. Venne. Twenty-five volumes have been handsomely bound during the year, and it is intended to supply each member with a catalogue of all the books in the possession of the Association within a reasonable time.

We regret to report that notwithstanding the trouble taken by the Council and the correspondence with the Government, that the question of the Schedule of Charges is not much advanced. There being two alternatives presented by the Government—first, an arbitration to decide upon the items of charges and the opportunity to make them obligatory by law, the Association paying all the expenses; the other, and that which seems to be preferred, is that the Association shall issue said schedule and force it into use, and that it shall become law by long and united usage. What arises from all this is that the profession would gain enormously by a greater unanimity of action, for the common interests of all.

We think it is only due to ourselves that frequently foreign architecture are employed in the Dominion, especially in Montreal, Toronto and Quebec. It is not too much to assert that the Canadian Associations of Architects have amongst them able and distinguished members, who can compare advantageously with those architects who are confiscating work to which Canadians are entitled. It is time time to protest against a thing which has become an abuse, causing prejudice, not only to our profession, but indirectly to the whole country at large, in that it deprives a good proportion of the population—architects, mechanics, manufacturers, etc.—of their just rights. The Federal Government has done something in the matter by levying a custom duty on plans coming from abroad, but more is required.

Your Council has presented to the Montreal City Council a petition urging the organization of an Art Standing Committee, which should examine and report on all plans, designs and models of monuments and embellishments of our public squares and avenues. The adoption of this suggestion would not entail any additional expense to the civic treasury, and could do only good to the public in fostering the art feeling, which is rather weak. The City Council, having many vexed questions on the tapis, has apparently been unable to consider the proposal as yet, but it is hoped that it will soon do so.

At the winter examinations held in Quebec in January, four candidates passed successfully—three candidates were for preliminary examinations and one for final. At the July examinations held in Montreal four candidates presented themselves, all of whom passed.

The Association now numbers 63 members—11 from Quebec, 1 from Laprairie and 51 from Montreal.

For the first time since its foundation the Association elected honorary members, viz: His Excellency the Lt.-Governor of Quebec, the Premier and the Minister of Public Works, Quebec; the Mayors of Montreal and Quebec; Sir Donald Smith, the Hon. Geo. A. Drummond and Mr. R. B. Angus.

As a trial the Council invited a competition for designs of a seal and letter heading for the Association, and offered $10 as a first premium. Several designs were received, but were not considered fully satisfactory by the Council. It may not be out of place to impress on the members of this Association the advisability of inducing the governments and municipalities to have the designing of public buildings thrown open to competition to recognized architects—members of some Association of Architects, throughout the Dominion, under well defined and dignified rules. We feel sure it would tend to improve the standing of the profession and help to create a greater national interest in architecture. It may be advisable to have a special committee to consider the matter or to refer it to the new Council for action.

During last winter the Association had its usual monthly dinners and meetings. These meetings are capable of being made very pleasant and useful by interesting members in them. Papers were read by Messrs. A. C. Hutchison, A. T. Taylor and J. Venne.

Six members have requested the aid of the Council to solve some professional difficulties, and the Council gladly gave such aid as was possible.

The possession by the Association of a portrait of Mr. Chas. Barry, hung in their rooms, has inspired Mr. J. Venne to present one of Victor Bourgeault, a well-known architect of Montreal, who died just soon enough to deprive the Association of his services. The idea has been suggested that the Association should possess the portraits or some memento of the most eminent of its deceased members, to serve as a remembrance to younger members, and more especially to their old pupils.

We must before closing acknowledge the good-will of the press and their readiness to report to the public anything that was considered of interest during the year, transacted by the Association."

The report was unanimously adopted. The report of the Treasurer was also adopted.

The President read two letters, one from the Prime Minister and one from the Minister of Public Works, expressing their regret at being unable to attend the luncheon in the evening.

The meeting then proceeded to the election of officers and Council, with the following results:—President, A. C. Hutchison; 1st Vice-President, A. T. Taylor; 2nd Vice-President, J. F. Peachy; Secretary, Jos. Venne; Treasurer, Jos. Perrault. Council: C. Baillairgé, 1st member; R. Findlay, J. Z. Resther, A. H. Lapierre, G. E. Tanguay and Theo. Danust. Messrs. A. J. Fowler and C. Chausée were selected as auditors.

The newly-elected President, Mr. A. C. Hutchison, took the chair, and a vote of thanks, proposed by Mr. H. Staveley, seconded by Mr. J. F. Peachy, was passed to the retiring officers for their efficient services to the Association.

It was resolved to have a new official list of the members of the Association printed, containing also the names of the honorary members and those of the officers and Council at the head.

On motion of Mr. J. Venne, seconded by Mr. G. E. Tanguay, it was decided that steps be at once taken for the organization of an architectural exhibition and of the allied arts, in connection with the next annual meeting, and that the Council be authorized to take action in the matter.

Moved by Mr. S. Lesage, seconded by Mr. A. T. Taylor, and resolved, that the Association take the necessary steps to have the Augé Bill amended to meet the views of the architects, or to secure its repeal.

Mr. A. T. Taylor explained what had been, and what he would propose should be done in connection with the creation of an Art Standing Committee in Montreal, to advise the City Council regarding the selection of sites for projected monuments of public character, and the erection of the same, as well as the opening of new streets and boulevards, or things of similar character, relating to the embellishment of the city. The need of such a measure is to be observed in the old city of Champlain where action is necessary to preserve the few souvenirs of its glorious past that we have left. Several of the members of Quebec touched upon the subject in the same strain, and it was agreed that action be taken in the matter.

A series of amendments to the charter and by-laws were submitted by the Quebec section for consideration by the Council during the year.

Mr. R. Findlay submitted for consideration a standard form of contract for use between proprietor and contractors; the Council will report on same at next annual meeting.

The meeting adjourned at this point till 3:30 p.m.

AFTERNOON SESSION.

At 3:30 o'clock the members again met at the "Chateau Frontenac."

A paper was read by Mr. Baillairgé on "The Bearing and Resisting Strength of Structures," (printed elsewhere in this paper) and on "Bribery and Boodling."

Mr. J. F. Peachy urged that action be taken to make the tariff of charges recognized by the public, his remarks being followed by a discussion as to whether the architect should refuse work when the superintendence of same is refused him. The majority of the members were of opinion that when the architect is deprived of the superintendence he should be free of all responsibility.

It was decided on motion of Mr. J. Venne, seconded by Mr. A. T. Taylor, that the Council consider the advisability of a proposition which would have for effect inducing the governments and municipalities giving out their work by competition on a basis guided by proper rules prepared by the Council for the purpose, and that the Council be also authorized to communicate with sister societies to discuss the matter at as early a date as possible.

It was agreed that the examiners shall receive in future $10 each for their services at each examination.

It was proposed that the Montreal and Quebec sections organize in their own locality sketching classes for the use of the members, in the interest of their advancement, and with the effect of promoting fraternity

Mr. J. Venne took a retrospective view of the position in which the profession has stood during the last ten years.

It was moved by Mr. Geo. Bussières, seconded by Mr. F. X. Berlinguet, that the meeting be adjourned, and that the next annual meeting be held in Montreal at a date to be fixed by the Council, but preferably to fall in September.

THE LUNCHEON.

The luncheon given in honor of the visitors at the Chateau Frontenac was one of the best ever given in Quebec. The ladies' ordinary was handsomely decorated for the occasion. President Baillairgé occupied the chair, having on his right Mr. Hutchison, the new president, and on his left Mr. J. M. Lemoine, ex-President of the Royal Society of Canada. Mr. Berlinguet occupied the vice-chair. About thirty sat down to the well spread tables. After the toast of the Queen had been duly honored, Mr. Hutchison proposed the health of Mr. Baillairgé and the Quebec section, to which the retiring president made a forcible reply. After urging a strong plea for the retention of the French language, and condemning any scheme for the assimilation of the currencies of nations, their methods of computing time, or their weights and measures, all of which he asserted would have a tendency to reduce the demand for labor, he went on to express regret that the Montreal visitors could not remain longer with them, in order that they might make a return for hospitalities shown by that city at a former meeting. Addressing himself specially to the Montrealers he then proceeded:

"In your legitimate pride as metropolitans, you make little of us, Quebecers,—we are at the end of the world, and it is exceptional to find in your city press more than three lines at a time devoted to the doings of the olden capital. Our turn will come, and may be it is close at hand. If Quebec to-day is attractive to tourists only, due to its drives, its points of view, its terraces, the surrounding landscape, its unrivalled port, its carnivals of ice and fire—if commerce, business, have for 30 years past eschewed, abandoned our port, and rendered us disinterested to the extent of cutting our own throats to favor Montreal, to make it an ocean port, the head waters of ocean navigation, by spending our millions in deepening Lake St. Peter—nature is about to force you to return to your whilom loves—for apart from the Chicago canal, which will lower the St. Lawrence between Quebec and Montreal and up to Lake Ontario by fully 5 per cent.—and I was the first to call the attention of our people to this unwarranted, unauthorized international spoliation—apart, I say, from the tapping of our waters to draw them off towards the Gulf of Mexico—there are other schemes upon the tapis (the Deep Water Convention now being held at Cleveland is proof to what I say): canals, one or more, which will run another 10 per cent., another 20 of our noble river, from the great lakes towards the Atlantic by the Mississippi and the Hudson; and this handiwork of man is already being added to by natural causes; our waters as you see on all hands are being lowered, shallowed. Man is and has been the direful agent in bringing this about—he has, under our Government's most unwise policy of timber limits, with no reserve cut down our forests, left bare the ground, the country; instead of the wise policy of France and of the Mother Country, to cause the forest to persist, by sparing every tree less than twelve inches in diameter—he has swept the surface clean, and where the axe has been impotent to do the unhallowed work, man has abetted fire in its devouring greed to lay waste our God-given patrimony of wealth and plenty. Well, see you how it is? You are astonished nowadays at the greater frequency of cyclonic winds, and storms and inundations. No wonder, though this should be so, when the winter's snow, which formerly, protected from the sun's rays by the foliage, melted and ran off slowly into rills and rivulets and rivers; now melts, as it were, all at a bound of sunshine and rushes along in its maddened devastating course, carrying away mills and bridges and whole villages, and increasing our waters to a depth unknown before in spring; while per contra, the rains of summer which, when the lands were wooded, ran from them slowly and measuredly, as in the wisdom of God it had been willed they should, reaching in time our lakes and rivers through their tributaries, these waters now are sucked up by the sun, before they reach their destination, or on the way, absorbed by the dried up, parched beds of the unprotected rivers; and hence in every way the St. Lawrence is gradually growing less; and gentlemen you will have to come to us to get deep water; for, thank God, the Ocean is still there, and the moon far enough away from man in his destructive rage, and though he may bring it within a stones throw by the telescope, to be not able to interfere with it, much less the sun in giving us the tides which, if they connot reach to Montreal, will continue to Quebec, and make this the head of ocean navigation, the true ocean port for steamers of draught too great for shallowed Lake St. Peter. Now think ye, gentlemen, that we dote on these possibilities of the near future; think ye that we tell you this in proud retaliation of the past? Not so, by any means, we look forward to it with pleasure, to do you good, not harm; to help you find a remunerative field for your unexpended and ever increasing millions. Come to us, we are ready to receive you with open arms; we have for some years past been endeavoring to put on the new man—not the new woman with her unfeminine, unloveable prerogatives—we have a new parliament, a new post-office, new Courts of Justice, new hospitals, new hotels: the Florence, Clarendon, Victoria, and Chateau Frontenac, adequate to all tastes, all purses, all aspirations—we have a new city hall by our friends Tanguay and Vallée and a new Mayor full of youth, talent and initiative enterprise. He saw as I pointed out that the westward cry must be abandoned, and that instead of St. Sauveur, St. Roch or Mount Pleasant, the walled portion of the city was geographically the most central for Quebec's future, and now the extension of the city is going forward towards Montmorency, between which and the city proper there is a stretch of six or seven miles of unimproved territory. This is where we await your Montreal millionares, and we will not be jealous if they bring you down with them to build them up and tell them how to make available ground of the Beauport foreshore by building return tramways to the close by heights and quarries, where lie ready, centuries of quarry refuse which would reach its destination by gravitation only and the loaded cars return the empty ones. Ground can be made here for almost nothing. Gentlemen, this is no idle theory of mine—already some of your own people are here at work. Messrs. Whitehead & Co. have erected vast cotton and woollen factories at the Montmorency, and one of yourselves, Walbank, is the architect. The thriving village of Hedlyville is advancing to meet La Canardière and Richardson's factories. Messrs. Parent and Bedard, both ex-Mayors of the large and thriving parish of Beauport, have for the fourth time in nearly three centuries rebuilt the as often fired brewery of Racey memory and celebrity, the water from the river Beauport being pronounced by analysts amongst the very best in America for the required purpose. This factory of beer and lager will do much good in weaning men from their whiskeying propensities, it will render them stern and strong and healthy, and fit them for your purposes of building you up docks, elevators, refrigerators for your trans-atlantic business, while the want of water at Montreal may seriously impair the utility of your Hochelaga and other schemes. Once more then, gentlemen, let us say, come to us and we will receive you for our mutual benefit with welcome and outstretched arms.

A number of other toasts were given and responded to, after which the very pleasant gathering terminated.

Mr. S. G. Beckett, architect, 15 Toronto street, Toronto, would be pleased to receive samples of materials.

STUDENTS' DEPARTMENT.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION FOR A CITY STORE FRONT.

THE competitions previously held under the auspices of the CANADIAN ARCHITECT AND BUILDER were especially designed to test the student's ability to properly design and plan various kinds of buildings. The object of the present competition is to test his knowledge of construction. It is to be feared that many students who have the ability to make pleasing sketches, are less proficient as regards a knowledge of the character of materials and the proper method of employing them in building construction.

With the object, as stated, of bringing to the proof the knowledge of this character which they may possess, students of architecture residing within the Dominion of Canada are invited to submit competitive designs for a city front for a retail jewelry store on a leading street.

The building is to have a frontage of 35 feet, and to be 5 storeys in height, with a retail store on ground floor, and a side entrance affording access to upper storeys, which are intended to be used for office purposes.

Drawings must be made with PEN and BLACK INK on WHITE cardboard, drawing paper or tracing cloth. On one sheet is required an elevation and plans of ground and first floors of the building, drawn to ⅛ scale; on another sheet, working details of ground floor, drawn to ¾ scale, and sufficiently coarse to admit of reduction to 15 x 10 inches in size.

Each competitor is required to mark his drawings with his nom de plume only, and to forward his drawings, so marked, post-paid, addressed to the editor of THE CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto, at a sufficiently early date to enable them to reach their destination before 5 o'clock p.m. on the 3rd day of December next, at which time the competition will close.

Each competitor must forward with his drawings a sealed envelope, containing his nom de plume as it appears on his drawings, together with his full name and address, and a brief description of his design, stating the materials proposed to be employed in its erection.

The first premium in this competition is $10.00, the second $5.00, and the third one year's subscription to the CANADIAN ARCHITECT AND BUILDER.

The competition will be decided by a Committee of three members of the Ontario Association of Architects.

The CANADIAN ARCHITECT AND BUILDER reserves the right to publish any of the drawings submitted. All drawings will be returned to their authors within a reasonable time after the competition is decided.

Competitors are urged to pay strict regard to the above stated conditions. Drawings which do not conform to the conditions will not be considered.

DRILLING GLASS.

GLASS can be drilled with a common drill, but the safest method is to use a common broach drill. No spear-pointed drill can be tempered hard enough not to break. The broach can be either used as a drill with a bow or by the hand. It should be selected of such a bore that it will make a hole of the required size, about 1 in. from the end. It should be broken off short with a pair of pliers, at about 1½ in., and when the sharp edges are blunted by drilling, a fresh end should be made by breaking off ⅛ in., and so on, until the hole is bored. It is always desirable to drill from both sides, as it prevents the glass from breaking. Drill lightly and lubricate with spirits of turpentine and oil of lavender, or a little camphor instead of a little oil of lavender. Holes may be drilled through plate glass with a flat-ended copper drill and coarse emery and water. The end of the drill will gradually wear round, when it must be reflattened, or it will not hold the emery. The best means of drilling holes in glass is by using a splinter of a diamond. A brass drill is made to fit the drill stock, sawn down a little way with a notched knife to allow the splinter to fit tight, and the splinter fixed in the split wire with hot shellac or sealing wax. The drill is to be used quite dry and with care. If the hole to be drilled is wanted larger than the tool, drill a number of small holes close together to form a circle as large as the holes required: then join the holes with a small file.

USEFUL HINTS.

The French and English papers, which are now used, come without friezes, which is a distinct gain in the matter of height, while it possibly detracts from the breadth of a room.

It is with color as with every form of art, it can only be handled by those who delight in it. Bright, pure colors are the basis of richness and purity of hue, but their successful use demands a delicate handling of subordinate hues and tints.

Strong liquid ammonia mixed with an equal bulk of turpentine may be used with advantage in removing old paint. It is unnecessary to apply anything additional to the surface of the wood for repainting, as is the case when lye is employed.

In experiments conducted by the German government on steel and iron girders, the soft steel girder proved twenty-two per cent. stronger than the iron girder. The strength of steel girders appeared to be about the same for the flanges, if made alike in sections.

Paper that is difficult to remove, even by the application of hot water, should be given a coat of hot paste. The paste assists in preventing the water from running off the surface; it will soon soak through. In the case of varnished papers it is necessary to score the surface with a chisel.

Blue walls, or those with blue lights in the color, make a room seem large, as blue recedes from the eye. This color must be skilfully used, however, for if too pale it is cold and unsympathetic; if crude it takes all color from the complexion of its mistress. The shades of blue that wear the best on the nerves and senses are toned with grey, yellow or pink.

The wall papers shown in New York this season are said to be much darker, and, like everything else, show elaborate floral decorations. Even a black surface is shown, with garlands or festoons of gay flowers. Maroon is very effectively used; it forms such a pleasant background for pictures. Artists claim that the use of the very light papers of the past few years has detracted from artistic effects, and a return to more pronounced colors will greatly increase the richness and beauty of interior decorations.

It is not generally known that the word "Anaglypta" has a classical origin. To the ancient Greeks the "glypta" meant every variety of engraved wood, until at a later date cameo cutting became popular among them, and it became necessary to add to their vocabulary in order to define the new art. "Cameo" was, of course, raised work, as distinct from "intaglio" or incised cutting, and the "ana," meaning raised, was therefore added as a prefix to the preceding term, in order to express this meaning. Subsequently the word "Anaglypta" came into general use to describe every kind of bas-relief.

A cement for wet places, like aquariums, is made of litharge, fine white sand and plaster of Paris (calcined plaster), each 1 part, and resin ½ part. The ingredients should be thoroughly mixed and made into a paste with boiled linseed oil to which a drier has been added. It should then be thoroughly mixed by beating and allowed to stand four or five hours before being used. It should not stand much longer than this, as the cement becomes worthless after it has been mixed twelve or fifteen hours. Glass may be cemented to wood or metal with this preparation, and it will resist the action of both fresh and salt water.

The ancients, according to Palladio, first squared and worked the sides of the stones which were to be placed one upon the other, leaving the other sides rough. The edges of the stones, being beyond the square, were then smoothed. But the roses between the modillions and similar ornaments of the cornice, which could not commodiously be done when the stones were fixed, were carved upon the ground. If the works were very great, as the Arena of Verona, the Amphitheatre of Pola and other buildings, to save expense and time, they worked only the imposts of the arches, capitals and cornices; the rest they left rough. But in temples and other buildings which required nice work, they spared no pains in the execution, glazing and smoothing even the very flutes of the columns and polishing them carefully.

Chimney felling is an art little known. Mr. Smith, a Lancashire steeplejack, recently dispnsed of his forty-sixth tall chimney with ease and despatch, thereby forstalling the laws of bricks and mortar, which threatened a descent without Mr. Smith's assistance. It seems to be the easiest thing in the world. The stack has lumps of it cut out at the base, one side being left alone, and props are then introduced into the gaps, shavings, paraffin, and tar being liberally added, as the cookery books have it. When all is ready, a match is applied, the smoke of its own burning rushes up the chimney, and in a few minutes the whole thing collapses. The chimney, which was 135 ft. high, came down twenty-five minutes after the match was applied in the most docile fashion, and, what is more, it disposed its remains exactly as Mr. Smith, who stood close by, had arranged.

A solution of 50 parts of commercial alizarin in 1000 parts of water, to which a solution of ammonia has been added, drop by drop, until a perceptible ammonia odor is developed, will give to fir and oak a yellow-brown color, and to maple a red-brown. If the wood is then treated with a one per cent. aqueous barim chloride solution, the first named becomes brown, and the latter a dark brown. If calcium chloride be used instead of barium chloride, the fir becomes brown, the oak red-brown, and the maple a dark brown. If a two per cent. aqueous solution of magnesium sulphate be used, the fir and oak become dark brown, and the maple a dark violet-brown. Alum and aluminum sulphate produce on fir a high red, and on oak and maple a blood-red. Chrome alum colors maple and fir reddish-brown, and oak Havana brown. Manganese sulphate renders fir and maple a dark violet-brown, and oak a dark walnut brown.

THE LATE PETER THOMSON.

WE give in this issue a capital likeness of the late Peter Thomson, who, at the time of his death, occupied the position of superintendent of Algonquin Park, the reservation set apart in the northern part of the province, by the Ontario Act of 1893, as a preserve, to be kept in its natural state for the use of the people. Previous to entering the employ of the government, Mr. Thomson was in business as a building contractor. He learned the trade of a carpenter in his youth, and after living in the United States and Hamilton for a time, settled at Brussels, in the county of Huron, where he lived for some 35 years. While there he erected many buildings in the neighborhood. Removing to Toronto some years ago, he continued in the same line, the construction of the Arlington Hotel being one of his largest contracts. Since 1893 he was employed by the government on colonization road work, superintending the building of some of their bridges, and was always considered a careful and competent man for the work. In July 1893, he was appointed chief ranger of the Algonquin Park, and in the following year became its first superintendent. He died at headquarters in the Park, on 5th September, of paralysis, at the age of 61.

THE LATE PETER THOMPSON.

A LEGAL VIEW OF AN ARCHITECTS' RESPONSIBILITY.

A CASE of more than ordinary interest to architects was recently argued before a judge in the town of ——— Ontario.

An architect, a member of the Ontario Association of Architects, received instructions to prepare plans and specifications and obtain tenders for the erection of an hotel building in a country village. The owner, after the plans and specifications had been explained to him carefully, accepted tenders and instructed the architect to proceed with the work, and supervise it.

The architect being unable to collect his commission and having waited until the last day, caused a lien to be registered against the building for the balance of the commission and later, failing, still to get his money, entered suit under power of the lien for the balance due him.

The defense set up that as there was a defect in the building they were entitled to damages from the architect therefor.

There had been a building on the site which had been destroyed by fire and it was decided to re-use the old foundation walls as far as possible, the owner undertaking to clear away all debris and leave the walls clear for examination and work. This was all clearly set forth and shown in the plans and specifications, the latter stating that it was to be assumed that the foundation walls were in good condition and would only require to be pointed up. The owner urged upon the architect the necessity of getting the building ready for occupation with the utmost dispatch.

The defect referred to was a slight sinking of the floor in the centre of the building and showing in one of the principal rooms and the main hall, a condition which might have been brought about by the frost (the building was put up in winter) leaving the foundation wall, or by the wall plate under the partition never having been set level, or by the joists themselves never having been levelled properly. The amount that the floor was out of level was one thirteenth of an inch to the foot one way and about one sixth of an inch across. No plaster was cracked, no doors bound and no inconvenience of any sort was occasioned except that the apparent deficiency in the maple floor offended the refined eye of the defence. They also claimed that one riser of the steps from the street to the building was out of plumb, another serious defect.

The defence secured the services of an architect who swore to the levels which he had taken at the building and also to the riser being out of plumb, but could not say just how much.

A member of the Ontario Association of Architects was called by the plaintiff. He swore that he had visited the building and inspected it. He considered that the plans and specifications had been unusually well carried out for that class of work and that the deflection of the floor was scarcely sufficient to be called a defect in a country job.

The owner admitted in cross examination that he had got a first class job, but claimed that it would cost him so much to rectify the error and that the architect should allow him for it.

Two practical builders swore they had been in the building and never noticed the deflection. The mason and carpenter each swore that they had carefully levelled that part of the walls and floor and admitted that if there was anything wrong they were to blame, and finally the architect swore that he had levelled the ground floor joist himself when they were laid on and left them true and level. As for the riser—well there were many ways in which it might have got out of plumb after six months use.

The judge in summing up the evidence said that undoubtedly there was a defect in the building and he would give judgment for the plaintiff with costs, less a sum which it had been shown would be sufficient to raise the floor and make it level (?). He did not refer to the riser.

Virtually he held that the architect was responsible and should pay for a defect which was admitted by the contractors to be their fault.

Those who are not properly informed as to the duties of an architect assume that he should be held responsible for any and every defect in a building, notwithstanding that he may have little or no say in the choice of the contractor. It is utterly impossible for an architect to obtain perfect work in these days of keen competition, more especially when the proprietors refuse to pay for perfect or even passable work. In this instance the class of work was an inferior grade and the defect was a matter of no moment. An architect should be held responsible for defective work when it is self evident that he could not prevent same except at such an undue loss of time on his part as would make it advisable for him to pay the proprietor to take his work elsewhere. A commission of 5% on the total cost of the work will not permit of an architect remaining on a building and acting the part of foreman for all the trades thereon employed.

The question now arises as to whether this architect should not claim and be awarded damages against his lawyer because he had not brought out sufficient evidence at the trial to secure for his client a complete victory.

The cases are analagous and if such a case were tried before the same judge, in the same court under similar circumstances, surely he would have to give similar judgment.

It would be interesting to know if an architect had ever before been held responsible or made to pay for a defect in a building after the contractors had been paid in full and the building taken off his hands by the owner.

The Egyptian decorator was a priest, or a priest's servant, and his business became hereditary. The Indian decorator was a servant of the family, and his situation also frequently descended to his son. In China and Japan the decorators were in the earlier times priests working from a religious motive. With the Greeks, too, religion fostered the arts: so in the mediæval ages. It was not till the Renaissance, when the invention of printing led to the spread of knowledge, that individual excellences brought the individual out from obscurity, and we have styles of decoration as diversified as the people who produced them. In Japan the decorator originally worked with the utmost patience and loving care to illustrate his religion; thus decoration came to be practiced by princes and persons belonging to great families. At last it came down to the art workman, who, in Japan, with no competition, no machinery and but few wants, made everything he produced instinct with beauty.—Work.

ON THE BEARING AND RESISTING STRENGTH OF STRUCTURES AND THAT OF THEIR COMPONENT PARTS AND MATERIALS.*

By Chas Baillairge.

Many failures have, of late years, occurred of various buildings or of portions thereof, due to faulty, hasty or unmatured construction, and hardly a day passes but what the newspapers chronicle some catastrophe, some collapse of a building just finished, or even before it is finished, as evidently incapable of supporting its own weight, let alone that of the living or dead weight, or both, which it should have been made strong enough to bear. Such failures have occurred, in Canadian as well as in United States and European cities, and in most cases with the loss of one or more lives.

Much more attention should also be bestowed on the erection of temporary stages or platforms in cases of reviews, races, athletic and other performances; but with this, which is of secondary importance, and where sufficient solidity of construction can be arrived at without subjecting the structure to abstruse calculations, or to anything more than giving it due consideration, we do not intend to deal.

The engineering of architecture must be more closely attended to by architects, as the engineer will take the matter out of the architect's hands; and that would be a slur to the profession which should and must be avoided. Not that engineering structures in this respect are always scathless, for there are also many cases on record of the failure of a bridge, a subaqueous tunnel or other such structure, but these are comparatively few and far between, while architectural mishaps are of far more frequent occurrence.

Our friend Mortimer, publisher of the Canadian Architect and Builder, rehearses the fact at page 112 of his "Hand-Book" that the ultimate strength of a wall or pier of good hard burnt bricks in good lime mortar, as given by Kidder, of Boston, is 1,500 lbs. to the square inch, say 216,000 lbs. or 108 tons to the square foot—while the use of Portland cement with the best hard burned bricks, increases the resistance to 2,500 lbs. to the inch, or 180 tons to the foot—though previous competent authorities have given results from 30 to 50 per cent. less than these. Assuming therefore the known weights of mortar and cement brickwork per cubic foot, it would require a wall or pier to be from 1,600 to 2,700 feet high to crush the bottom bricks; and since such extreme cases have not and can never occur in practice, and that walls do fall notwithstanding, which do not even reach to one-tenth of the height, it is evident that not only must the mere crushing elements be made factors of, but other important data of length, breadth, height and thickness, and these are the considerations which apparently, from seldom or ever entering a builder's mind or that of a would-be architect, lead to the repeated accidents and fatalities of every day occurrence in some part or other of the civilized world.

Now, this knowledge is at hand and to be found at page 109 of the "Canadian Contractor's Hand-Book," which gives the proper thickness of brick walls for dwelling houses up to 100 ft. in height; though, of course, there are other considerations to be dealt with, such as the supporting, staying or stiffening ministry of the successive tiers of joists or beams, whether of wood or iron, which enter into the structural arrangements of the building, important among which is the necessity that beams which would be otherwise of too lengthy a span and therefore liable to dangerous oscillation and destructive leverage on the walls, be supported at intermediate points by other walls and piers restorative of the necessary stiffness to insure stability.

When, however, a structure becomes very high and heavy, as with the present tall buildings like the Philadelphia city hall, the New York World (22 story) printing establishment, the American Surety building (307 ft. high above the sidewalk and may be 20 to 30 ft. below that level), the Manhatten and others in New York and Chicago, and a beginning in that way in Montreal and other cities—it then behoves the architect charged with designing the structure to take crushing weights into consideration, and especially when the buildings are designed to be fire proof; and that, to that end, the floors are beamed with iron joists, brick or terra cotta archings or vaultings between, and concrete haunch or spandril filling with tile or cement floors to boot; and which, including weight of superincumbent partition walls and columns of the floor or story next above or resting on and supported by the columns next below, and with 90 lbs live and dead weight additional for persons, furniture and fittings of all kinds, may be taken at 300 lbs. per foot sup. of floor space.

To this end, I have thought on retiring from the presidency of the Association of Architects of the Province of Quebec, it might not be amiss for me to tabulate, as I have done herein-below; and for the ordinary spans or intercommunications of 10x10 ft. centres, 10x12 ft. centres, and 20x20 ft. centres, or for floor spaces of 100, 200 and 400 ft. area respectively, and for each and every successive story of a building as I have done, the sectional area in square inches of steel built columns to support the weights, the thickness of their component plates, the weights in tons to be supported and in the last three vertical columns of the table the corresponding prices at a uniform rate of 5 cents to the pound—while if 6, 7 or 8 or ten cents to the pound or even more or less are to be allowed, as fluctuating with the market value of the metal to be put in place at any time, then can the whole, the total cost be added to or deducted from by a known percentage of 20 for one cent additional, 40% for 2 cents, 50% for 2½, 60% for 3, and 100% for 5, and so on; for in addition to the possible price of iron or steel being greater or less, there is also to be estimated the average cost of first raising the weights to the average height of the structure, which, should the stories average 12 ft. in height, would be 120 ft. for a 20 story building, 60 ft. for a 10 story building, and so on of other average heights.

To simplify and speed me in the computation of the table, I have assumed one unique type of section or build of the supporting column of 12"x12" from out to out with central web, the whole put together with valley, or angle or flange iron, riveted together as shown in diagram in the margin or herein below; but, as with this form and size of section, the plates for a 20 story structure reach to two inches in thickness or more, it is evident how by increasing the size of column to two feet square instead of one, or four feet bearing area (2' x 2') the plates would thus be reduced to ½ an inch in thickness instead of 2" or to a thickness of one inch, by doubling the bearing area of column or making it 1.'42 x 1.'42=2.0164 square feet, or simply 1.'4 x 1.'4=1.96 square feet, which is near enough for all practical purposes, when the factor of safety, as in this case, is already on the safe side.

Or again, instead of the posts or columns being exactly square, it might suit better to double the dimension one way, leaving the other as it is: for instance, 1 ft. x 2 ft., or 12 in. x 24 in. for inch plates instead of 2 in., or for ½ in. plates 1 ft. 6 in. (18 inches) x 2 ft. 8 in. (32 inches,) or any other form of section to suit, as round or oval, etc.

The tabular statement does not give weight of column, but taking item No. 1, the sectional area in square inches is given as 10 square inches and the thickness of plates at 0.1 in. (one-tenth of an inch). Now, how this is arrived at will be immediately seen on reference to the diagram, for, as evident, there are four plates each 12 in. wide, one web plate 6 inches, and 8 valleys of 3 in. x 3 in. or 6 in. in developed breadth, together 102 or say 100 inches in total horizontal girth. Now 100 in. x 0.1 in. = 10 in. or 5/6 of a square foot. of inch thick iron per lineal foot of column. Again, wrought iron being 480 lbs. to the cubic foot, gives 40 lbs. to the square foot of inch thick space, or for 5/6 of a square foot 33⅓ lbs. per lineal foot of column, and this into 14, the assumed height or length of column, gives 467 lbs., or with rivets say 480 lbs., which at 5 cents the pound, give the figures $24.00 in the corresponding column opposite item No. 1 of table.

Or it may be plainer or easier to say that 102 inches total horizontal girth of plate and valley iron in the section, gives (dividing by 12) 8½ superficial ft. of iron or steel plate 1/10 in. thick, and as iron 0.1 in. thick = 4 lbs., therefore does the 8½ ft. give as before 34 lbs., or neglecting the 2 odd inches (more than allowed for in not deducting the twice computed angles of the valley irons) 33⅓ pounds.

Now this unit of weight and cost of column opposite item 1 for a 20 ft. x 20 ft. space or 400 ft. area, which at 300 lbs. a foot of floor surface gives the 60 tons in the sixth column, must of course be half of itself when the supported area is only 20 ft. x 10 ft., and ½ of this last or ¼ of itself, where the supported area is only 10x10 or 100 sup. feet, and so is also the thickness of iron reduced to 0.05 in. and to 0.025 in. respectively, and the corresponding prices in the two last columns to $12.00 and $6.00 respectively.

Again, as herein before stated, as to how to increase the area of bearing surface of column to reduce thickness of plates to inch or half inch—so in a converse manner may the 12 in. x 12 in. columns of the upper floors be reduced to half their size, or to 6 in. x 6 in., instead of 0.1 in., or to 6 in. x 12 in., and the plates increased to 0.1 in. for column 7 of table instead of 0.05 in., and to 0.05 in. instead of 0.025 in. for column 10 of table.

It will likely be evident, or at any rate there can be no harm in remarking, that in computing by this table for a building of any number of stories the process must be from above downwards, and can not be from below upwards, except in the case the table is made to suit, to wit: A building 20 stories high, for the upper story supporting only the roof will remain invariable, and if the total height of structure were, for instance, only nine stories, then would item No. 9 represent the data for the first tier or story above street level with Nos. 10 and 11 for basement and sub-basement.

I herewith also give a table for a corresponding building with brick piers instead of iron, where the cost of brick work in cement at as high as $20 00 per mil (taking its crushing strength at 180 tons to the square foot, with a factor of safety of 6, or assuming the square foot of pier as capable only of supporting 30 tons) just comes to half the corresponding prices of iron or steel at 5 cents a pound, or would be a quarter of the cost thereof if at 10 cents the pound. Such piers as those given of a sectional area of only one square foot opposite item No. 1 of table, column No. 7, and of 1½ square foot on the same line of column No. 10 (the latter especially not being possible in practice), it would of course be necessary with such weights to bear, to have made of steel or iron or corresponding strength, or as indicated at columns 7 and 10 of table No. 1—and it might moreover be prudent to do the same with the smaller or more delicate piers of items Nos. 2 and 3, or if not, to continue up these piers of undiminished size from items Nos. 3 or 4, or even 5 according to circumstances—as, though theoretically capable of bearing the weight, such light brick structures would be dangerous of overthrowal by a comparatively slight side thrust.

On the other hand, as seen by the table, the corresponding sizes for the lower floors or stories become so great, that they would be altogether inadmissible on account of the space thereby lost to useful purposes; and the object of this second table is rather to show the inadmissibility altogether of brick work in the premises, as even though the cost of structure might be thereby reduced, it would be false economy to lose so much useful space, to say nothing of the very awkward appearance of such a structure; and again, with most companies requiring such structures and with no want of funds to provide them, cost is generally a secondary consideration—each insurance or other company or trust or syndicate striving to outvie its neighbors in magnificence and cost of structure. And this emulation exists even among individuals, as I am proof to, when on one of my visits to New York on inspection of an ordinary 25 ft. brown stone front dwelling house on Fourth avenue, which with its marble stairs and skirtings, etc., had cost its proprietor $100,000, the proprietor of the neighboring lot with an old-fashioned brick house thereon, seriously asked his architect if he could not build him one which would cost more money, to which, of course, the architect immediately assented. We don't have such chances as that in poor old Quebec, where we are on the contrary always met with the demand to do things for half their value.

The construction of these high buildings is rendered possible only by the use of steel frame or skeleton work. The older type of buildings, whether of stone, brick or iron, depended for its strength upon its walls. The modern tall office building has a steel frame. This carries merely the whole weight, and the walls, solid and massive as they may appear, do not support the structure, but simply fill the interstices. It is startling to think of the entire superstructure of a 20 story building resting on some 30 or 40 columns; yet, without this modern development, without the use of steel, the walls would have to be so thick at the lower stories that there would be no room left for offices. The steel represents the osseous structure of the animal, while the enveloping masonry surrounding the same exemplifies the flesh or meat, which saves the skeleton from the extremes of temperature and thus from the exertion of contractive and expansive forces which might otherwise jeopardize the structure.

It becomes important also, if not imperative, as a factor in the computation of the necessary bearing areas of the foundations supporting structures of the kind, to consider as data for comparison, what weights are permissible to the square foot of underlying piles or piers, or of the natural soil when of a nature to subserve the purpose—some of the columns bearing weights varying between 600 and 1,300 tons in the American Surety building already alluded to.

The inequality of the weights borne by a square foot of the foundations of the buildings mentioned in table III may appear striking at first sight, but they are due to the weights being distributed over greater or lesser areas of the supporting soil. For instance, in table I, item No. 21, we have 1,260 tons supported by a steel column a foot square, while in the American Surety building some of the columns are loaded to 1,280 tons, but these

*Paper read before the Province of Quebec Association of Architects at their annual meeting at Quebec, October 2nd, 1895.

are about 2 feet square, or of an area of 4 feet, which at once reduces the pressure per super foot to 320 tons; and if the foundation piers bearing these and transmitting their weight to the solid rock below were only 10 feet square, or 100 feet area, the weight per foot reduces to a little less than 13 tons; while if the pier be made 14 feet square, its area is doubled and the 13 tons reduced to 6½ or 6 as set forth in table. As stated last year by the writer in his paper on the foundations of heavy structures, the question is not so much the number of tons which 1 foot of bearing surface is loaded with, as that (not to prevent settlement which is inevitable, but to render it equal throughout) the bearing surfaces of foundation be equally loaded—the whole front of the new Joliette church having to be rebuilt at a cost of some $10,000 because, while the side walls bear with only 2 tons weight or pressure on their footings, the tower and front wall bearing on their footings with a pressure of 4 tons or double the weight. The tower, when I saw it three years ago, had torn itself and the portal away from the aisle walls and sank to a depth of more than 11 inches below the latter, completely dislocating and destroying this portion of the structure and requiring its entire demolition and reconstruction.

One would think at first sight—that is, the popular idea may be and is—that a solid structure or one of solid masonry like the pyramids, is that which with the same height and weight of material, bears heaviest on its foundations, but such is by no means the case, the greatest pressure being generally borne by the piers of a domed church or other structure, each pier being loaded, in addition to its own weight and portion of dome bearing directly on it, with one quarter of such portions of the vaulted or arched structures as correspond to the archways or openings of the aisle and transept, and which, as in the case of St. Peters of Rome, must be close upon 35 tons to every square foot of the supporting pier.

Nor is there anything extraordinary even in this figure, as I believe some of the so-called chapter houses of churches in England support weights even in excess of this, where one-half the weight of the domed or stone groined vaulted ceiling is borne by a single marble column of only a few inches in diameter at the centre of the structure. Another example of heavy weights borne by a small base is where a 100 ton gun, for instance, or ponderous piece of machinery supported by the jib or boom of a derrick, is thus transferred to and supported by the derrick mast or upright post, which, if say of a 14 inches square piece of timber, giving a sectional area of only 2 feet or less, loads the bearer with a weight of 50 tons, together with the additional weight of the derrick itself, representative also the derrick post or mast of a column in any building and the boom or jib with its suspended weight, of the 100, 200 or 400 ft. area of supported flooring with column at 10'-10' centre, 10'-20' or 20'-20' distance apart, or (at 300 lbs. the ft.), 15 30, and 60 tons respectively.

Now, even 60 tons, or 160 to a square foot of a solid stone pier, not monolithic, but made up of monolithic or large and closely fitting cut stones, is in no way excessive, since good cement brick work will bear 180 tons, while good ordinary cement stone masonry will bear twice that weight or 360 tons, and up to twice that figure or even more; for the experiments made on a brick pier, for instance, are so made on one of only a foot square, and those on piers of masonry have also been made on comparatively small based areas, where there was no lateral support or resistance round about to prevent the giving away by lateral failure.

Again, the strength of piers of stone masonry may be made to approximate almost indefinitely to that of the stone itself, as given in the ensuing table IV, where crushing powers are recorded of as much as 1,200 tons and over to the square foot, or rather equivalent thereto, and which would be much greater if it were possible, which it practically is not, to test a foot of stone in the same manner instead of only a small cube of an inch or an inch and a half square and then reduced to inch; for the small cube, as would also be the case with a piece of a larger one, must necessarily fail first at the angles or corners and along the edges, while if the same weight or pressure were applied to an equal area at the centre of a 12 inch stone or more, it is evident it would produce no effect, the tendency to crush and crack being counteracted by the lateral support given to the central portion by the strength and resistance of the outlying margin of the material experimented on.

And not only would the crushing weight of masonry approximate to that of the solid stone, as determined by experiments upon the tiny cubes thus treated, but there can be no doubt of it, go far beyond such data and indefinitely so, for even if the nucleus of the earth be fluid, and the crust only 40 miles in thickness as geologists pretend, and if the crust be stone and even if no heavier than granite, then would we have on each square foot of the inner rim or area of base thereof, more than 200,000 cubic feet of stone, and at 160 lbs. to the foot, a crushing pressure of 16,000 tons, but which, were it ten times greater, a hundred or a thousand times, could never crush the stone, supported on all sides as is every foot of the crust or solid component masonry thereof by the equally resisting power of every other foot bemming it in on all sides and preventing the possibility of its ceding or giving away to any other force than the disrupting seismic action of the interior.

I must, gentlemen, insist again, as I did in my last year's paper on "Foundations in Deep and Unreliable Soils," on the necessity of a consideration, not only of absolute, but of comparative stresses to secure uniformity or prevent inequality of settlement—that being the all-important desideratum.

The very term "the engineering portion of architecture," or rather the necessity for such a term, is a slur on the profession, an insult so to say to any architect who pretends he knows his business; for if we are to call in the superior scientific acquisitions of the engineer in dealing with the foundations, then, a fortiori, shall we have to do so in dealing with the stresses, much more difficult of calculation, of a domed structure, for instance; and surely it never shall be said that the architect has come down from the high pedestal on which, long before the days of engineering science, stood and stand to this day the Bramantes and the Michael Angelos, the Perraults and the Mansards, the Jones (Inigo) and the Wrens. Well may we hide our heads if ever that should come to pass, for, without the aid of the engineer, we architects can do as they do, and thus make themselves appear more scientific than they really are. Can *we* not also call in the aid of mathematics, and direct a professor or expert at that science to calculate a stress of any kind, whether of direct weight, lateral pressure, or resistance to overthrowal by a cyclonic wind or pressure.

If the profession would have that standing which it had of yore and still lays claim to in other countries, I must tell you, and I do so squarely—we must hear of no more such failures as those at Nicolet, St. Bastile, Joliet, Cornwall and elsewhere. Nor should there be any more roof failures, whether from rain saturated snow or due to faulty construction. Montreal must not in respect to falling buildings emulate New York, where such accidents are the order of the day, which are to the disgrace of the profession.

But though or while giving you a table for calculating the component weights and strengths and costs of a building up to 20 storeys in height, I hope none of you will ever be called on to design such an ungainly, unaesthetic piece of construction, and at any rate that you will set your face against anything of the kind elsewhere than in but a purely manufacturing or suburban district, and not where its presence would mar the landscape and architectural effect of surrounding common sense structures; and I here transcribe a most pertinent article from the "London Surveyor." It reads as follows:

"A *proposal* of a monstrous "sky-scraper" apartment house recently erected at Washington, the American Architectural Record has a deservedly severe article on "Architectural Aberrations," and puts forward the plea that city authorities should be allowed to veto plans for new buildings, not only if they sin against sanitary laws, but if they outrage the canons of art. As it pertinently remarks, "There is a patent absurdity in taking thought and spending vast sums of money for the purpose of making a harmonious city, and then permitting any promiscuous private person who can get possession of a piece of ground, and raise money enough, to put a building on it, to nullify all your dispositions and vulgarise your town." There is much in the protest, and though we do not suffer so badly as our cousins do from the *piled-up monuments of bad taste and cupidity*, still even London suffers from the tall-house mania, not to mention other hideous forms of architectural aberrations. Edinburgh, too, will note the timely protest with interest. But the task of acting as censor would be full of difficulties where mutable taste rather than positive science would have to be the guide."

To this I would add that there should be no foolish rivalry in such matters, as it is as easy for one architect to outdo another in height as for a naval architect to beat the record in point of length and strength, or for an artillerist to design a target that will resist a shot, a shot to pierce it, another target to resist the latter and again another shot to hole it, and so on, without end; but though there may be a reason for this when a nation wishes to retain its prestige over its neighbor; and though engineers are forced into long and still longer spans for bridges due to the widths and depths of rivers to be traversed and to conditions imposed by the authorities—as in the 1,700 feet twin spans over the Firth of Forth in Scotland, the Brooklyn suspension bridge and now the 3,200 feet span structure about to be thrown over the Hudson between New York and Jersey City—no similar necessity exists for structures of the Eiffel tower type, which all Paris is clamorous to have demolished, though it certainly is not an outrage to artistic taste and merit in any way approaching the super-

Type of steel-built column on which calculations of stresses, weights and prices are based, for computation of data in Table I.

Scale, ¼ inch to one inch.

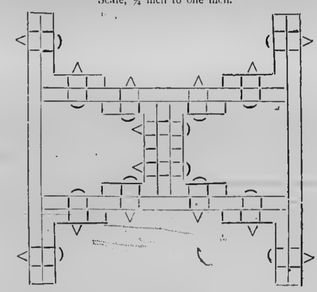


TABLE I.

Table of steel thicknesses and sectional areas, box built columns to support fire proof or iron, brick and concrete floorings in buildings from 1 to 20 stories high. Weight per sup. or square foot of roofing and flooring, partition walls, etc., 300 lbs., including 90 lbs. live load. Factor of safety = 5 or 1/5 of crushing load.

No. of item for reference	No. of stories counting upwards	No. of stories counting downwards	Columns at 20'-20' centres. Area supported 400 sq. ft.			Columns at 10'-20' centres. Area supported 200 sq. ft.			Columns at 10'-10' centres. Area supported 100 sq. ft.			At 11 ft. long in position & at 5 cts per lb.		
			Thickness of plates.	Sectional area.	Weight supported in tons.	Thickness of plates.	Sectional area.	Weight supported in tons.	Thickness of plates.	Sectional area.	Weight supported in tons.	Cost of each column at 5 cts lb. 20'-20'	Cost of each column at 5 cts lb. 10'-20'	Cost of each column at 5 cts lb. 10'-10'
			In-ches.	Sqr. Inch.		In-ches.	Sqr. Inch.		In-ches.	Sqr. Inch.		$	$	$
1	Roof	Roof	0.1	10	60	0.05	5	30	0.025	2.5	15	24	12	6
2	20	1	0.2	20	120	0.10	10	60	0.050	5.0	30	48	24	12
3	19	2	0.3	30	180	0.15	15	90	0.075	7.5	45	72	36	18
4	18	3	0.4	40	240	0.20	20	120	0.100	10.0	60	96	48	24
5	17	4	0.5	50	300	0.25	25	150	0.125	12.5	75	120	60	30
6	16	5	0.6	60	360	0.30	30	180	0.150	15.0	90	144	72	36
7	15	6	0.7	70	420	0.35	35	210	0.175	17.5	105	168	84	42
8	14	7	0.8	80	480	0.40	40	240	0.200	20.0	120	192	96	48
9	13	8	0.9	90	540	0.45	45	270	0.225	22.5	135	216	108	54
10	12	9	1.0	100	600	0.50	50	300	0.250	25.0	150	240	120	60
11	11	10	1.1	110	660	0.55	55	330	0.275	27.5	165	264	132	66
12	10	11	1.2	120	720	0.60	60	360	0.300	30.0	180	288	144	72
13	9	12	1.3	130	780	0.65	65	390	0.325	32.5	195	312	156	78
14	8	13	1.4	140	840	0.70	70	420	0.350	35.0	210	336	168	84
15	7	14	1.5	150	900	0.75	75	450	0.375	37.5	225	360	180	90
16	6	15	1.6	160	960	0.80	80	480	0.400	40.0	240	384	192	96
17	5	16	1.7	170	1020	0.85	85	510	0.425	42.5	255	408	204	102
18	4	17	1.8	180	1080	0.90	90	540	0.450	45.0	270	432	216	108
19	3	18	1.9	190	1140	0.95	95	570	0.475	47.5	285	456	228	114
20	2	19	2.0	200	1200	1.00	100	600	0.500	50.0	300	480	240	120
21	1	20	2.1	210	1260	1.05	105	630	0.525	52.5	315	504	252	226

posed box-like piles which are now in a fair way to disgrace our neighbors in the eyes of European nations.

Gentlemen, let us also be severe in architecture, to the extent at least of not allowing it to assume, as it is bidding fair to do in Ottawa, the phase of what may be called "bed post architecture," and in truth, though there are hundreds of otherwise very pretty villas and cottages in the new Capital, quite a number of their verandas and entrance porches are rendered hurtful to the eye of good taste, by being supported on bed posts, for they certainly cannot be called columns. And to cap the climax, in some of the twin dwelling houses or where there are two doors side by side, with a veranda or portico in common, the separation between the doors is for all you can imagine, of the exact shape of a partition between two horse stalls.

TABLE II.

Comparative table of sizes or sectional areas of brick piers to support fire proof or iron, brick and concrete floorings in buildings from 1 to 20 stories high. Weight per sup. ft. of roofing, flooring, partition walls, etc., 300 lbs., including 90 lbs. live load.

No. of Item for reference.	No. of stories counting up-wards.	No. of stories counting down-wards.	Piers at 20' - 20' centres. Area supported 400 sq. ft. Area of pier in sq. ft., ins.	Size of pier square.	Weight supported in tons.	Piers at 20' - 10' centres. Area supported 200 sq. ft. Area of pier in sq. ft., ins.	Size of pier square.	Weight supported in tons.	Piers at 10' - 10' centres. Area supported 100 sq. ft. Area of pier in sq. ft., ins.	Size of pier square.	Weight supported in tons.	Piers calculated at 14 ft. high, 20 bricks per ft. cube. Cost of each pier at $20.00 per M. all.	Cost of each pier at $18.00.	Cost of each pier at $16.00.
	Roof	Roof										$	$	
1			2.0	1 41	6	1	1.00	30	½	0.70	15	12	6	3
2	20	1	4.0	2.00	120	2	1.41	60	1	1.00	30	24	12	6
3	19	2	6.0	2.45	180	3	1.73	90	1½	1 29	45	36	18	9
4	18	3	8 0	2.83	240	4	2 00	120	2	1.41	60	48	24	12
5	17	4	10.0	3 16	300	5	2.24	150	2½	1.58	75	60	30	15
6	16	5	12.0	3.46	360	8	2.45	180	3	1.72	90	72	36	18
7	15	6	14.0	3.74	420	7	2.65	210	3½	1.87	105	84	42	21
8	14	7	16.0	4.00	480	8	2.83	240	4	2.00	120	96	48	24
9	13	8	18.0	4 24	540	9	3 00	270	4½	2 12	135	108	54	27
10	12	9	20.0	4 47	600	10	3.16	300	5	2.24	150	120	60	30
11	11	10	22.0	4.69	660	11	3.32	330	5½	2.35	165	132	66	33
12	10	11	24.0	4.90	720	12	3.46	360	6	2.45	180	144	72	36
13	9	12	26 0	5.10	780	13	3.60	390	6½	2.55	195	156	78	39
14	8	13	28.0	5.29	840	14	3 74	420	7	2.65	210	168	84	42
15	7	14	30.0	5 47	900	15	3 82	460	7½	2.74	225	180	90	45
16	6	15	32.0	5.65	960	16	4 00	480	8	2.83	240	192	96	48
17	5	16	31.0	5.83	1020	17	4.12	510	8½	2 92	255	204	102	51
18	4	17	36 0	6.00	1080	18	4.24	540	9	3.00	270	216	108	54
19	3	18	38.0	6.16	1140	19	4.36	570	9½	3.08	285	228	114	57
20	2	19	40.0	6.32	1200	20	4.47	600	10	3.16	300	240	120	60
21	1	20	42.0	6.48	1260	21	4.58	630	10½	3.24	315	252	126	63

TABLE III.

WEIGHTS PER SQUARE FOOT OR SUPERFICIAL FOOT BORNE BY PIERS AND FOUNDATIONS OF CERTAIN BUILDINGS, BRIDGES AND OTHER STRUCTURES.

Says Professor Butler, as given by Mortimer at page 104-5 of his "Hand-Book":

	Per sq. foot.
The load on the monolithic piers supporting the large churches in Europe does not exceed (early builders using much more massive masonry, proportionally to the load to be carried, than at present)	30 tons.
The Toff bridge in France	21 "
Former bridge at same place said to have failed at	64 "
Rennie subjected good 4 ft. rubble piers to	22 "
Granite piers Saltash bridge, England	9 "
Brooklyn bridge piers	29 "
St. Louis bridge piers before completion	38 "
The same after completion	19 "
Niagara suspension bridge limestone towers failed under	36 "
Maximum pressure on rubble masonry and cement mortar of some of the large masonry dams	14 "
Proposed Quaker bridge dam—270 ft. high	17 "
The following are from the writer and others:	
At centre of the Cheops pyramid say	40 "
Piers of the dome at St. Peters (the great thickness of these piers, say 20 to 30, renders the confined centre as resisting, so to say, as solid rock), say about	35 "
Weight on foot side walls Joliette church	2 "
Weight under tower (causing failure by sinking or settlement)	4 "
Strasbourg Cathedral tower, say	40 "
Washington monument, 555 feet high	45 "
Tower of Babel or of Belus, 650 ft. high, say	52 "
Central piers Britannia bridge	33 "
"Manhatten Life" building, 353 ft. high	15 "
The "Equitable" building and Union Trust, built with wide footings, load the foundations, it is said, only to	3 "
Proposed Hudson river bridge, 3,200 ft. span piers	26 "
The Stock Exchange, Chicago, is said to load the foundation soil at	4 "
Allowed by New York city regulations	15 "
Load per foot square of foundation brick piers of American Surety building, say	6 "
The author's design for the proposed London Eiffel tower (see fig. 5, page 18, of the 68 designs sent in, printed and published for "The Tower Company, Limited," by "Industries," 358 Strand, London, under title of "The Great Tower for London." Height of tower 1,600 ft., diameter at base 280 ft., total weight 14,303 tons, 20' wide offset balconies at every 200 ft. of total height, greatest weight on lower column at centre	117 "
Average weight on the 312 first tier columns	46 tons.
Total weight distributed by inverts or footings over the 61,600 ft. area, less than	¼ "
Weight at centre distributed by inverts or footings over the 100 ft. sup. of bearing to each colum at centre of tower	1⅜ "
Brunel (Paris) design for proposed London Eiffel tower, 500 ft. square, 2,296 ft. high, of granite, weight 196,902 tons, weight per foot square supported by bottom piers	160 "
Weight per square foot distributed over soil area of 250,000, say	4/5 "

TABLE IV.

CRUSHING TESTS OF BUILDING STONE.

For many years the resistance to crushing force shown by a building stone has been considered high evidence of its homogeneousness and durability.

The following table gives the resistance to crushing per square inch, shown by various stones, granites and marbles, and is compiled from General Q. A. Gillmore's report to the Chief of Engineers, United States Army; from Haswell's Engineer's Pocket Book; from "Stones for Building and Decoration," by Dr. Geo. P. Merrill, of the Department of Geology, Smithsonian Institution, and from tests made by Mr. Ira H. Woolson, C.E., at the request of the Professor of Geology of Columbia College School of Mines, on the Emery testing machine belonging to the college. Where tests have been made on a number of specimens, the highest result is given.

Paving brick should stand 10,000.00 to inch crushing force and absorb not over 2 to 3 per cent. of water.

CRUSHING WEIGHT PER SQUARE.

	Inches in Pounds.	Feet in Tons.
Aberdeen, Scotland, Granite (Haswell)	10,760	774.7
Albion, New York, Sandstone (Gillmore)	13,500	972.0
Altamount, California, Sandstone (Merrill)	1,149	82.7
Arbroath, England, Sandstone (Haswell)	7,850	460.2
Aquia Creek, — Sandstone (Haswell)	5,340	389.5
Bardstown, Kentucky, Limestone (Gillmore)	16,250	1,170.0
Bay of Fundy, Canada, Granite (Gillmore)	12,020	865.5
Bedford, Indiana, Oolitic, Limestone (Merrill)	10,125	729.0
Belleville, New Jersey, Sandstone (Gillmore)	11,700	842.4
Berea, Ohio, Sandstone (Gillmore)	10,250	738.0
Billingsville, Missouri, Limestone	7,250	522.0
Caen, France, Limestone (Gillmore)	3,650	262 8
City Point, Maine, Granite (Gillmore)	15,093	1,086.7
Cleveland, Ohio, Sandstone (Gillmore)	7,910	569.5
Connecticut, Freestone (Haswell)	3,319	238.9
Cornish, Wales, Granite (Haswell)	6,339	456.4
Craigleith, Scotland, Sandstone (Gillmore)	12,000	864.0
Dix Island, Maine, Granite (Gillmore)	15,000	1,080.0
Dorset, Vermont, Marble (Gillmore)	8,670	624 2
Dorchester, New Brunswick, S. S. (Gillmore)	9,412	677.6
Dublin, Ireland, Granite (Haswell)	10,450	737.4
Duluth, Minnesota, Granite (Gillmore)	19,000	1,368.0
Edinburgh, Scotland, Sandstone (Merrill)	12,000	864 0
English Magnesian Limestone (Haswell)	3,130	225 3
English Anglesa Limestone (Haswell)	3,600	259.2
Fairhaven, Vermont, Slate (Merrill)	12 870	926.6
Fond du Lac, Wisconsin, Sandstone (Gillmore)	6,250	450.0
Fox Island, Maine, Granite (Gillmore)	15 062	1,684 4
Glencoe, Colorada, Sandstone (Merrill	12,752	018 1
Glen Falls, New York, Limestone (Gillmore)	11 475	826.2
Greenwich, Connecticut, Granite (Gillmore)	11,700	842.4
Harbor Quarry, Maine, Granite (Gillmore)	16,837	1,212.3
Haverstraw, New York, Sandstone (Gillmore)	4 350	313 2
Hummelstown, Pennsylvania, Sandstone (Merrill)	13,610	979.9
Huron Island, Michigan, Granite (Merrill)	20,650	1,486 8
Hurricane Island, Maine, Granite (Gillmore)	14,937	1,075.4
Italian Marble (Merrill)	12,156	875.2
Joliet, Illinois, Limestone (Gillmore)	16 900	1,216 8
Jordan, Minnesota, Sandstone (Merrill)	3 750	270.0
Kasota, Minnesota, Sandstone (Gillmore)	11,675	840.6
Keene, New Hampshire, Granite (Merrill)	10,375	747 0
Little Falls, New York, Sandstone (Gillmore)	9,850	709.2
Long Meadow, Massachusetts, Sandstone (Merrill)	8,812	634.4
Manitou, Colorada, Sandstone (Merrill)	13,046	939.3
Marquette, Michigan, Limestone (Gillmore)	8,050	579.6
Marquette, Michigan, Sandstone (Gillmore)	7,450	536.4
Marblehead, Ohio, Limestone (Gillmore)	12,600	907.2
Massillon, Ohio, Sandstone (Gillmore)	8,750	630.0
Medina, New York, Sandstone (Gillmore)	17,725	1,276.2
Michigan Sandstone (Merrill)	6,323	455.2
Middletown, Connecticut, Sandstone (Gillmore)	6,950	500.2
Mount Raymond, California, Granite (Merrill)	5,970	429.8
Monson, Massachusetts, Granite (Merrill)	15,390	1,108 0
New Gunnison, Colorada, Sandstone (Merrill)	9,903	713 0
New Haven, Connecticut, Granite (Gillmore)	9,750	702.0
New London, Connecticut, Granite (Merrill)	12,500	900.0
Newry, England, Granite (Haswell)	12 850	925.2
North Amherst, Ohio, Sandstone (Gillmore)	6,650	478.8
North River Limestone (Gillmore)	13,425	966.6
Oswego, New York, Sandstone (Merrill)	6,220	447.8
Patapsco, Maryland, Granite (Haswell)	5,340	384.5
Port Deposit, Maryland, Granite (Gillmore)	19,755	1,422.3
Potsdam, New York, Sandstone, from a quarry of the Potsdam Red Sandstone Co. not crushed (Woolson)	42,804	3,081.8
Quincy, Massachusetts, Granite (Gillmore)	17,750	1,278.0
Quincy, Illinois, Marble (Gillmore)	9,787	704.0
Rawlins, Wyoming, Sandstone (Merrill)	10,833	779.9
Richmond, Virginia, Granite (Merrill)	10,104	1,375.5
Rockport, Massachusetts, Granite (Gillmore)	19,750	1,422.0
Scotch Whinstone (Haswell)	8,300	547.6
Seneca, Ohio, Sandstone (Gillmore)	10,500	756.0
Stoney Creek, Connecticut, Granite (Merrill)	16,750	1,206.0
Stockbridge, Massachusetts, Marble (Haswell)	10,382	747.5
Taylor's Falls, Minnesota, Sandstone (Merrill)	5,500	396.0
Tuckahoe, New York, Marble (Gillmore)	13,594	978.7
Vermillion, Ohio, Sandstone (Gillmore)	8,850	637.2
Vermont Marble (Merrill)	13,400	964.8
Vinalhaven, Maine, Granite (Gillmore)	16,750	1,206.0
Warrensburg, Missouri, Sandstone (Gillmore)	5,000	360.0
Westerly, Rhode Island, Granite (Gillmore)	17,750	1,278.0
Williamsville, New York, Limestone (Gillmore)	12,375	891.0
Yorkshire, England, Sandstone (Haswell)	5,710	411.1

ILLUSTRATIONS.

A COUNTRY RAILWAY STATION.—F. S. BAKER, ARCHITECT.

PROPOSED HOUSE FOR MR. A. A. DIXON, TORONTO.—SIDDALL & BAKER, ARCHITECTS.

ST. MARY'S SCHOOL, HALIFAX, NOVA SCOTIA.—DAVID STERLING, ARCHITECT.

THE building is situated near to the Cathedral, and faces on Barrington street. It is constructed of pressed brick with granite facings.

COLLEGIATE INSTITUTE, SARNIA, ONT.,—S. H. TOWNSEND, ARCHITECT, TORONTO.

THIS building, erected in 1890, is constructed of plain brick with tile gables. It was built by day labor, a local builder, Mr. Proctor, acting as clerk of the works. The cost was about $25,000. The building is 80×95 feet in size, and in plan is acknowledged to be particularly well adapted to the requirements. In the basement are large play rooms to meet the needs of the students for recreation when the weather is unfavorable to outside sports. The top story of the building is occupied by an assembly hall, with pannelled walls and open timbered roof, and fitted up with dressing rooms and stage.

SIDE TALKS WITH THE BUILDER.

THERE are many builders who have a practical knowledge of brickwork and know how to construct an excellent piece of brickwork, writes R. N. Buell in The Brickbuilder, but are careless or ignorant regarding that most important part of every building, and that upon which their structure depends most entirely. A poor stone wall has been the cause of ruining many a noble and otherwise perfect edifice. Let me give my brother masons a few pointers on laying stone—not that I shall attempt in these columns to give an exhaustive treatise on the subject, but simply to place before him a few simple rules, which may possibly be the means of saving him many dollars.

Of whatever quality the stone may be of which a wall is to be built, it should consist as much of stone and as little of mortar as possible. If it be inferior in durability and power in resisting the action of the atmosphere, etc., to the mortar, besides the certain fact that the mortar will yield until it has set hard, and so far act injuriously, no ulterior good is gained; and if the stone be the more durable material, the more of it that enters into the wall the better. Indeed, in rough walling, if the stones be laid so that the most prominent angles on their faces come into actual contact, the interstices being occupied by mortar, it will be better than if a thick, yielding mass were allowed to remain between them. Absolute contact, however, should not be permitted any more than in brickwork, lest the shrinkage of the mortar in drying leave the stones to such unequal bearing as the prominent parts alone would afford.

Stone being generally of a less absorbent nature than brick, it is not a matter of so much importance that it be wetted before setting. Nevertheless, adhesion on the part of the mortar is more certain and more complete if the stones be worked in, at least, a damp state.

Bond is not of less importance in stone walling than in bricklaying. Instead of carefully making the joints recur one over the other, in alternate courses, as with bricks and gauged stones, the joints should as carefully be made to lock so as to give the strength of two or three courses or layers between a joint in one course, and one that may occur vertically over it in another. In bonding through a wall or transversely, it is much better that many stones should reach two-thirds across alternately from the opposite side than that there should be a few through stones, or stones extending the whole thickness of the wall. Indeed, one of the many faults of stone masons is that of making a wall consist of two scales or thin sides with through walls now and then laid across to bind them together, the core being made of mortar and small rubble merely. This is a mode of structure that should be carefully guarded against. There is no better test of a workman's tact and judgment in rubble walling than the building of a dry wall, or a wall without mortar, affords.

Walls are frequently built with mortar that without it would have fallen down under their own weight in a height of 6 feet in consequence of their defective construction, thus rendering it evident that they are only held together by the tenacity of the mortar, which is very seldom an equivalent for a proper bond of stone. Masons are very apt to set thin, broad stones on their narrow edges to show a good face, by which the wall is injured in two ways. It tends to the formation of a mere case on the surface of a wall, and it for the most part exposes the bed of the stone to the atmosphere, as a stone is more likely to be broad in the direction of its bed than across it.

ST. JOHN, N. B., EXHIBITION.

THE recent Exhibition at St. John, N. B., reflected credit upon the Maritime Provinces, and attracted not only local exhibitors, but manufacturing companies in the upper provinces. The attendance was worthy of the interesting character of the exhibition.

The Toronto Radiator Manufacturing Company, and the Toronto Steel Clad Bath Company had interesting exhibits of their goods at this Exhibition. The exhibits were in charge of their St. John agents.

Amongst other exhibits of materials relating to architecture and building was a display of memorial art glass by Mr. Frank Reardon, of Halifax, N. S., and an exhibit by the Mosley Folding Bath Tub and Water Heating Company, of Chicago. Mr. Frank Welliday, of St. John, N. B., is the Company's Canadian agent.

PRESTIGE.

IN an interesting paper on the subject in Fame, Mr. Milton J. Platt says:

"Here is a simple question. Do advertisers for high class patronage pay sufficient attention to the prestige of the mediums they use?

"Prestige is not a mushroom growth, it cannot be bought; it must be earned. Space in the medium possessing it is worth to the seeker for a high grade of patrons an incalculably greater sum than space in the medium without it. This is also true, even though the latter's circulation equalled that of the former, and even though it were claimed for it, that 'it goes to the same class of readers.'

"Webster tells us that prestige at one time meant 'delusion; trick; illusion.' Those definitions are no longer applicable to the word itself, but they very nicely express some of the qualities attaching to more than one publication which claim kinship with those commonly known to be above suspicion. The present use of the word implies weight of influence drawn from past success; expectation of future achievements founded upon those already accomplished. This is the prestige the wise advertiser will look for, and the names of the magazines or other publications possessing it will at once occur to him."

THE WIDOW'S TENTH.

A CASE of unusual character came before Judge Ferguson at Osgoode Hall, Toronto, the other day, in the way of appeal from the finding of the master. Mrs. Nightingale, of North Toronto, filed a claim against the executors of her husband's estate, under an agreement which had been made between her husband and herself when he commenced business as a brick maker, to the effect that she should receive one brick in every ten manufactured. The judge decided in her favor.

The case of Mr. Neelon, contractor, for the Toronto Court House, against the city of Toronto, has reached the Supreme Court at Ottawa, where it is now being argued.

Supplementary letters patent have been issued to the Hamilton Bridge Works Company authorizing an increase of the capital from $10,000 to $150,000.

Complaint is made that a contract for $1,099 worth of sewer pipe for Victoria, B. C., was made by the sewer committee without the consent of the city council, or advertising for tenders. The rule is that no liability exceeding $50 can be incurred except by the council as a whole.

Joseph Lamarche, contractor, is suing the city of Montreal for $7,500 damages for injuries sustained by him in May last, when he fell and broke his leg. He claims heavy damages on the ground that it interfered very much with his business and that he suffered for the above amount.

USEFUL HINTS.

The French and English papers, which are now used, come without friezes, which is a distinct gain in the matter of height, while it possibly detracts from the breadth of a room.

The correct principle to observe in hot air heating is to supply a large volume of warm air, at a lower temperature flowing through the registers. Don't use a small furnace heated to a red hot heat, with small cold air supply, and a high temperature at the registers; the latter plan is one that causes trouble, and brings condemnation to furnace heating.

AUTOMATIC COPYING OF LARGE DIAGRAMS.—To secure exact copies, by the action of light, of large-sized illustrations and diagrams the prepared paper must be in immediate contact with the glass negative or the drawing. A certain pressure has, therefore, to be exerted, which is apt to break the glass. Mr. H. Sack, of Dusseldorf, spreads the paper on a rubber plate, and creates a partial vacuum between the rubber and the glass. The frame is made of pitch-pine: the apparatus resembles a light table running on four rollers. The vacuum can easily be produced by means of a hand-pump, a pipe for establishing connection being fixed to the table.

TRACING DRAWINGS.—A correspondent writing to an English architectural journal relative to the method of tracing drawings presents the following suggestions: Prepare the tracing cloth or paper by first rubbing on it some finely powdered French chalk, and then for doing the tracing use Indian or Chinese ink, in which a small quantity of prepared ox-gall has been rubbed up in ink. The tracing may be done by means of a good drawing pen.

A fire-proof building is being erected on the corner of Craig and St. Lambert sts., Montreal, for the main office of the Street Railway Company. About 500 tons of iron girders will be used in it. The floors will be of terra cotta. It is so constructed that none of the weight of the upper storeys rests on the walls.

TO ARCHITECTS, BUILDERS AND CONTRACTORS

We are prepared to furnish from our quarries in New Brunswick

BROWN AND OLIVE
FREE STONE

of the finest quality and of any dimension.

Samples forwarded free and quotations given on receipt of inquiry . . . . . Correspondence solicited.

WM. HOOD & SON 10 Richmond Sq. MONTREAL.

CREDIT VALLEY BROWN STONE

From Carroll & Vick's No. 6 Quarry, Credit Forks, Ont.

SANDSTONE, fine grained, reddish brown. Contains quartz, and a little felspar and mica. The stone is in beds of four feet and under, and can be handled in pieces up to five tons. Quarry 300 yards from Railway.

Specimen.	Section under Pressure	Height.	Crushing Load.	Crushing Stress per sq. in.	Average Crushing Stress per Square Inch
	Ins.	Ins.	Pds.	Pds.	Pds.
A	.....	.....	.....	.....	
B	2⅞ × 3	2⅝	131,000	15,188	
C	2 1/16 × 3	2⅝	130,000	14,751	
D	3 × 3	2⅝	133,000	14,777	14,905

14,905 pounds is the average crushing strength per square inch of our Credit Valley Brown Stone

The highest standard of test attained by any pure Sandstone in America.

IN confirmation of the facts above stated, we have pleasure in directing your attention to the accompanying table, showing the result of the test of our stone, in connection with the series of tests of building stones conducted in 1892 at the School of Practical Science, Toronto, under the direction of a committee of the Ontario Association of Architects.

By referring to the results of the tests above mentioned, it will be seen that the average crushing stress of the majority of Canadian and American sandstones is far below that of ours, the difference in our favor ranging from 75 to 50 per cent.

The Credit Valley Brown Stone, owing to its modest tone, harmonizes beautifully with red or cream colored brick.

It has been reported that there is difficulty in obtaining Credit Valley Brown Stone. To correct this mistaken notion, we wish to state to architects and the public that we have a large quantity of stone ready to ship on the shortest notice, which can be followed up with an unlimited supply. Last year we made extensive additions to our plant and opened up new quarries and mines, and will supply promptly all orders given to us or our agents.

CARROLL & VICK

Quarries: Credit Forks, Ont. Office: 84 Adelaide St. West, TORONTO.

Montreal Agents: T. A. MORRISON & CO., 118 St. Peter Street.

NEW BRUNSWICK BROWN STONE

.... FROM ....

Clark's Quarries, Sackville, N. B.

WRITE FOR PRICES TO

For character of material see . . new City Buildings, Toronto

WM. CLARK

SACKVILLE, N. B.

Residence of Jas. Ross, Montreal—Built of Miramichi Sandstone.

MIRAMICHI STONE

ONE of the most popular sandstones in the market—of a rich olive color—great durability, easily wrought, and moderate price.

SAMPLES ON APPLICATION

Address

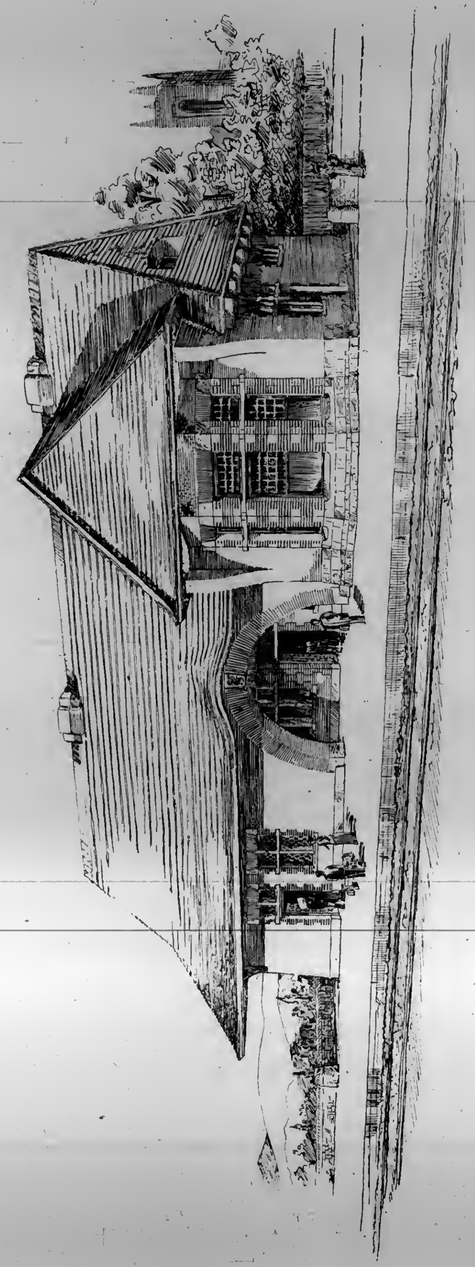
C. E. FISH

French Fort Quarries, • Newcastle, Miramichi, N. B.

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

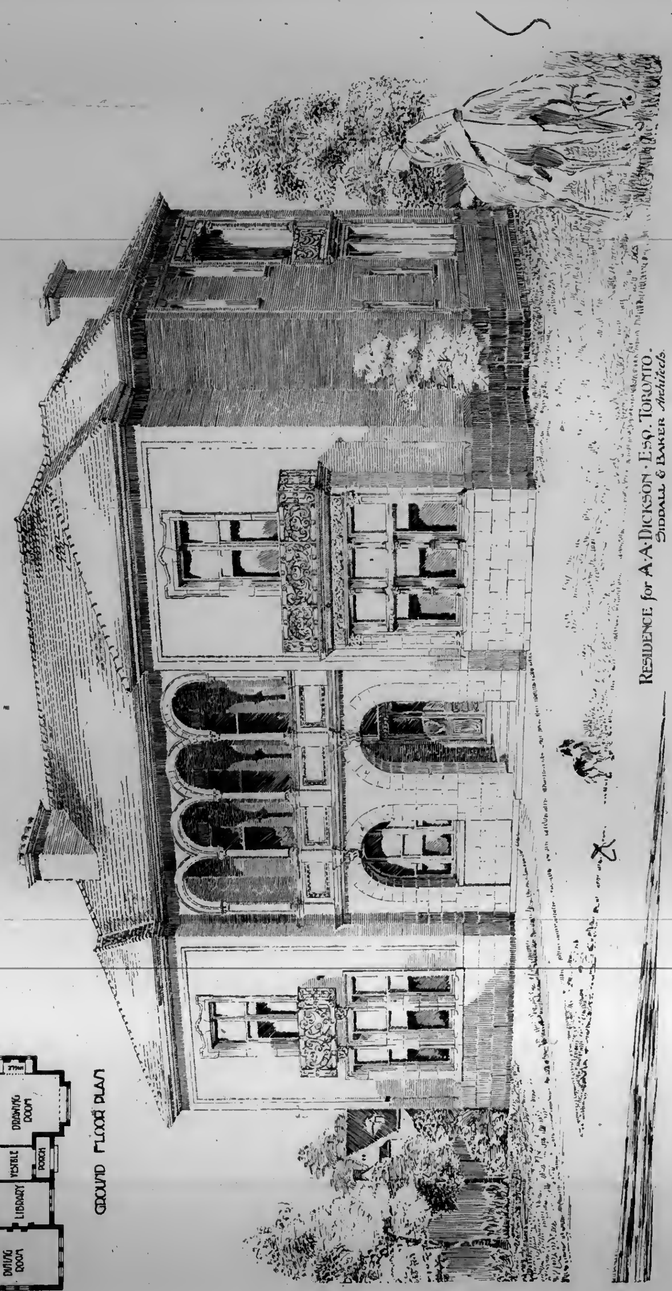
COLLEGIATE INSTITUTE, SARNIA, ONT.

S. H. TOWNSEND, ARCHITECT.

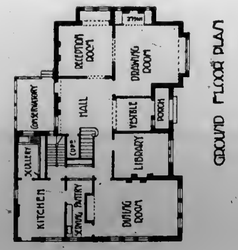


A COUNTRY RAILWAY STATION.

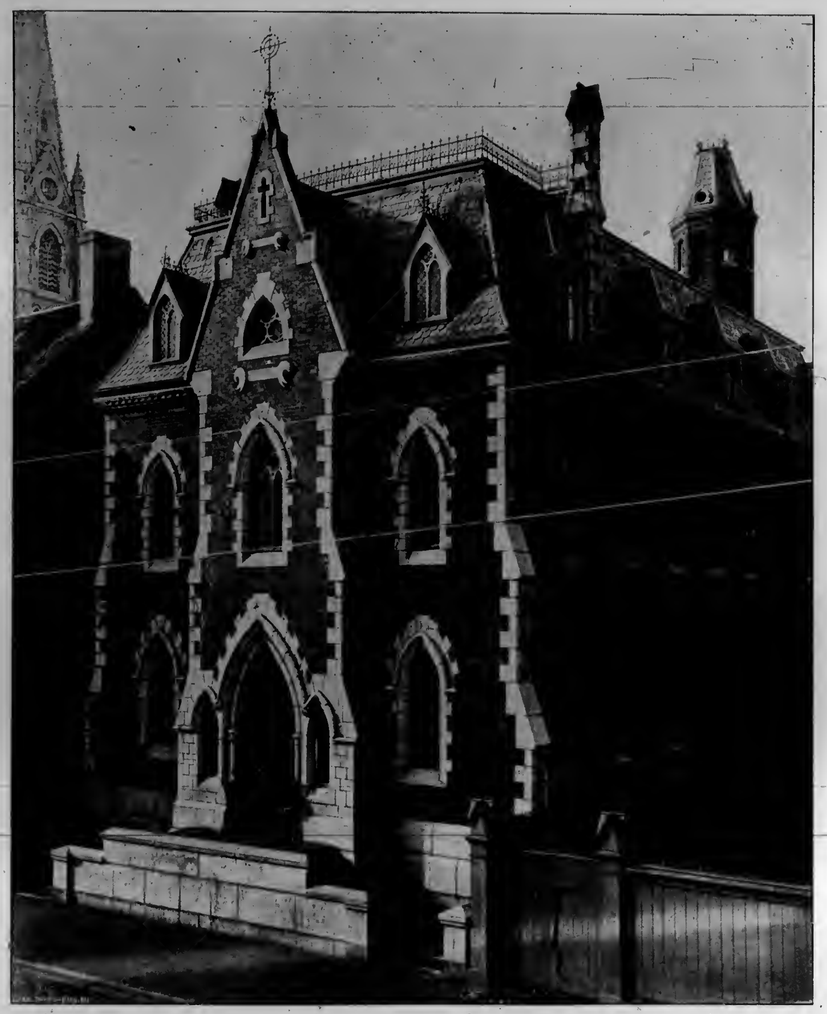
F. S. BAKER, A.R.I.B.A., ARCHITECT.



RESIDENCE for A. A. DICKSON, ESQ. TORONTO.
SIDDALL & BAKER *Architects.*



GROUND FLOOR PLAN



ST. MARY'S SCHOOL, HALIFAX, NOVA SCOTIA.

DAVID STERLING, ARCHITECT.

CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—No. 11. NOVEMBER, 1895 { PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

D. B. DICK	Toronto.
W. A. EDWARDS	Hamilton.
F. J. ALEXANDER	Ottawa.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:
W. A. LANGTON — Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. C. HUTCHISON, Montreal.
1ST VICE-PRESIDENT	A. T. TAYLOR, Montreal,
2ND VICE-PRESIDENT	J. F. PEACHY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

CHAS. BAILLAIRGE	Quebec.
ROBT. FINDLAY	Montreal.
J. Z. RESTHER	Montreal.
A. H. LAPIERRE	Montreal.
G. E. TANGUAY	Quebec.
THEO. DAOUST	Montreal.

AUDITORS—A. J. FOWLER and C. CHAUSSE, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.
JOHN ALDRIDGE, 1st Vice-President.
WM. PARK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JAS. CRANG.
WM. PEARS.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H. LUCAS.
H. MARTIN.
THOS. CANNON, Jr.
JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

TO the writer, who had occasion recently to visit the Toronto custom house, it seemed incongruous that side by side with iron doors and shutters, and other safeguards against fire, should be seen in active operation that relic of a past era, the coal oil lamp.

JUDGE MCDOUGALL, of Toronto, has decided, in a county court suit for $147 for 25 toise of stone, that stones are part of the land upon which they are found and cannot be removed by the tenant. Few land owners, however, will be found to object to having the loose stones removed from their property. Quarrying the stone is another matter.

WE referred in a recent issue to the quality of Canadian cement. Since then we have heard of tests applied in Montreal to a cement made at Vancouver, which it is said show it to be far superior to the English article, the difference in breaking strain being as 150 to 90 in its favor. Mr. Warsap, the manager, has just returned from a two months' visit to England, and the manufacture of the cement is to be carried on with renewed vigour.

APROPOS of the reference in these columns last month to the effect of ivy planting upon architecture, the statement has since been made in the daily press that it is the intention of the Ontario government to plant "creepers" round the Parliament buildings. The proposal has our hearty approval. Something in the nature of a disguise to the outside of these buildings has long been recognized by persons of cultivated taste, to be a necessity, and the announcement that the want is to be provided for will be hailed with pleasure.

SOMETIMES when condemning the extravagance of our governors in expending money on needless public works, we have consoled ourselves with the reflection that after all they paid for themselves. Some figures recently presented to the Montreal city council dispel that idea. They show that while the city debt had, during the past six years, increased 120 per cent., with a corresponding increase in interest charges, the revenue had increased less than 50 per cent. It does not pay a community to have its money squandered upon public works.

THE city of San Francisco has recently passed an ordinance limiting the height to which new buildings may be erected to 125 feet on streets over 100 feet wide, and 100 feet on streets of less width. The California Architect, in discussing the ordinance, prints some of the arguments for and against high buildings, and concludes by saying: "It seems to us that all these conflicting interests would be harmonized by the adoption of the rule that no part of a building on one side of a street should extend beyond a line drawn from the foot of the building on the opposite side of the street, at an angle of forty-five drgrees; this gives the public and the adjacent owners of property their share of sunlight and air—and at the same time allows a man to build as high as he likes on the rear portion of his lot, as long as he does not obtrude upon that forty-five degree line."

ST. LOUIS, like Toronto, is erecting a city hall, but it is hoped that the experience of the latter will not be that of the former. A committee of investigation has discovered numerous defects and weaknesses in the partially completed St. Louis building, which has already cost the city over $2,000,000, and which will have to be largely reconstructed. Toronto's complaint is not so much structural as financial.

MR. JAS. J. CURRIE, of Abbotsford, B. C., has sent a long communication to the New Westminster Board of Trade, in which he elaborates a plan for the construction of dwellings for the working classes in London, England, the material to be sawdust and other refuse reduced to pulp and moulded into planks. Artificial lumber of this kind is no new thing, but we question whether the freight from British Columbia on either the sawdust or lumber would not be too high to make it pay.

MR. JOHN J. FOY, of St. Louis, presented to the National Association of Master Plumbers of the United States recently, a lengthy paper, the title of which was, "Should Master Plumbers Handle Tools?" No general answer, affirmative or negative, can be given to this question. If the building business is active in the locality in which the plumber resides, it will probably be more profitable to him to pay journeymen to handle the tools while he devotes his time to securing contracts. If on the other hand, there are few contracts to be got, as has been the case of late in most of the cities and towns of Canada, the master plumber should not allow false notions of dignity to prevent him from taking hold of the tools and doing as much as possible of the actual work himself, thereby adding to his profits the money which under different conditions would be paid out in wages.

WE have recently received a communication from the Secretary of the Institute of Clay Workers, 222 Strand, London, asking our assistance towards obtaining specimens of Canadian manufactured bricks for the Institute's exhibition of manufactures of clay materials. The Secretary of the Institute adds that he would be pleased to see any of the readers of this journal who may at any time visit London, and to show them what is being done in England in the line of brick manufacturing. We trust that some of our manufacturers, in response to this invitation, will send to the Institute specimens of their products. In the manufacture of plain and pressed brick, terra cotta, and other clay materials, Canada has made wonderful strides during the past ten years, and we have little doubt that our productions in this line will compare favorably with those of other countries.

A GUILD of Sculpture has been incorporated in Ontario, to promote and cultivate the study and taste for that art, and for special training in designing, modeling, carving and working in metals. It is the intention to hold exhibitions and offer prizes for statuary, and to promote the establishment of a gallery. Ticket holders will receive statuettes or busts in terra cotta, and have a chance in the drawing of prizes. The president is Mr. L. R. O'Brien, R.C.A., the well known artist, and the Director of Arts, Mr. Hamilton MacCarthy, R. C. A., the equally well known sculptor. Mr. Emerson Coatsworth, M.P., is treasurer, and Mr. James Van Sommer secretary. The studios and office are at 28 Toronto street, Toronto. Officered by such men, and with a promising field, such a guild should, and no doubt will, be a success in promoting a love for this splendid branch of fine art.

A CANADIAN visitor to New York recently was impressed with the difference in methods of construction employed in that city compared with those pursued in Canada. In the construction of long stretches of wall in business buildings, the method usual in Canada of bonding each course of brick, is not followed; instead, it is the practice to lay a bonded course at regular distances, a few feet apart, and to fill in the space between these courses with brick bats, laid directly one upon another with a bedding of cement mortar between each course. It is claimed that this method of construction, which permits of the utilization of a large amount of what is here regarded as waste material, is not only cheaper but actually possesses some advantages over the Canadian method. One of these advantages is, that cracks due to settlement will affect only sections of the wall and not the entire structure, as is the case where bonded courses are laid throughout the building.

CANADIAN manufacturers who do an export business in iron materials are complaining of the treatment accorded to them by the Government in the matter of refund of duty. With the object of encouraging the use of Canadian iron, the tariff imposes a duty of 20 cents per cwt., or $4.48 per gross ton, on iron imported for manufacturing purposes from the United States, and in order that our manufacturers may not be placed at a disadvantage with American manufacturers as regards the ability to do foreign business, it provides for a refund of 99 per cent. of the duty paid by the Canadian manufacturer on American iron, when the article in which the iron is used is exported. These provisions are considered fair enough if properly carried out, but complaint is made that the Government has failed to provide any satisfactory means of arriving at the amount of refund, and some manufacturers at least, who are doing quite an extensive export business, have as yet not been able to secure a cent of refund. Manufacturers of iron goods which have to be subjected to steam pressure—as for example radiators—are obliged to use about 60 per cent. of American iron, in order to get the requisite amount of strength for their materials. It is apparent that it would be impossible for the customs inspectors to determine by examining the manufactured article just what percentage of Canadian and American iron it contained. The common sense way would seem to be to compel the manufacturer to submit to the Government proof of the amount of American iron which he is accustomed to use in the manufacture of a certain class of material, and upon this the rebate should be allowed in the case of material exported. Strange to say, however, the Government refuse to adopt this method, while neglecting to make provision of a more satisfactory character. The result is, that manufacturers are getting no rebate whatever, which means that American manufacturers are enjoying an advantage in foreign markets of something like $6.00 per ton. This condition of things should be remedied without delay.

It is alleged by manufacturers of certain lines of materials that there is need for a revision of the specifications under which tenders are received and contracts awarded for Government buildings. It is stated that under these specifications materials of certain manufacturers, who years ago were the only reliable makers of certain lines of goods, continue to be specified, thus shutting out the numerous other manufacturers who have come into the field in recent years. Some of these goods are of the most simple character, as for example supports for lines of steam piping, which can now be obtained from a score of different sources. It seems only right that all reliable Canadian manufacturers should be given an opportunity of submitting tenders for materials required for use in public works. The following order, recently issued by Secretary Carlisle, of the United States Treasury Department, recognizes the necessity for the change which our manufacturers desire to see introduced: "The supervising architect of the Treasury Department is hereby directed to eliminate from the specifications hereafter prepared in this office for the erection or repair of public buildings all requirements which demand from the successful bidder that he shall furnish certain specific materials or "equal thereto," and shall not use in connection therewith the name or designation of any individual, co-partnership, company or corporation. The said specifications must state in sufficiently descriptive terms the kind and quality of stone or brick desired, without reference to any particular quarry or manufacture; but these, and all other materials must be of the best quality for the purpose wanted, and subject to the approval of the supervising architect, without, however, naming any special make or brand of goods, or in any wise discriminating in favor of one specific kind of material as against similar material of equal quality. The supervising architect is further directed to settle definitely in his designs of public buildings the kind of material with which the walls are to be built, in order that controversies concerning the use of different materials may be avoided. This order shall take effect at once." Complaints are also heard of the difficulty experienced in securing copies of specifications, and answers to requests for information addressed to the Public Works Department at Ottawa. Mention is made of these matters in order that the complaints, if well founded, may receive attention at the proper hands.

CONCRETE AS A FIRE RESISTANT.

IN the last number of the ARCHITECT AND BUILDER we published a description of the method being adopted to render the new building in course of erection in Toronto for Mr. Robt. Simpson, as a departmental store, fireproof by means of concrete. The article has called forth a letter from "Architect," which appears elsewhere, in which he asserts very positively that concrete is not a fire resisting material, and that it is unsafe to use it where it will be subject to the action of great heat, which would have the effect of causing it to crack and disintegrate.

This is one of those cases where "doctors disagree," and when such is the case, who is to settle it? We have, since "Architect's" letter came into our hands, taken some pains to ascertain the views of different architects and experts on the subject, and find they are as widely apart as the poles. We shall be glad to have the matter discussed in our columns, for it is an important one, in view of the better class of buildings which are being constructed in our cities, and which their architects and owners are desirous of rendering as indestructible as possible.

The quality of concrete depends of course very much on the way it is prepared. If gravel containing limestone pebbles is used the application of heat will slack the lime contained in them and cause disintegration. If, however, slag or screenings are used (and slag, when obtainable, forms the matrix of the concrete used by the Simpson building contractors) disintegration would not occur to the same extent.

We have been shown the results of some very severe tests to which this concrete has been subjected, and assuming that they were fairly applied, they seem to indicate that it is what its supporters claim—absolutely fire resisting. The Board of Fire Underwriters of Alleghany County, Pennsylvania, which includes the city of Pittsburg, lay down the following specifications of a test, which will be required on all non-combustible floor construction before the same will be passed by the board:

"Enclose a space of eight feet square with a brick wall, having a protected steel beam in the center of same, thus having two half spans of floor arch enclosed; said beam must not rest on enclosure wall, but must be a 12-inch 32-pound beam with a span of 16 feet between supports.

Enclosure must be so arranged as to have a flue outlet and a door opening at the other side by which to feed fuel to fire bed.

Place furnace bed 4 feet below bottom of arch and maintain a mixed coke and wood fire at as high a degree of temperature as is possible for at least one hour, then beam and arch must be drenched by a plug stream of water, hose to be two and one-half inch, with a one inch nozzle, under a pressure of 65 pounds.

While fire is in operation the span of the floor must have a load of 750 pounds to the square foot resting on same.

The test must be witnessed, and in charge of an officer of this board."

The concrete appears to have stood this ordeal. The Board of Underwriters gave this certificate:—"As a result of the test of your concrete construction, witnessed by us on the 21st inst., I beg leave to say that we are satisfied with that type of construction for fire-proof buildings." This was signed by Mr. Biggert, assistant secretary of the Board, and addressed to the Columbian Fire-proofing Co., which has the contract for the work at the Simpson building. We understand it is the intention of the company to make some tests in Toronto, and that they desire to make it competitive, so that the relative merits of their system and others may be compared.

An important inquiry is about to be instituted in New York with the object of determining the value of various so-called fireproof materials, which will throw new light on the subject.

Some of the architects whose opinions we have sought say that their knowledge is only theoretical, but they cannot see why concrete, made with slag, should not be a good fire resistant. One, who used concrete for a hearth in a private dwelling, had an experience which rather surprised him, and which showed that it is not a good non-conductor of heat—a fact not very favorable to its fireproofing qualities. Others declare terra cotta, or preparations of clay, to be the only fire-resistants which can be depended on.

A recent test in Glasgow goes to show that concrete made with diatomite, which comes from the island of Skye, and consists of fossilized aquatic plants, will successfully resist fire.

It is claimed for concrete that in addition to being fire-resisting in itself, it possesses a great advantage so far as strength is concerned. And here let us correct a slight mis-statement in our former reference to the Simpson building. The spaces between the floor beams are filled in, not with hollow blocks of concrete, but with two thicknesses, having a space between. There are no joints—the concrete forms a monolith—and it is formed around iron bars which give it great strength. In this respect an advantage is claimed over terra cotta, in that the latter has to be put in place block by block, and being brittle, if one block is broken away, in a fire or otherwise, those beside it are liable to be dislodged. Certainly the tests applied to the concrete, as indicated in the Underwriters' requirements referred to above as well as other tests, show it to be possessed of great strength.

The ARCHITECT AND BUILDER simply seeks to give the facts, with a view of determining, as far as possible, what is the best fire-resisting material for buildings. That point it seems to be difficult to settle. The School of Practical Science at Toronto, part of whose work it is to test structural materials, is at present engaged with the matter, but has not as yet arrived at any conclusion. As a thoroughly disinterested investigator the result of its experiments will carry much weight. Would it not be well to employ more freely the facilities which that institution offers for testing materials about the merits of which there is great difference of opinion?

As the authorities differ on the point which has been raised by "Architect's" letter, we shall be pleased to have more light thrown upon it in the form of further discussion.

WHAT IS A FIREPROOF BUILDING?

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Having read an article which appeared in the last number of the ARCHITECT AND BUILDER, referring to the method of construction adopted in connection with the new Simpson building, Toronto, I desire to protest against some of the statements contained therein.

The article states that "the building is practically indestructible by fire," and then proceeds to describe the method of fireproofing which is being employed, which consists of covering the beams with slabs of concrete, and surrounding the columns with the same material. I quite agree with the writer of the article when he states that "so-called fire-proof buildings have shown that they are not such in great conflagrations," and I have little hesitation in saying that should the Simpson building again become the object of a conflagration, it would prove to be no exception to the above mentioned rule.

Concrete in itself is not a fireproof material, and therefore a building in the construction of which it is used as such cannot be fireproof. It is a well known fact to those familiar with the nature of concrete that its character is changed by the action of fire, which burns out the lime in the material and also causes it to crack and disintegrate, as the result of contraction and expansion. No doubt concrete used in the manner described is in some degree a protection against fire, but it is valuable for this purpose only to a limited extent. A fireproof building should mean an indestructible building, and such a building cannot be constructed of iron covered with concrete.

I have made a careful study of the nature and adaptability of this material, and as a result I never use it in close proximity to steam boilers, or in any other position where it would be exposed to the action of intense heat. For such positions I use hard burned brick, or fire brick. So far as my experience goes, clay is the only material which will withstand the action of fire, and porous terra cotta is the only material which can properly be called fireproof.

I call attention to this matter with the object of endeavoring to dispel some of the ill-founded opinions which exist on the part of architects and the public, with regard to this subject. It is quite time that both architects and the public should clearly understand what constitutes a fireproof building. Only evil can result from misconception of facts, such as there is every reason to believe exists at the present time.

ARCHITECT.

THE fourth annual meeting of the Association of Ontario Land Surveyors will be held in Toronto, commencing on Tuesday, Feb. 25, 1895.

THE TORONTO TECHNICAL SCHOOL.

UNDER the new principal recently appointed the Toronto Technical School appears to have entered upon a fresh era of prosperity. As several new subjects have been added, some of them of great importance in the line of architecture and building, a resume of the history and work of the institution will be of interest.

The school was established in January, 1892. Its principal promoters were the late ex-Ald. Gillespie, who died before it was opened; Dr. J. Oriland Orr, the present chairman of the Board, who was the first chairman; the late Mr. J. A. Mills, and Mr. A. M. Wickens.

At first it was thought to be somewhat of an experiment, but the success already achieved has placed it in a more definite position. It is situated on College St., at the head of McCaul St., and directly to the south of the School of Practical Science, in what was formerly Wycliffe College. Permanent quarters have been secured there, and the building so fitted as to be better adapted to the requirements of the school.

It is maintained entirely by the city of Toronto, and is under the control of a Board of Directors composed of seventeen members. Five of these are members of the City Council, five represent the Trades and Labor Council, two the Stationary Engineers, two the Architects, two the Educationists and one the Manufacturers. Regular meetings of the Board are held on the fourth Tuesday in each month during the session, which begins with October and ends with April.

DR. McMASTER,
Principal Toronto Technical School.

The classes are free to all residents of the city who wish to avail themselves of its privileges. Both sexes are admitted. The course of study to be pursued by any one is optional, and registration and entrance to any class can be made at any time during the session. It is desirable, however, to enter the classes at the opening of the session.

The school has a staff of nine teachers, and the class hours are from 7:45 to 9:45 p.m. each week day evening, excepting Saturdays.

The design of the school is to aid those who have not had the advantage of an education in the early period of life. It is specially intended for the artizans, tradesmen, mechanics, etc., and those who follow the usual occupations of an industrial community.

The nature of the work done is very different from that usually taken up by the ordinary commercial colleges or schools. An enumeration of the subjects taught will give some idea of the work it is doing. They are: Arithmetic and Mensuration, Algebra, Euclid, Descriptive Geometry, Perspective Drawing, Mechanics, Chemistry, Practical Chemistry, in each of which there are both junior and senior classes. Besides these there are courses as complete as the time will permit in Applied Electricity, Heat, Hydrostatics, Steam and the Steam Engine, Hydraulics, Light, Sound, Practical Geometry, Freehand Drawing and Designing, Mineralogy and Geology, and Modelling in Clay. In the draughting room a numerous group of subjects is taken up, as Machine and Architectural Drawing, Industrial Design, Shading, Lettering, Machine Construction, etc.

That the school is doing an important and useful work, and that it is appreciated by the young men of the city, is attested by the fact that the aggregate attendance for last year was 631, while the average nightly attendance for the whole session was 286. This year the attendance is already about 450.

There are no fees for attendance on any of the classes, and each student can take any subject he chooses, or any group of subjects that the time table will permit.

Considerable improvement was made during the holidays by the remodelling of the building and the addition of new class-rooms.

The school is now fairly well provided with apparatus in the more important departments for the practical illustration of the various physical subjects taught. It is intended to make the teaching as practical as possible, and to see that the students know the work and not merely see it done. At the end of the session, or of the work in any subject, examinations are held in the various branches, and certificates are granted to those who succeed. A diploma is also given by the school to those who complete certain definite courses of study. This work, it is thought, will require from three to four years on the part of a student with average ability and but meagre attainments at his entrance upon the course.

Three new teachers have recently been appointed to the staff, and one of the old teachers, Dr. J. McMaster, selected as principal. The new teachers are Mr. James Milne, electricity and steam engine, Mr. D. Hull, mathematics, and Mr. A. W. White, draughting. There are now three instructors in draughting, Mr. E. R. Babington, who also takes modelling, Mr. A. F. McCallum and Mr. White.

Modelling is a new subject and has been added for industrial work. It is well to emphasize the fact that the instruction given by the school is not considered from the side of art, but industrial. It is not intended to train the æsthetic ideas of the pupils so much as to enable them to earn dollars. The class in modelling is at present engaged on the five orders of architecture and is intended for stone cutters.

We subjoin a brief sketch and portrait of Dr. McMaster, the new principal.

John McMaster, B. A., M.D.C.M., the subject of this brief sketch, was born in the county of Simcoe, Ont., in 1857. His parents, who were of Irish lineage, settled in that county a few years earlier. From the age of five till he was twelve, he was as regularly kept at school as the average boy in a newly settled country place can be. At that very early age he learned to plough and became so useful on the farm that he was kept at home, excepting for a few months in the winter. At the age of eighteen it was necessary for him to leave home and to earn a livelihood for himself. At this time his education was very meagre, being confined to reading, writing and arithmetic, at the latter of which he was somewhat expert. As a boy he was very ingenious with his knife, always being mechanically inclined. In spare time, and on wet days, he used to occupy himself making miniature saw-mills, to be driven by a small stream that ran through the farm. Fire-arms made of lead, and bows and arrows of every description, were among his numerous inventions. His desire as a youth was to be an engineer and machinist. In this he never had his father's support, and as he grew older he became more anxious to obtain an education. His first employer owned a small saw-mill and worked a farm besides. John was part of the time engaged in the mill and part on the farm. During this year he bought books and studied Euclid, History and Short Hand Writing. With the money he earned he resolved to begin his own education. After six months in a public school he passed the entrance to the high school, and very shortly afterwards—three months—obtained a second class B certificate. His means being exhausted, he again went to work, and soon secured enough to fit him for teaching. He attended the various training institutions for teachers in this country, and has been engaged in teaching in nearly all the different kinds of schools in the Province. By alternately teaching and studying he was enabled to secure all the different grades of certificates granted by the education department. A degree in arts was the next desideratum. At Toronto University he took a complete honor course in mathematics, graduating in physics in 1886. While there he did not confine himself exclusively to mathematics, but gained a fair knowledge of science, metaphysics and English literature. After graduating he taught mathematics and physics for a few years in different high schools in the province. Not being satisfied with his attainments, he resolved to take up the study of medicine. At Trinity Medical College he took the regular course in medicine, graduating at Trinity University in the spring of 1894. While an undergraduate in medicine he won considerable distinction among his classmates as a student, carrying off his full share of scholarships and prizes.

Before the Technical School began he was engaged as a teacher in the city night schools for several years, and when that institution was commenced in Jan. '92 he was engaged as one of the teachers. Since that time he has remained on the staff, chiefly being engaged in teaching mathematical subjects. The principalship of the school was declared vacant at a Board meeting in August last, and after duly advertising for applications to fill the position, Mr. McMaster was selected from among a number who applied. His duties as principal began at the opening of the school on the 1st of October.

Judging from his active and energetic disposition, and his varied experience in teaching gained in all kinds of schools, as well as his extensive attainments in the various scientific departments of education, we expect an unusual measure of success for this institution.

THE IRELAND BUILDING COLLAPSE.

THE grand jury in New York has found indictments for manslaughter in the second degree against the architect, inspector, clerk, contractor, superintendent and foreman mason of the Ireland building, which collapsed some time ago and killed fifteen people. This seems to be somewhat wholesale condemnation, but it is only right someone should be punished for a catastrope which was the result of carelessness, or worse, somewhere.

The grand jury in addition to the indictments, condemn the building department and its regulations and suggest a number of desirable reforms. The principal changes are as follows: That the soil upon which a building is to be erected shall be examined by a competent engineer, and a certificate filed with the department as to the unit of pressure per square foot the soil will sustain; that the department exercise a vigilant supervision by means of experts, over the laying of all foundations, and require a statement as to character and sufficiency of such foundations before the superstructure is proceeded with. The grand jury strongly condemn Mr. Ireland, censuring him for desiring to drive the best bargain possible, regardless of the safety and lives of the men imperilled by his penuriousness. It also points out that such catastrophe should be impossible in a civilized community, and its occurrence proves either a serious defect in the law or culpable negligence in enforcing it. The provisions of the law allow a load of four tons to the square foot on any soil. The jury think one or one and a half tons the limit of safety on soil of a weak and yielding nature.

The testimony at the inquest proved that the direct cause of the disaster was a reduction in the thickness of the concrete footing of the column which gave way, to less than one third of that indicated in the architect's plans and specifications. This shows that there was culpable negligence somewhere.

PUBLICATIONS.

The two architectural and engineering journals of Australia have recently been merged into one, which we trust will be handicapped by nothing but its title, viz., "The Building and Engineering Journal of Australia and New Zealand and Australian Builder and Contractors' News."

We are indebted to the Builders' Exchange of Philadelphia for a copy of their annual Hand Book and Catalogue. The book numbers upwards of 300 pages, and contains illustrations of the headquarters of the Exchange, portraits of past and present officers, the code of practice governing its members, a list of members, the building and sanitary by-laws of the city, and a vast amount of other equally useful information. The Philadelphia Exchange is perhaps the most progressive and prosperous local organization of builders on this continent.

Hon. Russel Sage and other New York capitalists, with Mr. H. H. McLean, of St. John, N. B., are applying for incorporation to take over the patents of the Gold Car Heating Co. for Canada.

Jeremiah O'Neill, of Toronto, is bringing a claim against the Hamilton Bridge Co. for $1,500 damages arising out of injuries received while employed on the construction of the Simpson building.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

ST. JEAN BAPTISTE EVENING CLASSES.

THE inauguration of evening classes organized by the St. Jean Baptiste Society for the benefit of those desirous of obtaining knowledge in the different branches of art and science opened last week in the Monument National. There were on the platform the Hon. Judge Loranger, in the chair; the General Consul of France, Mr. Kleczkowski; Messrs. J. C. Wilson, Judge Jette, J. X. Perrault, L. O. David, L. I. Boivin, Rev. Abbe Colin, S. C. Stevenson, G. Boivin, Hon. Jos. Royal, J. D. Rolland, Jos. Venne, A. Bonnin and Hon. A. Desjardins.

Messrs. Boivin & Wilson spoke on the teaching of arts and trades, and the professors of the different classes each presented the programme they intend to pursue during the coming season, and discoursed briefly at the same time on the various professions they represent. The following is a list of different classes, together with the names of their professors: Hon. Jos. Royal, Political Economy; L. O. David, Universal History; Jos. Venne, Architecture; J. X. Perrault, Agriculture and Colonization; A. Bonnin, Applied Science.

The teaching in the Architectural class will consist of a series of lectures twelve in number, accompanied by lime-light views, illustrations and special geographical maps. The dates of the lectures are not yet definitely arranged, but are expected to be within a few days. The following are the subjects to be taken up at each meeting: 1st, Cursory View of the History of India, Egypt and Assyria, illustrated by special geographical maps; 2nd, Building Construction in Stone and Brick; 3rd, Greece and Rome; 4th, Building Construction in Wood; 5th, The Middle Ages—the Gallo-Roman period; 6th, The Building Trades, of so-called secondary importance, such as copper, galvanized iron, lead, slate, marble, etc.; 7th, The Middle Ages—the Gothic period; 8th, The Modern Industries applied to Iron and Steel, and the Mode of Transportation, and Mechanical Execution; 9th, The so-called Renaissance period; 10th, Organization of Labor, ancient and modern; 11th, The Present Times; 12th, Retrospective Review.

The classes are entirely free of charge to everybody, and all are invited to attend the same, irrespective of condition and position.

MASTER PLUMBERS' ASSOCIATION.

As the result of a conference held recently between the wholesale dealers in plumbing and heating apparatus and the Executive Committee of the Master Plumbers' Association, a Joint Committee was appointed, consisting of Messrs. James Robertson, of Thos. Robertson & Co.; Mr. McLaren, representing the Toronto Radiator Co., and Mr. Lekyer, representing the Gurney-Massey Co., on the one side; and Mr. Jos. Lamarche, President, and Mr. G. W. Hughes, Corresponding Secretary, of the Master Plumbers' Association, on the other, to devise means whereby more satisfactory trade relations than have heretofore existed may be established.

COUNCIL OF ARTS AND MANUFACTURES.

The Plumbing Classes in connection with the Council of Arts and Manufactures will open shortly. The instruction, as in former years, will be given under the direction of a Committee appointed by the Master Plumbers' Association.

ARCHITECTS' ACCOUNTS.

The daily press having been discussing the two accounts of Messrs. Perrault & Mann, architects, rendered the city of Montreal for professional services, and which seem in the eyes of certain aldermen disproportionately high, a representative of your correspondent met one of the architects, with the object of securing enlightenment on the matter. It appears that the account in connection with the fever hospital is not, as many believe, for services in connection with the existing buildings on Moreau street, as there was no architect whatever for the erection of the building, everything being left in the hands of the contractors, but it is for the preparation of a set of plans, estimates, etc., for a new hospital containing 180 beds, and studies for same, together with the expense of a trip to the States for the purpose of visiting similar establishments there, in accordance with orders given jointly by the local and provincial health departments. As to the other account, the Market Committee having no fixed idea as to what it intended to do, had the architects prepare two sets of plans and specifications, which were considered by the Committee, but finally set aside, and for which the architects claim not to have received a cent. Their charges are only at the ordinary percentage rate on such work for the repairs of the market, which the Committee decided in the end to preserve.

OBITUARY.

An old-time Montreal plumber has recently passed away in the person of Mr. A. Lothian, who at the time of his death was upwards of 79 years old. Deceased came to Montreal from Scotland in 1842, and assisted in the construction of the city water works.

THE CITY AND THE C. P. R.

The understanding arrived at some time ago by the city and the C. P. R., under which a new passenger depot was to be erected in the east end, has been disturbed by the substitution of another plan for the one which accompanied the agreement.

STRENGTH OF BRIDGE AND TRESTLE TIMBERS.*

YOUR committee appointed to report on "Strength of Bridge and Trestle Timbers, with special reference to Southern Yellow Pine, White Pine, Fir and Oak," desires to present herewith, as part of their report, the very valuable data, compiled by the chairman of the committee, relative to tests of the principal American bridge and trestle timbers, and the recommendations of the leading authorities on the subject of strength of timber during the last twenty-five years, embodied in the appendix to this report and tabulated for easy reference in the accompanying tables I to IV.

The uncertainty of our knowledge relative to the strength of timber is clearly demonstrated after a perusal of this information, and emphasizes, better than long dissertations on the subject, the necessity for more extensive, thorough and reliable series of tests, conducted on a truly scientific basis, approximating as nearly as possible actual conditions encountered in practice.

The wide range of values recommended by the various recognized authorities is to be regretted, especially so when undue influence has been attributed by them in their deductions to isolated tests of small-sized specimens, not only limited in number, but especially defective in not having noted and recorded properly the exact species of each specimen tested—its origin, condition, quality, degree of seasoning, method of testing, etc.

The fact has been proved beyond dispute that small-size specimen tests give much larger average results than full-size tests, owing to the greater freedom of small selected test pieces from blemishes and imperfections, and their being, as a rule, comparatively drier and better seasoned than full-size sticks. The exact increase, as shown by tests and by statements of different authorities, is from 10 to over 100 per cent.

Great credit is due to such investigators and experimenters as Professors G. Lanza, J. B. Johnson, H. T. Bovey, C. B. Wing, and Messrs. Onward Bates, W. H. Pinley, C. B. Talbot and others, for their experimental work and agitation in favor of full-sized tests. Professors G. Lanza, R. H. Thurston and Wm. H. Burr have contributed valuable treatises on the subject of strength of timber. The extensive series of small and full size U. S. Government tests, conducted in 1880 to 1882 at the Watertown Arsenal under Col. T. T. S. Laidley, and more recently the very elaborate and thorough timber tests being conducted by the U. S. Forestry Division under Dr. B. E. Fernow, Chief, and Prof. J. B. Johnson of Washington University, St. Louis, afford us to-day, in connection with the work of the above-mentioned experimenters, our most reliable data from a practical standpoint.

The test data at hand and the summary criticisms of leading authorities seem to indicate the general correctness of the following conclusions :—

1. Of all structural materials used for bridges and trestles, timber is the most variable as to the properties and strength of different pieces classed as belonging to the same species, hence impossible to establish close and reliable limits of strength for each species.

2. The various names applied to one and the same species in different parts of the country lead to great confusion in classifying or applying results of tests.

3. Variations in strength are generally directly proportional to the density or weight of timber.

4. As a rule, a reduction of moisture is accompanied by an increase in strength ; in other words, seasoned lumber is stronger than green lumber.

5. Structures should be, in general, designed for the strength of green or moderately seasoned lumber, of average quality, and not for a high grade of well seasoned material.

6. Age or use do not destroy the strength of timber, unless decay or season-checking takes place.

7. Timber, unlike materials of a more homogeneous nature, as iron and steel, has no well defined limit of elasticity. As a rule it can be strained very near to the breaking point without serious injury, which accounts for the continuous use of many timber structures with the material strained far beyond the usually accepted safe limits. On the other hand, sudden and frequently inexplicable failures of individual sticks at very low limits are liable to occur.

8. Knots, even when sound and tight, are one of the most objectionable features of timber, both for beams and struts. The full-size tests of every experimenter have demonstrated, not only that beams break at knots, but that invariably timber struts will fail at a knot or owing to the proximity of a knot, by reducing the effective area of the stick and causing curly and cross-grained fibres, thus exploding the old practical view that sound and tight knots are not detrimental to timber in compression.

9. Excepting in top logs of a tree or very small and young timber, the heart-wood is, as a rule, not as strong as the material farther away from the heart. This becomes more generally apparent, in practice, in large sticks with considerable heart-wood cut from old trees in which the heart has begun to decay or been wind-shaken. Beams cut from such material frequently season-check along middle of beam and fail by longitudinal shearing.

10. Top logs are not as strong as butt logs, provided the latter have sound timber.

11. The results of compression tests are more uniform and vary less for one species of timber than any other kind of test ; hence, if only one kind of test can be made, it would seem that a compressive test will furnish the most reliable comparative results.

12. Long timber columns generally fail by lateral deflection or "buckling" when the length exceeds the least cross-sectional dimension of the stick by 20, in other words, the column is longer than 20 diameters. In practice the unit stress for all columns over 15 diameters should be reduced in accordance with the various rules and formulae established for long columns.

13. Uneven end-bearings and eccentric loading of columns produce more serious disturbances than usually assumed.

14. The tests of full-size long compound columns, composed of several sticks bolted and fastened together at intervals, show essentially the same ultimate unit resistance for the compound column as each component stick would have if considered as a column by itself.

15. More attention should be given in practice to the proper proportioning of bearing areas ; in other words, the compressive bearing resistance of timber with and across grain, especially the latter, owing to the tendency of an excessive crushing stress across grain to indent the timber, thereby destroying the fibre and increasing the liability to speedy decay, especially when exposed to the weather and the continual working produced by moving loads.

The aim of your committee has been to examine the conflicting test data at hand, attributing the proper degree of importance to the various results and recommendations, and then to establish a set of units that can be accepted as fair average values, as far as known to-day, for the ordinary quality of each species of timber, and corresponding to the usual conditions and sizes of timbers encountered in practice. The difficulties of executing such a task successfully cannot be overrated, owing to the meagreness and frequently the indefiniteness of the available test data, and especially the great range of physical properties in different sticks of the same general species, not only due to the locality where it is grown, but also to the condition of the timber as regards the percentage of moisture, degree of seasoning, physical characteristics, grain, texture, proportion of hard and soft fibres, presence of knots, etc., all of which affect the question of strength.

Your committee recommends, upon the basis of the test data at hand at the present time, the average units for the ultimate breaking stresses of the principal timbers used in bridge and trestle constructions shown in the accompanying table.

In addition to the units given in the table, attention should be called to the latest formulae for long timber columns, mentioned more particularly in the appendix to this report, which formulae are based upon the results of the more recent full-size timber column tests, and hence should be considered more valuable than the older formulae derived from a limited number of small-size tests. These new formulae are Professor Burr's, App. I.; Professor Ely's, App. J.; Professor Stanwood's, App. K.; and A. L. Johnson's, App. V., while C. Shaler Smith's formulae will be better understood after examining the explanatory notes contained in App. L.

Attention should also be called to the necessity of examining the resistance of a beam to longitudinal shearing along the neutral axis, as beams under transverse loading frequently fail by longitudinal shearing in place of transverse rupture.

In addition to the ultimate breaking unit stress the designer of a timber structure has to establish the safe allowable unit stress for the species of timber to be used. This will vary for each particular class of structures and individual conditions. The selection of the proper "factor-of-safety" is largely a question of personal judgment and experience, and offers the best opportunity for the display of analytical and practical ability on the part of the designer. It is difficult to give specific rules. The following are some of the controlling questions to be considered.

The class of structure, whether temporary or permanent, and the nature of the loading, whether dead or live. If live, then whether the application of the load is accompanied by severe dynamic shocks and pounding of the structure. Whether the assumed loading for calculations is the absolute maximum, rarely to be applied in practice, or a possibility that may frequently take place. Prolonged heavy steady loading, and also alternate tensile and compressive stresses in the same piece, will call for lower averages. Information as to whether the assumed breaking stresses are based on full-size or small-size tests or only on interpolated values, averaged from tests of similar species of timber, is valuable in order to attribute the proper degree of importance to recommended average values. The class of timber to be used and its condition and quality. Finally, the particular kind of strain the stick is to be subjected to, and its position in the structure with regard to its importance and the possible damage that might be caused by its failure.

In order to present something definite on this subject, your committee presents the accompanying table, showing the average safe allowable working unit stresses for the principal bridge and trestle timbers, prepared to meet the average conditions existing in railroad timber structures, the units being based upon the ultimate breaking unit stresses recommended by your committee and the following factors-of-safety, viz :

Tension, with and across grain	Ten.
Compression, with grain	Five.
" across grain	Four.
Transverse Rupture, Extreme Fibre Stress	Six.
" Modulus of Elasticity	Two.
Shearing, with and across grain	Four.

In conclusion your committee desires to emphasize the importance and great value to the railroad companies of the country of the experimental work on the strength of American timbers being conducted by the Forestry Division of the U. S. Department of Agriculture, and to suggest that the American Association of Railway Superintendents of Bridges and Buildings endorse this view by official action, and lends its aid in every way possible to encourage the vigorous continuance of this series of government tests, which bids fair to become the most reliable and useful work on the subject of strength of American timbers ever undertaken. With additional and reliable information on this subject, far-reaching economies in the designing of timber structures can be introduced, resulting not only in a great pecuniary saving to the railroad companies, but also offering a partial check to the enormous consumption of timber, and the gradual diminution of our structural timber supply.

WALTER G. BERG, Chairman,
J. H. CUMMIN,
JOHN FOREMAN,
H. L. FRY,
} Committee.

*Report of Committee of American Association of Railway Superintendents Bridges and Buildings, presented at Annual Convention, New Orleans, Oct., 1895.

AVERAGE ULTIMATE BREAKING UNIT STRESSES IN POUNDS PER SQUARE INCH.

Recommended by the Committee on "Strength of Bridge and Trestle Timbers."

AMERICAN ASSOCIATION OF RAILWAY SUPERINTENDENTS BRIDGES AND BUILDINGS.—5TH ANNUAL CONVENTION, NEW ORLEANS, OCT., 1895.

KIND OF TIMBER.	TENSION.		COMPRESSION.			TRANSVERSE RUPTURE.			SHEARING.	
			With Grain.							
	With Grain.	Across Grain.	End Bearing.	Columns under 15 Diams.	Across Grain.	Extreme Fibre Stress.	Modulus of Elasticity.		With Grain.	Across Grain.
White Oak	10,000	2,000	7,000	4,500	2,000	6,000	1,100,000		800	4,000
White Pine	7,000	500	5,500	3,500	800	4,000	1 000,000		400	2 000
Southern, Long-Leaf or Georgia Yellow Pine	12,000	600	8,000	5,000	1,400	7,000	1,700,000		600	5,000
Douglas, Oregon and Washington Fir or Pine.	Yellow Fir	12,000		8,000	6,000	1,200	6,500	1,400,000		600	
	Red Fir	10,000					5,000				
Northern or Short Leaf Yellow Pine		9,000	500	6,000	4,000	1,000	6,000	1,200,000		400	4,000
Red Pine		9,000	500	6,000	4,000	800	5,000	1,200,000			
Norway Pine		8,000		6,000	4,000	800	4,000	1,200,000			
Canadian (Ottawa) White Pine		10,000			5 000					350	
Canadian (Ontario) Red Pine		10,000			5,000		5,000	1,400,000		400	
Spruce and Eastern Fir		8,000	500	6,000	4,000	700	4,000	1,200,000		400	3,000
Hemlock		6,000			4,000	600	3,500	900,000		350	2,500
Cypress		6,000		6,000	4,000	700	5 000	900,000			
Cedar		8,000		6,000	4,000	700	5,000	700,000			1,500
Chestnut		9 000			5,000	900	5,000	1,000,000		600	1,500
California Redwood		7,000			4,000	800	4,500	700,000		400	
California Spruce					4,000		50 0 0	1,200,000			

AVERAGE SAFE ALLOWABLE WORKING UNIT STRESSES IN POUNDS PER SQUARE INCH.

Recommended by the Committee on "Strength of Bridge and Trestle Timbers."

AMERICAN ASSOCIATION OF RAILWAY SUPERINTENDENTS BRIDGES AND BUILDINGS.—5TH ANNUAL CONVENTION, NEW ORLEANS, OCT., 1895.

KIND OF TIMBER.	TENSION.		COMPRESSION.			TRANSVERSE RUPTURE.		SHEARING.	
			With Grain.						
	With Grain.	Across Grain.	End Bearing.	Columns under 15 Diams.	Across Grain.	Extreme Fibre Stress.	Modulus of Elasticity.	With Grain.	Across Grain.
Factor of Safety.	Ten.	Ten.	Five.	Five.	Four.	Six.	Two.	Four.	Four.
White Oak	1,000	200	1,400	900	500	1,000	550,000	200	1,000
White Pine	700	50	1,100	700	200	700	500,000	100	500
Southern Long-Leaf or Georgia Yellow Pine	1,200	60	1,600	1,000	350	1,200	850,000	150	1,250
Douglas, Oregon and Washington Fir or Pine.	Yellow Fir	1,200		1,600	1,200	300	1,100	700,000	150	
	Red Fir	1,000					800			
Northern or Short-Leaf Yellow Pine		900	50	1,200	800	250	1,000	600,000	100	1,000
Red Pine		900	50	1,200	800	200	800	600,000		
Norway Pine		800		1,200	800	200	700	600,000		
Canadian (Ottawa) White Pine		1,000			1,000			100		
Canadian (Ontario) Red Pine		1,000			1,000		800	700,000	100	
Spruce and Eastern Fir		800	50	1,200	800	200	700	600,000	100	750
Hemlock		600			800	150	600	450,000	100	600
Cypress		600		1,200	800	200	800	450,000		
Cedar		800		1,200	800	200	800	350,000		400
Chestnut		900			1,000	250	800	500,000	150	400
California Redwood		700			800	200	750	350,000	100	
California Spruce					800		800	600,000		

POSSIBILITY OF SIMPLE AND SAFE HOUSE PLUMBING.*

By Herbert J. Bowman, C. E., Town Engineer, Berlin.

French Gothic Panel.

Mr. President and Gentlemen: — In the Statutes of Ontario, 47th Victoria will be found "The Public Health Act, 1884, and appended thereto a by-law, the enactments of which are in force in every municipality till altered by the Municipal Council.

Sections 15 and 16 of this by-law are practically the plumbing regulations in force all over the Province, except in the cities and towns that have adopted plumbing regulations of their own.

In order to see whether they are so framed as to admit of the "Possibility of Simple and Safe House Plumbing," it may be interesting to examine these enactments, which are as follows:—

Sec. 15. The following regulations regarding the construction of houses shall be in force within this municipality:

Rule 1.—No house shall be built in or upon any site, the soil of which has been made up of any refuse, unless such soil shall have been removed from such site, and the site disinfected, or unless the said soil shall have been covered with a layer of charcoal, covered by a layer of concrete at least six inches thick and of such additional thickness as may be requisite under the circumstances to prevent the escape of gases into such proposed house.

Rule 2.—The drain of every house which may be connected with a sewer or cess-pool shall be ventilated by means of a pipe extending upward from the highest point of the main soil or waste-pipe, and also by a pipe carried upward from the drain outside the walls of the house according to the principles shown in the appended diagram. These pipes shall be of the same dimensions as the said main soil or waste-pipe, and shall be constructed of the same material or of stout galvanized iron, and no trap shall intervene between the said ventilating pipes. In case a trap shall intervene between the sewer or cess-pool, and the ventilating pipes already described, then a four inch ventilating pipe of the same material as above described shall be carried from a point between such trap and the sewer. All such ventilating pipes shall be carried above the roof of the said house, and shall open above at points sufficiently remote from every window, door, sky-light, chimney or other opening leading into any house.

No pipe carrying air or gas from any drain or soil-pipe shall be connected with any chimney in a dwelling house, unless the same be a furnace chimney used exclusively for the purpose of ventilating such soil pipe or drain.

Rule 3.—Every house drain shall be constructed of vitrified earthenware or iron pipe; and every soil and waste pipe, of iron pipe rendered impervious to gas or liquids, the joints thereof being run with lead and caulked, or of lead pipe weighing at least 6 lbs. to the square foot; and the waste pipe from every closet, sink, tub, wash-basin, safe or other service shall have as near as may be to the point of junction with such service a trap so constructed, vented and furnished, that it shall at no time allow of the passage of gas into such house. All joints shall be so constructed as to prevent gas escaping through them.

Rule 4.—The construction of any closet or other convenience which shall allow of the escape into the house of air or gas which has been confined in any part of it or from the drain or soil pipe, is hereby prohibited.

Rule 5.—No refrigerator waste shall be allowed to connect with any drain.

Rule 6.—No pipe supplying water directly to a water-closet or urinal, shall be connected with the pipe supplying water for drinking purposes.

16. Every person who erects, or causes to be erected, any building shall, within two weeks of the completion thereof, deposit in the registry office of the registry division in which the building is situated, plans of the drainage and plumbing of the same as executed; and in the case of any alteration of any such plumbing or drainage, it shall be the duty of the owner of the house, within two weeks of the making of the alteration, to deposit in the same manner the plan and record of any such alteration; if such alteration is made by a tenant, it shall be the duty of the tenant or lessee to deposit, or cause to be deposited the plan and record of such alteration.

In examining these statutory plumbing regulations it must be remembered that they were compiled at least as far back as 1884, and that since that time considerable progress has been made toward simple and at the same time safe plumbing, and the methods of good plumbing practice have become more uniform.

Upon looking at the diagram appended to the Health Act, it will be seen that a trap is placed on the drain between the house and the sewer, but it is also indicted by the dotted lines that this trap may be omitted. Thus it will be seen that the views of both the opposing schools of plumbing experts have been met, one insisting upon a trap on the house drain and the other insisting that no such obstruction should be placed there.

The diagram, however, can scarcely be taken as illustrating a typical Canadian house, as comparatively few houses have two bath rooms.

It would have been better to have shown the necessary arrangement for a kitchen sink on the ground floor and also to have shown the cellar excavated, as is now usually done under the greater part of the house, affording a convenient place for the laundry with its stationary wash tubs or the less expensive slop hopper.

Rule 1, dealing with the soil of building sites, does not come within the scope of our present inquiry, so it may be passed over.

Rule 2 requires the extension upwards of the soil pipe (a) through the roof, but goes on to state that this extension may be of galvanized sheet iron. A sheet iron pipe is a cheap and temporary make-shift and should not be allowed in connection with house plumbing. Nothing but cast iron soil pipe and lead or brass waste-pipe are now used in good plumbing. This rule requires an outside ventilating pipe (b); which is quite unnecessary where no trap is placed on the house drain, and where a trap is used, this ventilating pipe, then called the fresh air inlet, is not usually extended above the roof, but only about two feet above the ground. It is very unlikely that the fresh air inlet would act at all were it constructed bending over the roof as shown in the diagram. This rule calls for still another ventilating pipe (c) in case a trap is placed on the main drain. This pipe is to be carried from a point between the trap and the sewer and extend up above the roof, and is an outlay placed upon the householder to ventilate the public sewer. Any bend in this pipe, as shown in the diagram, will cause it to freeze up during our Canadian winters, and even a straight pipe will sometimes freeze up at the top. Partly on account of this, but perhaps more on account of the additional outlay, from which the householder receives no benefit, the pipe is usually omitted in Ontario.

In most of our cities and towns having plumbing regulations of their own it is now required, or permitted, that a house have but one continuous iron soil pipe from the outer connection with the house drain at least three feet outside the wall, up to the opening at least four feet above the roof, the trap and other ventilating pipes being dispensed with. This is certainly the simplest arrangement and quite as safe as any other. It would be better to cut out the proviso that closes this rule and leave it "No pipe carrying air or gas from any drain or soil-pipe shall be connected with any chimney of a dwelling house."

Rule 3 requires that every house drain shall be constructed of vitrified earthenware or iron pipe. By house drain is evidently meant the private drain connecting the house plumbing system with the public sewer, and vitrified clay sewer pipe is almost invariably used, as outside of the house it answers the purpose equally as well as cast iron pipe and costs less than one quarter as much. Inside the house, however, nothing but cast iron soil pipe and lead and brass waste-pipe should be used. The minimum weights per lineal foot for the different sizes of lead waste-pipe should be given, as nothing but drawn lead pipe is now used. The old method of making lead waste-pipe by hand from sheet lead has been entirely discarded, so that the rule should be amended where it says "lead pipe weighing at least 6 lbs. to the square foot." The requirement that iron pipe shall be rendered impervious to gas or liquids was probably inserted in this rule to ensure a liberal coating of coal tar to the cast iron soil pipe. It has been found, however, that the coal tar varnish covered up sand-holes and other defects in the pipe, so that now untarred pipes and fittings are mostly used after having been immersed in linseed oil to prevent them from rusting. The only proper way to render cast iron soil pipe impervious to gas or liquids is to require a good thickness of metal, and a standard for the different sizes should undoubtedly be laid down in the Public Health Act. This would please the manufacturers, because they would require but one set of patterns; it would please the wholesalers because they would require to stock only the standard sizes; it would please the master plumbers because they would then not fear the dishonest rival underbidding on light pipe; it would please the plumber because it would lessen the danger of having to remove cracked pipes and fittings when the water-test is applied; and last of all it would be a great benefit to the householder, as he would have the foundation of a good plumbing job ensured.

The requirement that the waste from every fixture should be trapped and vented, is a good general rule, although there are some cases where trap vents are not necessary. The word "safe" must have crept into the list of fixtures unawares, as it has long been considered a violation of the rules of good plumbing to connect a safe-waste direct with any drain. Safes of sheet lead were usually placed under the old fashioned boxed-in plumbing fixtures to prevent water from leaky or defective baths, etc., going through the floor and injuring the ceiling below. It is quite possible that sufficient water might never be caught in a safe to fill a trap on its waste, hence it should not be connected direct with the plumbing system, but empty openly into some lower fixture. Fortunately safes are now seldom required since all fixtures are left open and if any water leaks onto the floor it may be easily seen and mopped up. The conclusion of rule 3 is somewhat indefinite, viz: "All joints shall be constructed so as to prevent gas escaping through them." The section of the Toronto plumbing by-law governing this matter is much more practical and is as follows: "Every connection between lead and iron pipes shall be made with brass thimbles or ferrules, having properly wiped joints, and the ferrules shall be properly gasketted, leaded and caulked into the said pipe. Ferrules for four-inch pipe shall weigh not less than two and a half pounds; for three inch pipes not less than one and three quarter pounds, and for two inch pipes not less than one and a half pounds; each ferrule to be not less than four inches in length. All lead pipes shall have properly wiped joints. When the trap to closets is above the floor, the connection of the same with the soil-pipe shall be made of brass and rubber, said brass flange to be not less than three sixteenths of an inch thick and cast."

Rule 4 is a good general rule, but, in spite of it, the writer has recently found in one of our Ontario towns a new plumbing job with the universally condemned pan closet fitted up. The water closet is perhaps the most important plumbing fixture in a house and the styles made are innumerable, although but two types of closets are now generally used. The older of these is the "hopper" closet, consisting of a straight hopper discharging into an S trap, and forming a good closet from a sanitary point of view, although objected to by the fastidious as its walls are not easily kept clean without almost daily attention. In an attempt to remove this objection, the wash out closet was designed, being in reality a distorted hopper discharging into the same form of trap. This arrangement does not remove the filth, but puts it out of sight and where it is more difficult to get at. The true solution of the problem was the construction of a hopper closet in one piece with the walls more nearly perpendicular, and a larger and deeper pool of water in the trap. This forms what has been termed the "wash-down" closet now coming into general use. The remaining type of closet is used in more expensive work and is composed of the various forms of "syphon" closets. These have deep pools of water and have various devices to start syphonic action to remove the contents rapidly.

Tinned copper baths are now the most frequently used, and when "steel-clad," require no work around them and are just as good from the sanitary standpoint as enamsled cast iron or the expensive porcelain baths. The ordinary porcelain basin is defective because there is no means of cleaning the overflow pipe. A removable strainer on the overflow is much more desirable. Kitchen sinks of cast iron, steel and porcelain are in common use. The waste pipe from an ordinary kitchen sink should not be more than 1½ in. in diameter and have an ordinary lead trap properly vented to prevent the seal being syphoned out when the rush of water goes down the soil pipe from the closet.

Rule 5 is a wise one, as no refrigerator waste should be connected direct with the plumbing system. During the winter no ice is placed in the box and the water seal of the trap would soon be lost. There is no objection, however, to have the waste water from the refrigator discharged openly into the kitchen sink or into any plumbing fixture in the basement below, or it may discharge into the trap on the cellar drain. No mention seems to be made in the rules of how cellar drainage should be arranged where it is required.

Rule 6 is intended to prevent contamination of the drinking water in case the water should be turned off in the street main and a partial vacuum thus caused.

Section 16, requiring owners of houses to file in the county registry office plans of the drainage and plumbing of same as executed, seems to be entirely ignored. House plumbing should be constructed so that every detail may be easily examined without a plan, but of course a plan of the outside drainage should be on record somewhere, and if every town had a registry office no better place could be found.

From the foregoing comments the conclusion may be drawn that when the statutes are revised in 1897 some changes and additions are required to bring this portion of the Public Health Act up to date.

* Paper read at annual meeting of Medical Health officers for Ontario, Sept., 1895.

ILLUSTRATIONS.

RESIDENCE AT SWAN LAKE, OKANAGAN, B. C., FOR JUDGE SPINKS—R. MACKAY FRIPP, F.R.I.B.A., ARCHITECT.

ST. JOHN'S CHURCH, NORWAY—CHAS. J. GIBSON, ARCHITECT, TORONTO.

RESIDENCE FOR ARTHUR THOMPSON, ESQ., GLEN ROAD, ROSEDALE—J. FRANCIS BROWN, ARCHITECT.

A COUNTRY CHURCH—C. J. GIBSON, ARCHITECT, TORONTO.

TORONTOS' MUNICIPAL BUILDING.

In a report submitted to the Property Committee of the Toronto City Council a few days ago, Mr. Lennox, architect of the new court house, strongly urged that an iron roof be substituted for the wooden roof shown on the original plan. He pointed out that the building was substantially fire proof, and that a fire could only spread by means of the roof, and that in the event of the timbers becoming ignited, the flames would be uncontrollable at such a height. The character of the neighborhood was, he thought, a great element of danger. He pointed out that iron and fire proof material was fifty per cent. cheaper than when the estimates for the building were prepared.

As to cost, while several plans were proposed, he strongly advised one with steel principals, and beams, and steel rafters, riveted together, and porous terra cotta protection. This, allowing for the reduction in carpenter work by the change, would increase the cost $27,702. An alternative plan was mentioned, to have the roof of slowly burning construction, by having 3½ inch plank protection instead of terra cotta. This would cost $18,202.

When the report came up in the committee for consideration it was determined not to make the change, but Mr. Lennox was instructed to report on the cost of a covering of asbestos under the tiles, and also on the cost of iron beams and marble floors in the corridors instead of wood beams and oak floors.

These further facts came out in the discussion: The stone work will cost about $100,000 over Elliott & Neelon's contract. The plumbing contract, including heating, is the only one not let. Mr. Lennox says he has an offer from one of the largest firms in the city to do it for $78,000 or $79,000. All the stone is now on the ground except about $10,000 worth. About $200,000 more is required for the work to carry it to completion. According to present estimates the total cost will be $1,850,000. Mr. Lennox says there will be no extras.

STUDENTS' DEPARTMENT.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION FOR A CITY STORE FRONT.

THE competitions previously held under the auspices of the CANADIAN ARCHITECT AND BUILDER were especially designed to test the student's ability to properly design and plan various kinds of buildings. The object of the present competition is to test his knowledge of construction. It is to be feared that many students who have the ability to make pleasing sketches are less proficient as regards a knowledge of the character of materials and the proper methnd of employing them in building construction.

With the object, as stated, of bringing to the proof the knowledge of this character which they may possess, students of architecture residing within the Dominion of Canada are invited to submit competitive designs for a city front for a retail jewelry store on a leading street.

The building is to have a frontage nf 35 feet, and to be 5 storeys in height, with a retail store on ground floor, and a side entrance affording access to upper storeys, which are intended to be used for office purposes.

Drawings must be made with PEN and BLACK INK on WHITE cardboard, drawing paper and tracing cloth. On one sheet is required an elevation and plans of ground and first floors of the building, drawn to ⅛ scale; on another sheet, working details of ground floor, drawn to ¾ scale, and sufficiently coarse to admit of reduction to 15 x 10 inches in size.

Each competitor is require to mark his drawings with his nom de plume only, and to forward his drawings, so marked, postpaid, addressed to the editor of THE CANADIAN ARCHITECT AND BUILDER, Confederation Life Building, Toronto, at a sufficiently early date to enable them to reach their destination before 5 o'clock p.m. on the 3rd day of December next, at which time the competition will close.

Each competitor must forward with his drawings a sealed envelope, containing his nom de plume as it appears on his drawings, together with his full name and address, and a brief description of his design, stating the materials proposed to be employed in its erectinn.

The first premiun in this competition is $10.00, the second $5.00, and the third one year's subscription to the CANADIAN ARCHITECT AND BUILDER.

The competition will be decided by a Committee of three members of the Ontario Association of Architects.

THE CANADIAN ARCHITECT AND BUILDER reserves the right to publish any of the drawings submitted. All drawings will be returned to their authors within a reasonable time after the competition is decided.

Competitors are urged to pay strict regard to the above stated conditions. Drawings which do not conform to these conditions will not be considered.

THE REQUIREMENTS OF AN ARCHITECT'S EDUCATION.

THE President of the Architectural Association, in his address at the opening meeting of the Association in London last month, gave the following as the prevailing consensus of opinion regarding the main need of an architect's education: 1 That the system of pupilage or apprenticeship is good as far as it goes, but it does not go far enough. 2. That it should be supplemented by systematic training by skilled instructors. 3. That that training should be directed to stimulate the artistic faculty—to order the imagination, to give the necessary practical as well as theoretical knowledge in all the accessories of the craft; in short, should consist of work in studio, lectures, classrooms, and in workshop.

THE ORIGIN OF FINGER PLATES.

A CURIOUS custom introduced by our forefathers is that of finger plates for doors. It is a custom that is gradually disappearing, but one that dies hard. I have seen (says Ashby Sterry in the Graphic) superb old solid Spanish mahogany doors disfigured by a modern garish finger plate. As far as my experience goes, if one wishes to open or shut a door, one always takes hold of the handle. Probably everyone who happened to be sane or sober would take a similar course I have been endeavoring for some time to trace the origin of the aforesaid finger plates, and have come to the conclusion that they must have arisen from the intemperate habits of our ancestors. Probably when they were so disguised in liquor that they were unable to see the handle of a door, they usually laid hold of the edge at any part where they could conveniently clutch it. In that case the finger plate was doubtless of some service, and those made of corrugated brass, and very popular in days gone by, probably gave a very firm hold when people in general were glad to find something to cling to. But in the present mild days of lemon squash and sobriety, the finger plate is altogether an absurdity, and the sooner it is disestablished the better.

BUILDING MATERIALS SEVERELY TESTED.

IN a series of glass cases in the room of the Public Buildings Commission, at the city hall, Philadelphia, says the Philadelphia Record, are preserved a number of specimens of materials used in the construction of the building which have been subjected to a pressure test by the government machine at Watertown, Mass. A sample brick from those used in the construction of the tower still retains its shape, although compressed into powder by a pressure of 500,000 pounds to the square inch. Its mate, rather dilapidated, did not succumb until 600,000 pounds pressure was reached.

Specimens of the white marble which forms the imposing exterior nf the hall showed remarkable staying power. One cube successfully resisted a pressure nf 800,000 pounds, and a portion of a similar specimen is preserved which cracked only under the enormous pressure nf over 1,000,000 pounds. A report like a cannon shot was heard when it finally gave way, and the commissioners maintain that if a block of marble near the foundation of the city hall should crack, the report could be heard in Kensington.

USEFUL HINTS.

AN English writer gives the following as the best way to finish exterior hardwood: First, give the work a coat of clear raw oil, with the addition of a good paste drier. Let this stand several days to harden. Then thoroughly fill it with good filler, let dry, and then apply three coats of shellac, thorougly rubbing down in oil on each coat, and you will have a job which will last for years.

THE objectionable dark coating which most bronze statues soon acquire, with the look of cast iron, does not consist, according to Herr Buhl, of sulphuride of copper, as commonly supposed, but of a mixture of coal dust, sand, etc., with oxides of the bronze metals. It is not removable, either mechanically or by treatment with dilute sulphuric acid; but on the other hand, it may be very quickly and completely washed off by means of a concentrated solution of carbonate of ammonia, applied with brushes. Thereupon a layer of patina is formed, which guards the statue against fresh formation of the dark coat.

IT is very noticeable, says Edward Hurst Brown in Painting and Decorating, that the rich red shades are again coming into favor for certain sorts of interior decorations, more especially in halls and dining-rooms. Some very handsome papers are shown entirely in reds, in which the designs are self-colored, after the manner of brocades or damasks. Other old fashions that are again coming into use are the papers in imitation of old tapestries, with curious landscapes or pictorial effects, or quaintly colored flowers, highly naturalistic in their coloring, yet on the whole somewhat subdued and sombre, because the general color tone is dark rather than light. In another direction an old fashion is revived when we find papers on the market this season that very closely resemble the old gilts, with a powdering of single or double leaves, in shaded gold, on a plain tint background. There is a certain sweet simplicity about these that cannot fail to make them popular with a great many people who are tired of a great deal of the over decoration that has been done of recent years. The trouble too often has been that our houses have been decorated to death, and there has been no living in peace with eur walls.

HALIFAX SANITARY REGULATIONS.

THE Royal Gazette, the official paper nf Nova Scntia, contains the rules and regulations of the Board of Health, for the city of Halifax, for the guidance of architects, plumbers, householders and others using the water supply, to secure the sanitary condition of buildings. For purposes of comparison we reproduce them.

1. It shall not be lawful to construct or extend any drain for the reception of sewerage or waste water under or into any building, or to connect the same with any public or other sewer or drain, unless the said drain shall in its plan and construction conform to the following requirements:

(a) An effectual hand-hole cleaning trap, of approved description and make, shall be placed in line of drain or soil pipe just before it leaves the premises.

(b) Between the said trap and the foot of the soil pipe (to be situate as remote as possible from any opening into the house) there shall be connected with the main house drain an inlet pipe for the admission of fresh air, four inches in diameter, the mouth of which shall be left open and have a cap, giving an area of one-fourth more than the diameter of the inlet pine;

(c) All soil pipes within the walls of any building shall be of cast iron, and continue to at least three feet above any opening in the roof which may be within fifteen feet of same, and three feet above any opening into any adjoining building or extension, when such building or extension is within fifteen feet of such pipe, and be left open so that the whole of the inside drainage may be thoroughly and constantly ventilated. All soil or vent pipes, when they pass through the roof, must be properly flashed with 5 lb. sheet lead, and made water-tight.

(d) Whenever in the opinion of the plumbing inspector and the city engineer the trap provided for in section (a) would be liable to freeze, it may be dispensed with, and the fresh air inlet provided for in section (b) will not be required;

(e) The soil pipe shall have two cleaning out screws, one to be about twelve inches above and in front of the bend of the basement floor, and the other between the said bend and the outer wall of the house;

(f) All drains and plumbing fixtures of any house or other building shall be provided with sufficient traps and vents to prevent gas from the sewer, drain or waste pipes from escaping into any apartment, and each such fixture shall have its own trap, with sufficient vent; said trap to be placed directly under and as close as possible to fixture;

(g) No fixture shall drain through more than one trap (main trap excepted); the vent to be not less than one size smaller than trap, and no vent of less than one and one-quarter inches in diameter; all traps must be protected from syphonage by special vent pipe;

(h) No trap vent pipe shall be less than three inches in diameter where it passes through the roof, and all vent pipes must continue to rise after leaving the trap, and pass out through the roof or connect with the soil pipe;

(i) The rule for soil pipe terminus, as hereinbefore mentioned, shall govern said vent pipe;

(j) Vents of water-closet traps shall be two inches for a length of twenty feet and for a greater length three inches in diameter;

(k) No safe-waste, range boiler, refrigerator waste or cistern overflow shall be allowed to connect direct with any drain; the end of such wastes shall be covered by flap valves;

(l) Waste from bath and basin will not be allowed to connect to water closet bend, but must have a separate fitting or connection to receive the same, except where the bend is iron and situated below the ceiling;

(m) The waste pipe of bath, basin or any fixture shall not be connected with the trap of a water closet or any other fixture. Exit pipes of all fixtures, except water closets, shall be furnished with suitable attached strainers. Overflow pipes from fixtures must in each case be connected on the inlet side of the trap.

(n) The overflow pipe from the water closet cistern shall not be directly connected with the soil pipe of any fixture;

(o) No pan closet shall be fitted up in any building, and no closet or other convenience which allows the escape into the house of air or gas which has been confined in any part of it, or from the drain or soil pipe, or which allows the accumulation of filth in or about it, shall be fitted up or used;

(p) Sinks in all hotels, restaurants, boarding houses, laundries, or other places where the engineer or inspector of plumbing or other officer approved by the Board may direct, shall be provided with suitable grease traps.

2. Each house or building must have its own separate soil pipe and drain, and such soil pipe or drain shall be so placed as to be always readily inspected without destruction to walls, and the plumber shall be responsible for the proper connection of his work with the system of drainage, which connection shall be made by a cast iron bend and five feet of pipe extending horizontally from the vertical soil pipe, and no two or more houses or buildings shall have a drain in common until such separate drain passes outside the walls of the house or building which it serves. Where buildings are constructed flush with the line of the street two buildings may be connected with one six-inch or larger street drain with a Y junction placed immediately in front of wall. All drains must be properly connected with the private drain, and not covered until inspected. In no case shall the drains between the walls of the house and the street line be laid until the private drain from the street line to the public sewer has first been laid and completed. Changes in direction of soil pipes shall be made with curved pipes, and connections with horizontal pipes shall be made with Y branches.

3. No iron pipe shall weigh less than the following per length of five feet:

6-inch diameter,	.....	100 lbs.
5-inch "	.....	85 "
4-inch "	.....	45 "
3-inch "	.....	30 "
2-inch "	.....	20 "

All pipes, traps, bends or fittings shall be of good quality, and shall be free from flaws or defects, and shall be of uniform thickness. No inverted joints of any kind will be allowed below any fixture.

4. Every connection between lead and iron pipes shall be made with brass thimbles or ferrules, having properly wiped joints, and the ferrules shall be properly gasketted, leaded and caulked into the said pipe. Ferrules for four-inch pipes shall weigh not less than 2½ lbs.; for three-inch pipe, not less than 1¾ lbs., and for two-inch pipe, not less than 1 1-2 lbs., each ferrule not to be less than four inches in length. All lead pipes to have properly wiped joints. Where the trap to closet is above the floor the connection of the same to the soil pipe shall be made of brass and rubber, said brass flange to be not less than three-sixteenths of an inch thick and cast.

5. No lead waste or vent pipe shall weigh less than the following:

1	inch in diameter....	6	lbs. per yard.	
1 1-4	" "	7	"	"
1 1-2	" "	8	"	"
2	" "	10 1-2	"	"
2 1-2	" "	13 1-2	"	"
3	" "	16 1-2	"	"
4	" "	24	"	"

Trap vent pipes may be standard iron, with steam fittings: sheet metal will not be allowed. All traps and fittings shall be equal in quality and thickness to the pipe to which they are attached.

FOR WATER SUPPLY PLUMBING.

6. Hereafter it shall be unlawful for any person (except the officers and servants of the city in the discharge of their duties) to attach, put in, lay or re-lay, introduce, extend or alter any water pipe, tap, fitting, apparatus or appliance, by or through which city water may be supplied, drawn, distributed or used, unless such person or his employer holds a license from the city as a duly authorised plumber for that purpose.

7. Application for laying of service pipes shall be made in writing at the city engineer's office and upon the required forms.

8. Every house or building separately assessed on the line of street is entitled to one-half inch service pipe. Where pipe is supplied larger than half-inch an extra charge will be made.

9. No two premises supplied with water from the water works shall be dependent upon one service pipe beyond the street line, but each separate and distinct tenement or premises shall be supplied through a separate pipe provided with proper stopcocks or other means of cutting off the water.

10. All service pipes upon the premises of water takers shall be laid at a depth of not less than five feet below the surrounding ground, and must not be turned up or laid at a less depth where they pass through or under a cellar wall or into or through any private premises, and where they cross or are near any other excavation, they must be properly protected against settlement.

11. In all cases the water taker must show that the pipe laid within his premises is laid in accordance with the requirements of the city, and unless the same is shown to the satisfaction of the city engineer, connection shall not be made with the street pipe.

12. When a service pipe has once been put into a house or premises by the city, the owner or occupant of the premises consenting, or not objecting, to the position of such service pipe, then no subsequent removal of such service pipe shall be made except at the expense of the owner, agent or occupant of the said premises.

13. For water works pressure no lead pipes shall weigh less than the following:

⅜-inch internal diam.,	4 lbs.	per lineal yard.	
½-inch	"	6 lbs.	" "
⅝-inch	"	8 lbs.	" "
¾-inch	"	10 lbs.	" "
1-inch	"	13 lbs.	" "

14. All water supply pipes shall be laid with due regard to danger from freezing, and be properly laid and graded, with a fall to a stop, and wastecock placed in the cellar or other convement point where they can be entirely drained off.

15. All pipes in buildings must be so laid and placed as to be easily accessible.

16. Water pipes or fittings on private premises must never be laid, carried along or put near any external wall, doorway or window opening, or in any exposed position or other position where they would be liable to freeze, without being thoroughly boxed in, encased or protected to the satisfaction of the city engineer, or his authorized officer, so as to prevent the action of frost.

17. If necessary to prevent freezing, the pipes must be carried at a sufficient depth underground below the cellar to some convenient point in the interior of the building, from thence the pipes must be properly encased in suitable boxing of ample size, stuffed with some suitable approved non-conducting material, the pipe being carefully placed and secured in the centre of the box.

18. In case of leaky or improper pipes or fixtures on any premises, the city engineer shall have authority to cut off the supply of water by shutting off the stopcock or by detaching the service pipe from the main, and before the water is again turned on the pipes and fixtures shall be repaired or altered as required, and the cost of detaching and re-attaching or of turning off and on the water shall be paid by the person owning or occupying the premises, and no person supplied from such service shall have any claim against the city by reason of such cutting off of the water.

19. Whenever any water taker has reason to fear that the water may freeze in any of the pipes or fittings on his premises, in spite of all precautions taken to prevent the same, he must be careful to see that the water is shut off from the premises at the stop and waste cock, and the pipes emptied of water, except when actually needed for use.

20. The fact of water being found running to waste from any pipe, tap or other water fitting will be held to be sufficient notice from the city engineer that the water is to be at once shut off from the premises as required by law. Water takers are cautioned that as a rule any noise heard in a pipe, even though no defects are visible, is an indication o

leakage and waste of water somewhere on the premises, and calls for immediate investigation and stoppage.

21. All persons shall keep their service pipes, stop-cocks and other fixtures on their own premises and from the line of the street in good order and repair, and protect from frost, at their own risk and expense.

22. Stop and waste cocks must on no account be covered up with coals, vegetables, or anything which will prevent the inmates of the house or the water inspector from getting access to them at once. And whenever any licensed plumber is called into any premises, his first care shall be to see that this rule is attended to, also to see that the stop and waste cock is in good order and easily turned.

23. Taps, faucets, cocks or fittings in porches or sheds, or outside of buildings are strictly prohibited. Any such supply required must either be by means of a suitable approved hydrant or by special written sanction of the city engineer.

24. The water supply to stables, barns, outbuildings or any other description of buildings or property must come under the operation of Rules 10, 11, 15, 16, 17, 21, 22, and 23, and must conform in all other respects with the requirements of these rules and regulations. If after every practicable precaution has been taken the pipes or fittings cannot be wholly and effectually protected against the action of frost in the severest weather they must be cut off and removed, or an approved hydrant with valve well below the reach of frost may be substituted in order to procure the required supply.

25. All urinals, except those which are especially sanctioned by the city engineer, and rated by the works department, shall either be supplied through a meter or shall have some approved valve or apparatus attached thereto, or in connection therewith, by which the same can be flushed, with not more than two gallons of water, at intervals not exceeding thirty minutes, or with not more than one gallon at each time of use.

26. After the 31st day of December, 1896, it shall be unlawful for any person whomsoever to have upon his premises, and connected with the city water supply pipes, any water closet which is not provided with a suitable and effective valve and cistern, or other substantial arrangement, approved by the city engineer, by which the water supply may be cut off automatically after flushing the closet with a quantity of water not exceeding three gallons each time it is used.

The remaining rules provide for permits, inspection, licensing of plumbers, appointment of inspectors and their duties, penalties, etc.

NEW PATENTS.

THE last issue of the Patent Record contains notice of the granting of a number of patents relating to architecture and building. Like so many of the patents taken out, some of them are of little practical utility, but we give a list, with some notes, so that if any of our readers wish to look further into them they may have the opportunity of doing so.

Water Closet—P. H. Howard, assignee of Wm. T. Fox, Rochester, N. Y.

Roofing Tile and Machinery for manufacture of same—Abraham Weil, Steinheim, Prussia. The claim in this case consists mainly in a packing consisting of a metal plate, which is slit and bent back, bringing about an intimate connection of the tiles and augmenting the durability of the roof.

Combined Screen and Storm Door—Chas. C. Wheeler, Holland, Michigan. This door is so made that wire screen can be used in summer and panels in winter on the same frame.

System of Heating Buildings—John D. McEachren, Galt, Ont. All the hot water is conveyed, by this system, from the heater to an expansion tank in the upper part of the building, whence it is distributed to the radiators.

Means of Applying Paints and Varnishes—H. C. Cleaver, London, England. This is a plan by which paint is sprayed from a tank by means of an air pump or compressor. It is substantially the plan adopted at the World's Columbian Exhibition buildings.

Window Screen—Chas. C. Wheeler, Holland, Michigan. This screen is so constructed as to permit of its extension to fit windows of different size.

Ladder—Thos. J. Quinn, assignee of Mark A. Walker, Detroit, Mich. Simply an extension ladder.

Hot Water Heating Apparatus—The Phoenix Hot Water Heater Co., assignee of S. N. Murgittroyd, Phoenix, N. Y. A new form of construction of hot water heater.

Machine for Bending and Trimming Metal Shingles—The Metallic Roofing Co. of Canada, assignee of C. W. Conner, of Montreal.

Cornice Mould Embracing Frame—Henry Burbidge, Kentville, Nova Scotia.

Hot Air Heating Apparatus—C. P. Shindler, Vancouver, B.C. This is a combination of a fire frame with an angular shaped coil.

Artificial Stone—Wm. Owen, London, England.

Sewer Pipe—Moise Courtemanche, Montreal. Means of securing opening in the side of sewer pipes.

Paving and Roofing Composition and method of making the same—The Asphaltina Co. of America, assignee of J. A. Just, Syracuse, N.Y. (3 patents). The first is for a composition made by adding resin and sulphur to petroleum sediment. The second is for a composition made of a calcium resinate, a heavy hydrocarbon, tar and sulphur. The third is for a composition made by treating tar with sulphur.

Method of Manufacturing Cement—Jasper Whiting, Chicago, Ill. Molten slag is chilled, dried and ground, and caustic soda or lime added to form this cement.

Warm Air Register—Charles H. Foster, Omaha, Nebraska. This register combines a frame, with guard, valve panel, foot rest and dust receptacle.

Sash Lift, Balance and Lock—F. H. Peters, Montreal. A sash lift, balance and lock in combination.

Metallic Shingle—Frederick Crawford, Toronto. A new form of metal shingle.

A NEW CANADIAN PAVING MATERIAL.

AN experiment has been made at Cleveland, Ohio, in the use of trap rock as a paving material, and it promises to result very satisfactorily. A foundation of crushed limestone, ten inches thick, is laid; above this is placed the trap rock, eight inches thick, arranged in three layers—coarse screenings, fine screenings and dust. The trap is obtained from quarries near St. Joseph's Island, St. Mary's River, at the north of Lake Huron. The rock can be had for little more than the cost of quarrying and transportation, and the pavement as laid down cost $3.10, $3.19 and $3.65 according to grade. Two miles have been laid in Cleveland and it promises well. Trap is used extensively in Germany for road making.

ARCHITECTS AND BUILDERS IN CONVENTION.

The American Institute of Architects held its twenty-ninth annual convention at St. Louis, during the third week of October. One of the matters considered was a classification of the membership into four grades, which was determined upon. The questions of education and the licensing of architects received much consideration. This we shall have occasion to refer to more fully at a future time. A permanent home for the Association is proposed, probably at the national capital, and a committee was appointed to deal with it. Fire protection was also considered, but the association seemed disposed not to take the initiative, and it was left in the hands of a committee. A number of interesting papers were read. The next convention will be at Nashville, Tenn.

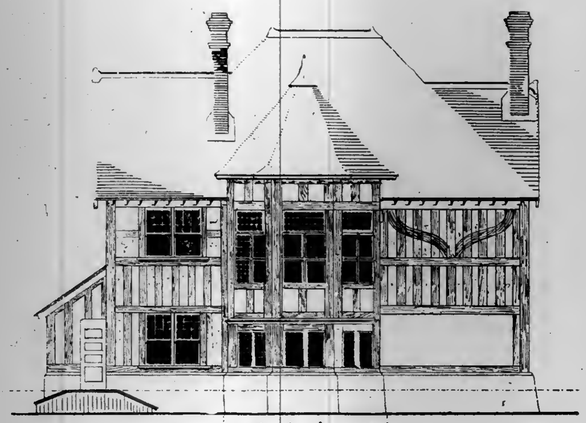
The National Association of Builders met at Baltimore the same week. The greater part of the time was spent in rearranging the constitution, provision being made for state associations. Next year's convention will be held at Buffalo.

A WORKMAN'S SUIT FOR DAMAGES.

While working at the new court house in Toronto, on the 20th of September, 1893, Samuel Garland met with an accident, through a four ton stone falling from a derrick, whereby his foot was crushed. He sued the city for $3,000 damages, the case being tried before Judge Street in April, 1894. It resulted in a non-suit, but on appeal a new trial was ordered, and the case came up again recently before Judge Meredith. The jury was chosen entirely from the country, and the verdict was again in favour of the city. The plaintiff's foot had only one small bone broken, but it was so badly bruised that it will always be disabled.

One of the points involved was as to the method of lifting large stones at the building. It was the custom to raise them by means of chains placed around them, but in this instance the stone was lifted by dogs, which tore out and allowed it to fall. The evidence established, however, that the plaintiff and a man who was working with him, who was not a foreman or anyone he was bound to obey, were wholly responsible for the accident, and that therefore the city could not be held for damages.

The Toronto Radiator Mfg. Co. have recently erected extensive additions to their buildings on Dufferin street. The ground floor of the new buildings is conveniently fitted up as offices and show rooms, the upper floors being used for manufacturing purposes.



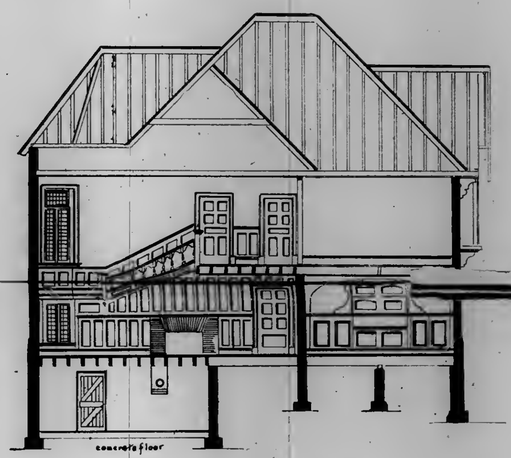
cellar for furnace

Back Elevation

Elevation towards Vernon

Scale Scale- one eighth of an inch to a foot of feet

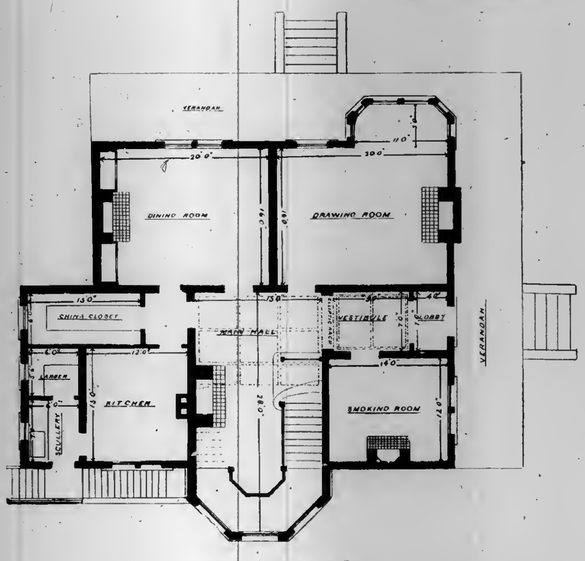
Elevation to Swan Lake



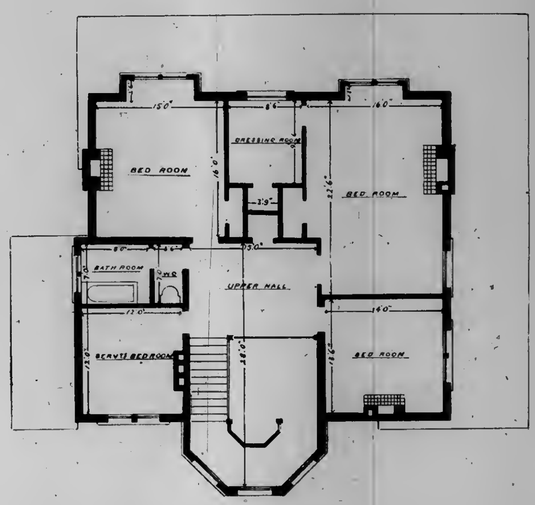
Section on A B

Residence erected at Swan Lake Okanagan B.C. for Judge Spinks

R. Mackay Fripp f.r.i.b.a. Architect March 1892 Vancouver B.C.



GROUND FLOOR PLAN



FIRST FLOOR PLAN

RESIDENCE FOR ARTHUR THOMSON ESQ.
GLEN ROAD ROSEDALE.
J. FRANCIS BROWN ARCHITECT.
BOARD OF TRADE BUILDING
TORONTO

CHAS. GIBSON, ARCHITECT
TORONTO
Country Church.

CANADIAN ARCHITECT AND BUILDER.

VOL. VIII.—NO. 12. DECEMBER, 1895 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

D. B. DICK	Toronto.
W. A. EDWARDS	Hamilton.
F. J. ALEXANDER	Ottawa.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON — Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. C. HUTCHISON, Montreal.
1ST VICE-PRESIDENT	A. T. TAYLOR, Montreal.
2ND VICE-PRESIDENT	J. E. PEACHY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

CHAS. BAILLAIRGE	Quebec.
ROBT. FINDLAY	Montreal.
J. Z. RESTHER	Montreal.
A. H. LAPIERRE	Montreal.
G E. TANGUAY	Quebec
THEO. DAOUST	Montreal.

AUDITORS—A. J. FOWLER and C. CHAUSEE, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.
JOHN ALDRIDGE, 1st Vice-President.
WM. PARK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
JAS. CRANG.
WM. PEARS.
FRED. WAKEFIELD.
WM. BOOTH.
JAS. ISAAC.
H LUCAS.
H MARTIN.
THOS. CANNON, Jr.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

THE eighth year of publication of the CANADIAN ARCHITECT AND BUILDER comes to a close with the present number. An index to the contents of this volume is presented herewith. At the commencement of a new volume and a new year, we may have a few words to say with regard to the progress achieved. Meanwhile, we heartily extend to every reader best wishes for a Happy and Prosperous New Year.

THE old Upper Canada College Buildings, Toronto, which it was proposed a year or two ago to use as a public museum and art gallery, are now occupied as a manufactory of tinware. "To what base uses do we come."

MONTREAL is to lose its distinction of having the largest bell on the continent of America. A Cincinnati foundry is about to cast what will be the largest swinging bell in the world for a church in that city. Its tongue will weigh 640 lbs.

THE Architectural Sketch Club, of Toronto, has been re-organized as the Toronto Sketch Club, and will, we trust, do much to encourage good work among its membership, which embraces the students in the various architects' offices in the city. The organization is informal in its character and is intended to cultivate the social as well as the professional element among its members. There will be competitions for designs and at each meeting a critic chosen from among the architects.

THE new Jamieson building at the north-west corner of Yonge and Queen Streets, Toronto, shows a rounded corner at the street junction, and serves to emphasize the great advantage which would have been secured by rounding in a like manner the corner of the new Simpson building. The opportunity is now past, so far as this building is concerned. Immediate action should be taken, however, to ensure, at least, the rounding of the north-east corner, on which stands at present an old and inferior building such as cannot much longer be allowed to occupy so valuable a site. While the opportunity of greatly improving the appearance of the city which existed by reason of the destruction of the former Simpson building has gone by, the importance of providing means of relieving the street traffic at this point should now be estimated at its proper value.

THE Art Student's League, of Toronto, is holding its annual exhibition at Roberts' gallery, on King street. There is some very creditable work on exhibition, showing that the League is doing good work. The exhibition is well worth a visit.

AN important step has been taken towards the building of the proposed bridge over the Hudson at New York. The general plans of the bridge have been approved by the War Department. The next step is the fixing of the exact location, when the detail plans can be completed, and then the projectors will be in a position to make their financial arrangements and go on with the construction of the bridge.

UP to 1st October buildings were erected or altered in New York this year to the number of 5,254, of which 86 cost $100,000 or over each. The total cost of these 86 buildings was $20,000,000. Of the entire number of buildings 2,067 were tenements or flats, and houses for residential purposes. New York seems to grow, but we fancy it will be some time before it ranks as the third city in the world as to size, notwithstanding the placing of it there by some of the United States journals.

M. L. WUARIN, a Frenchman who writes in the Revue Scientifique, on "Buildings in the United States," gives the latter nation much praise for the way they plan their houses and their household management. Among the things he commends are the interior drainage, free use of water, hygienic plumbing, heating (hot water heating), cooling methods, including the mechanical fan, distribution of hot water, laundry arrangements, methods of putting in coal, and last but not least, the district telegraph system. Old nations can sometimes learn a great deal from the new.

WE hear occasional complaints of the working of the lien law in Ontario, one being that a person who supplies building material may, by the collusion of the party who sells the land and the builder, be done out of his just rights. It is impossible to frame a law to meet every possible case, and if parties make up their minds to act dishonestly they can always find means to do so. We understand that since the lien law was amended in 1893 it has proved much more satisfactory than formerly.

A DEPUTATION of commercial travellers recently waited upon Hon. R. Harcourt, who has charge of the license branch in the Ontario government, and complained of the unsanitary conditions which prevail in country hotels, urging that steps should be taken to remedy this state of affairs, by the appointment of an inspector, or otherwise. Unfortunately there is good reason for the complaint, but the conditions referred to exist chiefly where there is no proper water supply or drainage system. It is probable the coming session will witness legislation to remove the cause of complaint.

A PROPOSAL to pull down the old court house in New Orleans, to make way for a more modern building, is meeting with much opposition, and justly so. The old building was the government house in the days of French and Spanish rule in America, and more history and romance cluster around it than perhaps any other building on the continent. If New Orleans wants a new court house let it be built on another site, and preserve the old building as a museum or art gallery, or something of that sort. There is too much of a tendency to remove the ancient landmarks. Boston is perhaps an exception to this rule.

THE Carmelite Monastery at Niagara Falls, Ont., is trying an experiment in heating by electricity, which will be watched with interest. The whole building will not be so heated, but having arranged for a fixed amount of power, all of which is not required for other purposes, the surplus is to be employed for heating. Electricity is not an economical agent for heating so far, and is used on street cars on account of its convenience, and because the current cuts no figure in the railway's expense account. But it will be employed at the monastery under favourable conditions, and the result will be of service in arriving at the relative cost as compared with other methods.

GREAT apprehension is felt lest the Church of England body in Toronto should lose St. Albans Cathedral, or rather the portion of it already built, the building and the land on which it stands being heavily mortgaged, without any money to meet the indebtedness. The hard times have, in common with many other institutions, seriously affected their revenue. Some time ago an appeal was made, but it met with a very small response, and now another request is made to save the property. A contribution of one dollar per member is asked for. It would be unfortunate if the building passed out of the hands of the church, as a large expenditure has already been made upon it.

WHILE it is unquestionably the duty of every architect to guard the financial interests of his clients, he should be equally careful to do justice also to the rights of contractors. Bitter complaints are sometimes heard of the manner in which architects, in the employ of wealthy clients, are accustomed to exact from their contractors an unnecessary amount of work, and put them to so much needless expense that on the completion of their contracts everything in the shape of profits is found to have been wiped out. In some cases the wealthy client instead of the contractor should have been called upon to pay the cost of the extra work required. We know of instances in which contractors, who faithfully tried to carry out their work in the best manner, became discouraged by the penuriousness and lack of consideration of the architects by whom they were employed. Such contractors are none too plentiful, and it is a pity that they should be forced into the belief that work skilfully and faithfully performed will bring no greater reward than if done in an inferior manner. We constantly hear comparisons made between the ancient skilled artisan and the artisan of to-day, and the desire expressed that it might be possible to obtain at the present time work equal in quality to that of former centuries. Yet how often does it happen that the skillful workman is put on a par with the inferior workman as regards the price which he shall receive for his work. If he is not willing to bring his price down to meet the tender of a man of inferior ability, in the majority of cases he loses the work. This is a poor method of encouraging a high standard of skill and honesty on the part of contractors, and we trust that this reference to the subject will cause architects who may have done injustice to contractors to extend to them a greater amount of consideration in the future.

THE purposes to which paper is now applied are almost numberless and cover every variety of industry. One of the most recent, in connection with the building trade, is for plastering. Two factories are in operation in the United States, one at Buffalo and one at Toledo, for the manufacture of paper plaster, and a third is about to go into operation at Fulton, West Virginia. About fifty men will be employed at the latter. The new plaster is practically fire proof, it can be put on in the coldest weather and will not crack, it is one fifth lighter than the old plaster and almost indestructible, and it can be used for roofing purposes also.

RATHER an odd suit came before Judge Morson at Toronto recently, in the Division Court. It will be remembered that Mrs. Dr. Oldright some time ago recovered $3,600 damages from the Grand Trunk, for injuries received by stepping into a hole at the new Union Station. At the trial Mr. Wm. Laidlaw, Q. C., who was her solicitor, used a plan of the station, which was produced by the G. T. R. and put in as an exhibit. The plan was made by Messrs. Strickland & Symons, architects for the G. T. R., and they now sue Mr. Laidlaw for $25, the price of the plan, saying that he ordered it. Mr. Laidlaw, on the other hand, alleges that the Grand Trunk had it made.

THE Southern Architect makes a strong plea for training the public taste in architecture and offers a suggestion as to how it can be done. The papers print a great deal of what is known as boiler-plate matter, that is, miscellaneous articles which are furnished in the form of stereotype plates, some of it good and some very inferior. The Architect suggests that articles should be prepared under the direction of the various associations of architects, stereotyped, and furnished to the papers at low cost, when they would no doubt gladly be published. It points out that at present architects are endeavoring to teach the public by an occasional artistic building, and that the process is very slow. It further advocates, by this means, the development of a style of architecture adapted to its own locality—the South which in time would grow into a renaissance. In the latter is there not a suggestion for Canada? Why not have a Canadian order of architecture? It would be of slow growth, it is true, but it will never come if a beginning is not made.

A DISTINGUISHING feature of modern house planning is the wide portiere entrance between apartments on the ground floor which apartments open into a square hall. Heating contractors complain that this kind of plan renders exceedingly difficult the proper heating of the house. It is claimed that if the radiating surface in a house of this description is evenly proportioned as between up and down stair apartments, the latter will be very inefficiently warmed, while the temperature of the former will be uncomfortably high. A heating contractor told the writer that he got over the difficulty by giving to the down stair apartments 75 per cent. more radiating surface than was called for by the rules of the heating authorities, and deducting in equal ratio from the up stair rooms. This arrangement is said to have worked satisfactorily. Presuming these statements to be substantially correct, it is clearly apparent that satisfactory results cannot be achieved by following any hard and fast rules on the subject, but that methods must be varied to fit the conditions.

THE ruinous competition amongst contractors in the smaller towns and villages is due in a great measure to the fact that workmen, when out of employment, become ready to snap at anything that gives promise of remuneration of any kind. Men who may be good mechanics in their several callings, but who know little or nothing of estimating, and less of the management of men or work, put in bids for contracts that are either away above the mark or ridiculously low. The former does little harm, as the overgrown tender is never considered, but the low tender injects its poison into the whole transaction, and leads the owner to believe that the legitimate tenders are much too high and that an attempt to take advantage is being made. This state of affairs generally ends in either awarding the contract to the incompetent low bidder or a second call for tenders. If the first, the contractor usually bungles the whole matter, partly from lack of knowledge and partly from the fact that he soon discovers there is no money in the job for him; then comes a series of schemes and efforts to slight the work and cram in inferior material, against which the architect or inspector "kicks," with the result that the contractor gets deeper and deeper in the mire, until at last, in despair, he either throws up the work or lowers his head to the inevitable, which is often ruin to himself and family. If new tenders are called for, the legitimate contractors, in their effort to keep out the "workman," will cut down their estimates to starvation rates, while the "incompetent" in his eagerness to get work, makes further reductions in his tender, thus dropping into the "trap" prepared for him by the regulars, and as a rule, his low figures catch the owner, in spite of the advice or protests of the architect, and the result is trouble and confusion all round, and oftentimes severe loss to the owner. This is a sad and injurious condition, but it exists in every town in Canada, and should be brought to an end. Can it be controlled? With proper management we think it can.

SHOULD ARCHITECTS BE LICENSED.

IT is probable the next session of the Ontario legislature will witness the passage of an act restricting the use of the title "Architect" to those who have taken a course of study and undergone an examination on the subjects comprised therein. Such a bill was introduced last session, but it did not reach its final stages before the house was prorogued. Some opposition was offered on the part of the Patrons, but when the matter was presented to them in its true light they withdrew their objections and agreed to allow it to pass. There seems to be nothing now it the way to prevent such a measure being placed on the statute book.

We do not know that there is any necessity for us to urge such a measure at length. The matter has already been fully discussed in our columns, and our views expressed. If it is necessary in the public interest to license medical men, who have to do with the lives of the people, and the legal profession, who have the welfare of their property in charge, why should it not also be required in the case of architects, upon whose work the safety of both life and property depends? It seems

strange that a surveyor, who lays out a piece of property upon which a building is to be erected, should have to undergo a course of training and pass an examination before he can do so, while the architect, who plans and superintends the erection of the building, the most valuable and important part of the property, involving considerations of comfort, safety and the pocket, may be a man utterly incompetent for the work which he undertakes to perform. The evil results of such incompetence is seen in a disaster like that of the collapse of the Ireland building in New York, which involved not only great destruction of property but the loss of fifteen lives.

But apart from this view of the matter, we should aim at improving our style of architecture. Why should our streets be lined with architectural monstrosities, when for the same money a building might be erected, which would be a thing of beauty and a joy forever? Architects should be artists as well as engineers and expert builders, and it is only by education that their tastes can be cultivated, and they become qualified to design buildings in which beauty may be combined with utility.

The great objection urged against a measure such as that referred to, and it has been brought against the medical and other similar licensing acts, is that it creates a close corporation, and that the examining and licensing body, composed necessarily of experts, is disposed to lay down such restrictions as to create a monoply for its own benefit. While we admit that there is some force in the objection, such an evil can be guarded against by having the rules for admission, and tariffs of charges, made subject to approval by the lieutenant-governor in council, or some other competent authority, who would see that all interests were properly guarded.

It is not the intention of the proposed act to interfere with the right of any person to plan his own building, or to employ anyone else, no matter who, to prepare his plans. It is proposed only to restrict the right of using the term "Architect" to those now practising, and to such persons as in the future shall take a proper course of study and undergo the prescribed examinations. Under the act of 1890, incorporating the Ontario Associations of Architects, the title "Registered Architect" is given to such as have or may qualify, but the distinction between "Architect" and "Registered Architect" is too fine for the general public to understand, and the provisions of the present law have, therefore, failed in their purpose, and the public have not received the protection which it was designed to give. The proposed act is, we consider, one which may well be enacted in the interests of the people.

A number of states in the American union are likely to pass similar measures. In New York such a bill was before the legislature at its last session, but did not pass. It will probably come up again at an early day, and Illinois and California, with no doubt others, will soon have such laws.

Mr. R. M. Fripp, architect, of Vancouver, recently gave a lecture on "Simplicity in Architecture."

Mr. A. C. Hutchison, the well known architect of Montreal, is announced to give a lecture on Rome, illustrated with stereopticon views, in St. James Square church, Toronto, on the 20th of December. Mr. Hutchison has recently returned from a trip to Europe, and his lecture will doubtless be full of interest.

ABOUT PAVING MATERIALS.

Although asphalt has come into pretty general use for street paving, there are some serious objections to it, and it is evident that we have yet to discover something which will be better adapted for street paving than anything now in use. Asphalt is expensive, and in damp weather, or a moist climate, is so slippery as to be unsafe. As a test on the latter point a record was kept by the city engineer of London, England, of the accidents arising from the condition of the streets, for fifty days, with the following result: Asphalt 1066; granite 719, wood 542. These figures indicate a serious objection to asphalt in such a climate as that of England.

The city of Halifax, Nova Scotia, has been making some experiments in paving materials for sidewalks, and the city engineer, in his report, recommends concrete on level streets, and asphalt for hills and less important streets. The cost of the former averaged $1.83 per square yard, while the latter cost only 70 cents, and under ordinary conditions could be put down for considerably less. The kind of asphalt pavement used is not specified, but from the low cost we infer that it is not such as would be suitable for roadways. This, however, by the way.

Wood block pavements have much to recommend them, but a great deal depends on the variety of wood and the way they are laid. Cedar blocks, so extensively introduced in Toronto and other cities in America some years ago, have not been a success. They will not stand heavy traffic and have been pronounced unsanitary. Hardwood is now being tried, and the Timber Trades Journal declares that in the near future the whole of London will be surfaced with wood. The variety now being used is the Australian jarrah, which has been tested in the metropolis, on some of the Paris boulevards, and in some of the provincial towns, in every case with satisfactory results. It has supplanted everything except Baltic fir, and is gradually but surely displacing that. If blocks four inches deep will answer, and they are now being tried, it will bring the cost down almost to that of Baltic fir, which has to be laid six inches thick.

Jarrah is the hardest and most durable of all Australian woods, and it is stated it will resist the wear and tear of London street traffic as long as granite. It is free from knots and does not shrink to any appreciable degree, the grain is close and tenacious, and it resists the influence of damp and moisture, in fact, being of the eucalyptus family, it is a valuable antiseptic, rendering it valuable from a sanitary point of view. It affords a good foothold for horses without being slippery. What more need be said in its favor?

Other Australian hardwoods are being tried in Great Britain, one known as karri being apparently second only to jarrah, and Tasmanian blue-gum is to be tested in Glasgow. It is, of course, too much to expect that any of these foreign woods will come into use in Canada, where we have so much wood of our own. Vitrified brick, if it can be brought down to a reasonable price, will probably be the pavement of the future in Canadian and American cities. Trap rock, referred to by us in the November number, may supplant the ordinary macadam for boulevards and park drives, but it would probably be too dusty for business streets and could hardly withstand heavy traffic.

One of the most unlikely paving materials which has been introduced anywhere is described in the Manufacturers' Record. At Norfolk, Virginia, a plant has been set in operation for making paving blocks out of the grass which grows on salt water marshes. The grass is subjected to heavy pressure, which forms it into large blocks, which are cut by circular saws into smaller blocks, 5½ inches thick, provided with strong wires, which run lengthwise. These blocks are then subjected to a bath in three tanks of different kinds of oil, which renders the fibre supple. A pavement of this material has been tested for over a year in Philadelphia, on one of the busiest streets near the stockyards, and with satisfactory results. It is smooth, noiseless, and horses cannot slip on it. Large contracts for these blocks are said to have been secured from New York and Pittsburg. We must, however, class ourselves as doubters as to the wearing qualities of such a material, without further information.

But our readers will perhaps smile with incredulity when we mention another material for paving, which, if such a reputable journal as the Literary Digest is to be believed, has been successfully tested. In the southern states, where sugar manufacturing is carried on, there are millions of gallons of molasses produced, which, after supplying the market, remain over and become a waste product. The head chemist of a refinery at Chino, California, Mr. E. Turke, was led to make an experiment with this molasses, and had a walk one thousand feet long made between the factory and the main street, mixing sand with the molasses and putting it down in the same manner as asphalt. It dried quickly, became hard and remained so, the sun making it harder instead of softening it. A block of the composition two feet long and one foot wide was subjected to severe tests, being laid with its ends resting only an inch or two at each end on supports. When struck in the middle with a heavy hammer it showed no sign of cracking or bending. Notwithstanding this test, we can hardly imagine molasses coming into general use as a paving material.

It is clear from what we have stated that we have not yet passed the experimental stage in the matter of pavements.

ILLUSTRATIONS.

RESIDENCE, BISHOP STREET, MONTREAL, FOR DR. D. F. GURD—ROBERT FINDLAY, ARCHITECT.

FACTORY BUILDING FOR THE METALLIC ROOFING CO., TORONTO—HENRY SIMPSON, ARCHITECT.

PROPOSED BUSINESS PREMISES, VANCOUVER, B. C.—R. MACKAY FRIPP, F.R.I.B.A., ARCHITECT.

TOWN HALL, CARLETON PLACE, ONT.—G. W. KING, ARCHITECT, TORONTO.

The town of Carleton Place, Ont., is to have a town and fire hall, which will be erected on Bridge street, the main business street of the town, at the south end of the iron bridge across the Mississippi river. The size of the building will be 61.6 x 104 ft., without projections. The north-west corner is cut off by the river, making the Bridge street frontage only 52 feet.

The material will be limestone, in random rubble masonry, with Beckwith freestone trimmings, slate roof and galvanized iron cornices. The wall fronting on the river will be concrete to ordinary water line, dimension stone in cement to one foot abve high water mark, which is the underside of the basement floor. The floors will be of slow burning construction, metal ceilings throughout, divided into panels by wood mouldings. Basement will contain caretaker's rooms with separate entrance, cells for male and female prisoners, with separate staircase to court room and entrance. Also pump room, boiler room, furnace and coal room. On the ground floor is clerk's office, with vault, having outside light, mayor's room, committee rooms, council and court room combined, public library with reading and smoking rooms, separate entrance to hall staircase and ticket office. In rear is an engine house 26x65 inside, with Mezzanine flat under stage containing firemens' recreation room, gymnasium, and lavatory with shower bath. On the first floor will be the public hall, seating 800, with gallery seating 250, stage 31x65, fitted with the latest improvements and nearly equal in equipment to a regular theatre stage. All principal rooms will be finished in oak, the others in pine. It will be steam heated, with electric bells and electric light. Cost, including river foundations, $25,000. M. Ryan, of Smith's Falls, is the contractor.

THE NEW GLOBE BUILDING.

A printing office is generally considered a hazardous fire risk, but the new Globe building in Toronto, to replace that destroyed by fire last January, now rapidly approaching completion, will be fire resisitng. It stands on the corner of Yonge and Melinda streets, upon the same site and occupying precisely the same space as the old building, but is very much more substantial. It is of skeleton construction, similar to the new Simpson building further up the same street, but all the columns are built into the brick walls, and the floor beams are encased in concrete. The interior is finished in plaster instead of metal sheeting as before. The interior arrangements are much the same as in the old building, the only feature of essential difference which will strike onn on entering being an iron stair-case in the business office leading to the upper storeys. Some of the mechanical departments, however, such as the stereotyping room, will be shut off so as to prevent the spread of fire, should one break out. Only the Yonge street end is designed to be fire proof, the part ftonting on Jordan street, which is cut off by a lane arched overhead, and which will be rented, being of ordinary construction. The building is so planned that two additional storeys may be added in the future. It will be one of the most convenient and best equipped newspaper offices on the continent: Burke & Horwood are the architects.

A HAMILTON BOY'S SUCCESS.

Archie Rigg, a Hamilton boy and resident of that city up to a short time ago, has made himself prominent in St. Louis in recent architectural competitions. He prepared plans for five competitions and was successful in winning one first and one second, while dozens of the leading architects of St. Louis failed to get a place. His plans for a $25,000 residence were considered the best and were accepted, winning for him the cash prize of $100, in addition to which the firm he is with gets the superintendence of the work. In a competition for an $85,000 office building he won second prize, capturing the St. Louis Competition Club's bronze medal. J. L. D. McCarthy, architect, and F. J. W. Hirst, engineer, as chairman and secretary of the Competition Club, write saying that Rigg's work cannot be given too great praise. As Archie is but a boy yet, a brilliant future seems to be in store for him.

DEFECTS OF THE ONTARIO LIEN LAW.

In pursuance of a conversation which the writer had recently with a well-known dealer in builders' materials at Toronto, the latter has contributed from his own experience the following facts relative to the inadequate protection afforded the material dealer by the present Lien Laws of Ontario :

A contractor two and a half years ago came to me and requested materials for building four houses on Charles street, Toronto. He stated that he had purchased the property from the Westminster Presbyterian church authorities, and had secured through a firm of lawyers a loan sufficient to complete the buildings, and that the mortgage was completed and he would be able to pay me within thirty days after delivery. Enquiry of the proper parties showed the contractor's statements to be substantially correct. About the time when payment should have been made me, the contractor came to see me and said that he had just had differences with the lawyers and that he had recalled his mortgage as the lawyers refused to give him the amount of money he was entitled to. To protect myself as regards filing a lien and also with the view of not hindering the contractor from getting a loan, I continued to supply him with material for six months longer. He was not successful, however, in getting his loan, and I filed my lien, which in due course was established.

Another period elapsed, and then the mortgagees of the land called upon the church people to pay off the mortgage. The church people requested the mortgagees to sell the property, and the same was offered for sale but not sold. This action was undoubtedly taken to freeze out the liens on the property, and which I understand legally was done. About two months after the sale, certain parties connected with the church suggested that as I was the principal lien holder, my claim amounting to about $600 for simply materials supplied that I should take the property over and complete the fresh pair of houses, which were partly built.

I considered the matter, and spent considerable time in arranging matters, and then made the church people an offer, and the church committee appointed three of their number to confer with me and to report at their next meeting. The interview took place and was satisfactory to two of the sub-committee, but the third member of said committee opposed the acceptance of my offer, and carried his point, with the result that he with others on the committee took hold of the property, completed two of the houses, never offered in any way to recompense me for all my materials supplied in good faith, and as far as I know, the church is reaping the benefit of the advantage afforded them by the law of grabbing everything in sight.

Another case is that of a contractor who bought a piece of property, and stated at the time of ordering material from me that the loan had been arranged, gave me the name of the lender, whom I found to be a monied man and who informed me that he intended to loan the money. When the goods had been delivered and the first payment should have been made, the lender backed down. It was only then that I discovered that there was an agreement referred to in the Registry office between the original owner of the land and the contractor. This agreement at first was not to be found, but afterwards through my promising to assist in trying to obtain a loan, it turned up. It then appeared that under this agreement if the contractor did not pay down the whole of the purchase money within a short period that he forfeited all interest in the property. My lien was registered and carried into court, and I closed the case. The original owner of the land stepped in, completed the houses, and the labourers and material men lost everything.

In another case a contractor bought material from me to the amount of $700 on the strength of the statement that his mortgage was arranged. At the time he gave me his contract for stone, he promised me the contract for bricks, lumber, lime and cement. I confirmed the stone contract by letter the next day, some days later secured the brick contract and confirmed this by letter, and later on I also secured the lumber contract.

No money was forthcoming when promised and to protect myself I filed a lien. The case came up at Osgoode Hall, and then it became known that a well-known gentleman of Toronto was at the contractor's back, and much to my surprise the defence was that as the contracts were made at different times it was not a general contract, and that I was only entitled to about $5 for a load of lime delivered within the statutory time for filing liens. The case was adjourned to allow us time to bring witnesses, and as the contractor appeared to be completely under the thumb of his backer, I considered it necessary, notwithstanding he was defendant to the suit, to subpoena him, lest he might not be on hand when the case was called. I personally went with the serving party to the contractor's house. At the interview in the presence of the third party, the contractor, (I believe thoughtlessly) corroborated my convictions that it was a general contract and not individual ones. I then had to arrange, at his wish, to keep him clear of his backer until the case was called, and which I did. The case was called and the solicitor for the gentleman at the back of the contractor called his nominal client (the contractor) as a witness. The latter, much to his backer's surprise, confirmed my statements. After this, the decision of the court was given in my favor. On appeal it was given against me. On further appeal the case was going decidedly in my favor when the contractor's backer compromised in court by paying me $475. The contractor agreeing in the sweet bye and bye to pay me the balance, which balance has not so far materialized.

PERSONAL.

Mr. H. W. Worrall, architect, has opened an office at New Westminster, B.C.

Mr. Thomas Webber, one of five brothers in business as contractors in Hamilton, is dead.

John Strickland, the well-known builder and contractor, of Brantford, is dead, aged 63 years. It was he who built the asylum for the blind at Brantford.

The "New Books" department of the December Review of Reviews is crowded by the holiday publications, but contains brief reviews of the best literature of the season. The department is fully illustrated.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

The series of monthly dinners and course of lectures for the winter were inaugurated on the 10th December. A number of the members dined together at the St. Lawrence Hall and afterwards adjourned to the rooms of the Association, New York Life Building, when a lecture was given by the president, Mr. A. C. Hutchison, on "Ancient Rome," illustrated by a large number of excellent lime light views. The lecturer began by making an analysis of the history of Rome, and fully explained each view as it passed on the curtain in a clear and interesting manner. Mr. Hutchison having passed the greater part of last winter in Italy and Sicily studying the ancient monuments, proved to his audience, who thoroughly enjoyed his lecture, to be very well acquainted with his subject. Mr. A. T. Taylor, vice-president, was in the chair, and there was a good attendance of members and students. On motion of Mr. J. Venne, seconded by Mr. Theo. Daoust, a vote of thanks was accorded the lecturer for his paper.

Future gatherings have been arranged for the second Tuesday of the month during this season, with the following program : Jan. 14, Mr. R. Findlay, "Old Colonial Architecture" (with illustrations); March 10th, Mr. J. Venne, "The Making of Plans for a Building" (with illustrations); April 14th, Mr. W. E. Doran, "Truth in Architecture." The February meeting has not yet been definitely arranged for.

The following examiners have been appointed for the examinations to be held during the coming year : For Montreal, Messrs. A. C. Hutchison, A. T. Taylor and J. Venne ; for Quebec, Messrs. J. F. Peachy, H. Staveley and C. Baillairgé. Examinations will take place this winter in Quebec for admission to study and registration on the 29th, 30th and 31st January. One month's notice is required to be given the secretary by intending candidates.

The Association has petitioned the Attorney-General for the repeal of the law known as the Augér Bill, and for substituting for it the law which was in force before the Augér law was known ; or that in default of its repeal, that the following amendments be made to it : 1st. That the rights of the lenders remain privileged and free of all proceedings which would tend to delay their recovering the amount of their loan. 2nd. That no discrimination be made in this law for anybody except for the laborer. 3rd. That the time when a building can be legally termed completed be clearly defined.

The proposed building by-laws which were prepared in English by a committee composed of members of the Association appointed by the Council at the request of the municipal authorities, have been translated into French by the latter and returned to the Association for comparison and further revision, which has just been completed. It is hoped that this by-law will be passed without amendment at an early date, as the remedy is greatly needed, and Montreal could then be classed among the best governed cities as regards the erection of its buildings.

A PROTEST.

TORONTO, Dec. 3rd, 1895.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR : Will you kindly favor me with space in your paper to cite a prevailing grievance, which is as time advances becoming more and more pronounced. It is the practice of government employees, with a permanent salary, to compete against architects who have only their profession. Men holding positions in the government service are frequently employed as architects by some of our largest corporations, and others.

Now is this fair, is this just to the architect, the government and the public? I and others think not, and know that if the matter was brought to the notice of the Minister of Public Works he would not countenance it, for if I am correctly informed, employees of the Department are not at liberty to carry on a private business. It is in reason that such should be the case, for it is impossible for any one man to attend to two separate businesses at the same time, and it is self-evident that a man carrying on a personal business cannot keep his mind from dwelling on it at all times, which would in this case interfere with the successful discharge of the government business. It is not improbable that during some part of the day he will require to be on the works to give a decision on a critical point of construction which is not understood by the contractor. This cannot wait until he is liberated from business ; when and where is it done if not on the works, directly after it is discovered? It is also a known fact that plans prepared by one of these men have been figured on by contractors in the government office. Their methods of getting patronage are not just to the profession to which they imagine they have a right to belong. They make capital of the fact that they do it after hours, have no office expenses, and must have constructional ability or they could not hold their present situations. I have never heard what claim they make to be designers ; they are wise if they do not lay stress on that.

These methods of doing business are highly detrimental to the profession, to say nothing of the effect on the character of the men who resort to them. I cannot longer withhold my protest at seeing the profession pulled down from its hitherto high standard as the highest and noblest art in the universe, by such men, for a mere monetary consideration, for I have no doubt that if they could not add to their munificent salaries they would not do the work at all. If they would even have the decency to maintain the recognized schedule of professional charges, it would place us on an equal footing in an unequal race. Then the public would probably give their commissions to architects who could devote their whole time to their client's interests, which would necessarily mean architects whose time is their own.

Very truly yours,

CONN.

TORONTO SKETCH CLUB.

A meeting was held in the office of Messrs. Darling, Sproatt & Pearson, on Tuesday evening, Nov. 19, when a Sketch Club was organized for the purpose of studying design. This club differs from the old architectural clubs to a great extent. In the preceding clubs, lectures, classes, etc., were of the first importance, while design was considered a secondary matter. The relative merits of classes for lectures and design were fully discussed at this meeting and it was resolved that design was the most necessary function of an architect and more attention should be paid to this subject than is usually taken by students. The study of construction can be carried on privately as books give all the information necessary to make an architect expert in that line. With design it is different. A design may be prepared at home, but it is absolutely necessary, if the student is to advance, that his design be criticized by some one competent to do so. A designing club of some kind is, therefore, what a student should attend, so that the faults or merits of his design may be pointed out. It was decided to have the meetings as informal as possible and any point about a design openly discussed. In order to obviate the expense of running the Club, it was decided to hold the meetings in the offices of the numerous architects who would favor the Club in this particular. The architect at whose office the meeting is held will act as critic on the occasion. After the criticism is over, the members cast ballots for the designs they consider entitled to 1st and 2nd place.

The first regular meeting was held in the office of Messrs. Strickland & Symons. Mr. Symons acted as critic. The subject was "An Entrance." It is the intention to have the subject only chosen and the members design in any style they wish.

A meeting was held at the office of Mr. E. B. Jarvis, on the evening of the 19th inst. The subject on that occasion was "A Gable." The next meeting will be held in the offices of Messrs. Darling, Sproatt & Pearson, when Mr. Darling will act as critic. Reports of these and all subsequent meetings will appear in the CANADIAN ARCHITECT AND BUILDER. It is also the intention to publish such of the sketches as shall possess sufficient merit for that purpose.

THE FORESTERS' TEMPLE.

Some time ago we published an illustration of the temple being erected on the corner of Richmond and Bay streets, Toronto, for the Independent Order of Foresters. The charter of that organization authorizes them to hold real estate only to the value of $100,000, whereas the building, including the site, is expected to cost about $260,000. It has just come out how this provision has been avoided. Oronhyatekha, the supreme head of the order, has an amanuensis named Jessie Brayley, and this lady suddenly finds herself possessed of considerable wealth (on paper), the property above referred to being in her name. The site was deeded to her, and she gives mortgages to the trustees covering the value of the property. By this means the limitation imposed on the Order is avoided. The registration of the papers gave publicity to the facts.

CORRESPONDENCE.

[Letters are invited to this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

FIRE PROOF MATERIALS.

MONTREAL, December 3rd, 1895.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—I beg leave to question your views on fire proofing. Judging by several articles which have at different times appeared in the CANADIAN ARCHITECT AND BUILDER advocating the use of concretes for fire proofing, I think you have overestimated the value of that material for that purpose, and I consider that the letter signed "An Architect" is to the point and ought to appeal to the unbiased judgment of anyone having only public interest in view.

That concrete business is as old as the hills and has been pushed for all it is worth in every imaginable shape, and up to this day there is not a single instance where its most sanguine advocates have been able to prove its superiority over porous terra cotta. There is one thing we all know, and that is that at the Denver tests it was shown conclusively that porous terra cotta was the only material that stood all the tests. We all know that porous terra cotta is absolutely fire proof and that we have never heard of a building fire-proofed with porous terra cotta ever having been destroyed by fire. Does it not then stand to reason that it is safer to use a material that we know is fire proof, rather than run the risk of adopting what we only consider as good, but of which we only have opinions and no positive facts? Is it not better to leave well enough alone?

Yours truly,

N. T. GAGNON.

[NOTE.—Mr. Gagnon is mistaken in saying that we advocated the use of concrete for fire proofing. We only gave the facts as they were presented to us, and did not express an opinion of our own as to the relative merits of concrete and terra cotta.—EDITOR C. A. & B.]

SAFETY OF HOT WATER HEATING SYSTEMS.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—The prevalence of accidents to hot water heating systems at this season of the year entitles practical engineers to enquire into cause and effect.

This system of heating is annually becoming more generally used both in public buildings and private dwellings, and the amount of ignorance displayed as to the requirements of safety is remarkable. When we consider that nearly every plumber has developed into a "practical steamfitter" (so-called), who will undertake the erection of the most intricate systems of heating apparatus, and considers himself fully competent of doing so as soon as he is able to run a straight thread and cut a piece of pipe—notwithstanding that the theory of expansion and contraction is an almost unknown thing to him. When we examine some of the arrangements laid out by these men we wonder that some of the explosions ("break-downs" they call them) that have followed their experiments have not resulted in a serious loss of life. Thus, so far, Dame Fortune seems to have been kind to them in this respect.

A very large number of business blocks are now heated by this system, and the usual class of labor employed is a fireman who has not the slightest knowledge regarding the nature of the plant under his charge. It is therefore especially necessary that all systems should be properly examined before being passed over to this class of help.

It has been my lot to have to look into several more or less serious "break-downs" of hot water furnaces, to ascertain the cause, and in every case the cause of the whole trouble was traced to want of expansion. One instance will suffice. A pair of twin boilers blew up some time ago in a manufactory here, and made things exceedingly interesting around the establishment. The boilers were set side by side and were so arranged that either one or both boilers could be used for the whole system as occasion demanded. Boilers were attached to separate headers as shown in diagram. For convenience we will discuss arrangement of pipes under separate heads. For the information of any of your readers who are not well versed in this method of heating, I wish to point out that the whole efficiency of the system depends on a proper and systematic arrangement of mains and their accessories.

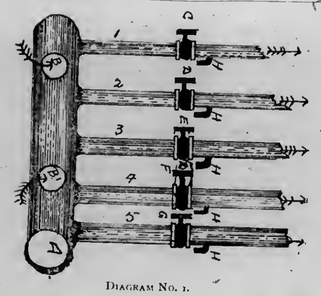


DIAGRAM NO. 1.

Diagram No. 1 represents "flow" header, designated A, fed from boilers at B, B' mains shown at 1, 2, 3, 4, 5, distributing hot water to several radiators throughout the building.

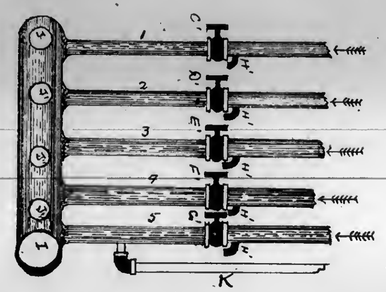


DIAGRAM NO. 2.

Diagram No. 2 represents return header, designated I, return from header to boiler being effected at pipe J, J', J'', J''',—pipes from the radiators being arranged as 1, 2, 3, 4, 5.

Boilers were each provided with shut-off valves between header and boiler on each pipe. As water is heated it flows in direction indicated by arrows. My object, however, is not to discuss action and circulation of water so much as arrangement of mains, etc.

By diagrams it will be noticed that each line of main is provided with valves, as at C, C', D, D', E, E', F, F', G, G', and drip valves as at H, H', thus enabling any particular line of main to be operated singly or in conjunction—a very well arranged system and an arrangement that will recommend itself to any engineer for various reasons: (1) Because either one or both boilers can be used; (2) because any one line of main can be used; (3) Because in case of accident occurring to one of the boilers or any radiator, repairs can be effected without disabling the whole system; all of which tends to show that the person who laid the arrangement of pipes and mains had given some thought to economy and efficiency.

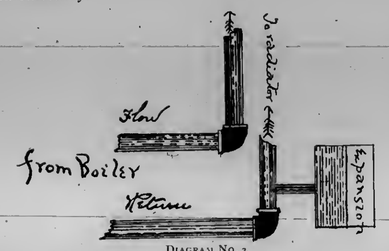


DIAGRAM NO. 3.

By referring, however, to diagram No. 3, we find what may almost be called a fatal error. This diagram represents arrangements made for expansion. Main 5, 5, leads to a small set of radiators in upper storey of building, and expansion tank had of necessity to be higher than this. The reader will observe that expansion is taken from the highest point on return main 5. By tracing out main 5 in diagrams 1 and 2, it will be noticed that these mains are each provided with valves and drips the same as the others, plainly signifying that they were intended for same purpose. Practical engineers can easily imagine what would happen in case these valves were closed; there would be a gradual expansion and increase in pressure until strength of material had been reached, and then! Well, an enquiry if not an inquest.

Just what happened in the case in question was this: The weather was mild and main B was not required; a good fire was built under the boilers, resulting shortly after in a wreck, and the enquiry, "How did it happen?" etc.

In this as in many other cases the steamfitter seems to have had a fairly good idea of how to lay out and run mains, but no idea whatever as to what was required to prevent disaster by over pressure, and consequently the whole of his good work was negatived by want of knowledge on this point.

In diagram 2, attached to return main 5 is shown a small pipe in outline. To prevent possibility of accident through any of the valves in the mains being closed, this should be continued to expansion tank in upper storey. And in addition to this, each of the boilers in question should have been provided with a safety valve, set for required pressure, as an extra precaution. There is not the slightest doubt but that this class of boiler is just as liable to explosion as any steam boiler, and the sooner architects and others realize this fact, the better will be the reputation of this class of heating.

Yours truly,

ENGINEER.

A portion of the geological museum building at Ottawa has been declared unsafe and the specimens have been removed from it. A new building for the museum and a new custom house are said to be in prospect.

LONDON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

MR. PEELE, stone carver, has started a private school for the teaching of architectural and model drawing.

Herbert Matthews, architect, will move into new offices in the Albion block at Christmas.

The erection of the G. T. R. car shops will increase the population and give an impetus to the building trade. There is scarcely an empty house in the city at present.

Many of the large buildings that have gone up this year are not yet completed, the Y. M. C. A. being one of them. London has now some of the finest public buildings in the country.

The London Waterworks Commissioners control the water supply, and have been running the plant so economically that they were enabled to turn over more than $20,000 to the city. They own about 250 acres at Springbank, where the waterworks plant is situated, and the value of the property has been enhanced by the advantages it possesses of having fine sites for summer cottages, as the electric street railway will run down there next summer.

HAMILTON ART SCHOOL.

THE directors of the Hamilton Art School have been considering a scheme of the principal, Mr. Ireland, by which the work of the classes may be rendered more efficient, and the students encouraged, after they have completed their elementary course of instruction, to keep in touch with the school. With these objects in view it was resolved at a late meeting

(1) That any student, male or female, who has paid fees for the full term of three years, may attend the evening classes free, by becoming an annual member, which will cost only $1 a year. By granting this liberal concession it is expected that students will avail themselves of the three years' course more generally than has been the case in the past, instead of from two to two and a half years on the average only, and thereby avail themselves of a life-long privilege. Hitherto students, after leaving the school, have not cared to trespass on Mr. Ireland's time for some occasional help which they needed, and did not feel disposed to pay a year's fees for the same. In the future they will be able to get this, as an ex-student member's privilege.

(2) That students attending the all-day classes may attend the Tuesday and Friday evening classes free.

(3) That pupils over 14 years of age who are attending the Saturday morning classes be also allowed to attend the Tuesday and Friday evening classes free.

(4) The rule that students must join the school either at the commencement of the term or half term is amended; they can now pay fees in advance for the unexpired portion of a term.

The extent to which a chimney can poison the atmosphere has been scientifically determined by a test made in Berlin. The soot which comes out of the chimney of a single sugar refinery was gathered for six days and was found to weigh 6,800 pounds.

Some years ago the old Nova Scotia Penitentiary was sold to the Church of England Building Committee. It was proposed to use the stone for a new cathedral, but the project fell through. The building has now been sold to the People's Heat & Light Co., to be used for gas works. It cost the committee $10,000 and they sold it for $22,000.

The specifications of the engineers' department of Toronto contain a provision to distribute moneys due to defaulting contractors among persons who supply material, after the claims of workmen have been paid in full. As the provisions might be taken advantage of for the purpose of filing fictitious claims, the advisability of eliminating it altogether is being considered.

A deputation of the Toronto Builders' Exchange appeared before the Water Rates' sub-committee of the Executive to complain of a clause compelling the payment in advance of a charge for water of 5 cents a thousand on brick, 2½ cents a toise on stone, and 2¼ cents a barrel on lime. It was also urged that such charges were unfair, and that the charge should be made on lime alone. Ald. McMurrich, chairman of the committee, suggested that it would be a move in the interests of the city if builders were permitted to use the city water free for building purposes. The revenue, as shown by the Treasurer's statement, was small, and under almost any system the honest man would pay and the dishonest man would not. The suggestion of th chairman was adopted.

STUDENTS' DEPARTMENT.

C. A. AND B. COMPETITION.

THE Judges in the CANADIAN ARCHITECT AND BUILDER'S competition for a City Store Front have carefully examined each of the designs submitted, and have made their report thereon, as follows:

"This draughtman's competition is very much in advance of the average—all the designs submitted having some points of merit—making it rather more difficult than usual to make a selection. As usual there is strong evidence of the tendency to sacrifice the study of the planning and construction in favor of a pretty elevation. In view of this, it is not surprising that we should have awarded the first position to one who has certainly a commonplace elevation, but the best all round grasp of the situation.

The first three places have been awarded to: 1st, "Romanesque;" 2nd, "Penny;" 3rd, "Arrius."

"Romanesque" shows the proper spirit in which to enter such a competition as this. In the style chosen, whatever opinion may be in regard to a style which has for one of its main characteristics the use of small openings in large wall space, the author has handled it well, though the proportion of storeys is not good, the upper storeys being too high for the ground floor, which makes the scale of the latter detail too fine in proportion. The plan shows very little accommodation on either floor for such an expensive building, though the parts are well arranged, with the exception of elevator and entrance. The small area at back has hardly sufficient light for a main office.

In "Penny's" design the general grouping of storeys, with the exception of excessive height of ground floor, is good; the proportion of voids and solids is satisfactory; the main cornice is not well studied. His arrangement of plans shows insufficient lighting of ground and upper storeys. The planning of office flat for such a large building gives too small a number and an unsatisfactory arrangement of offices. The elevator and stair arrangements on ground floor are extravagant. The stone piers each side of shop window are rather small to carry weight above, and no other construction is shown either for carrying front or floors of building.

"Arrius," like "Romanesque," shows a good grasp of the situation. The elevation up to main cornice, with the exception of archevolt over shop wiudow, is good. The storey over main cornice is too high in effect. The window in gable suggests a pitched roof. The value of the design of gable depends entirely on how the roof is to be constructed, which he has in no way indicated. His plan shows good construction. The light is deficient and entrance hall not very good.

"Grad." He has spent too much time on his iron construction, which could not be taken into consideration, though carefully shown. His elevation is good, but he has sacrificed the lighting of his top office to exterior effect. His office plan is not well arranged. It would have been better to arrange his office vaults over ground floor vaults. No private stair to basement is shown. He deserves great credit for his construction all through.

"Bon-ton" has one of the best elevations sent in. His office entrance is good, but a little extravagant. The position of vault spoils an otherwise well planned store. His office arrangements are fairly good.

"Wreath" has a good plan, though bad entrance to office—2 ft., 6 in.—hardly wide enough for main stairs. His elevation is too affected. Such a mass of masonry over his shop window is not good. His first floor windows are altogether too small.

"Erectheus" has placed himself out of the competition by his style of rendering, which does not conform to conditions. He shows no plan or construction.

"Bluenose"—Plan too small, though not bad. Elevation not badly grouped; rather commonplace.

"Boreas"—Store too small; vault badly placed; side entrance too wide; shop front too small; office plan too much passage; rooms too small. This elevation shows a feeling of English Renaissance, though unstudied in detail and indicating lack of knowledge.

"Doric" wants a little more study.

EDEN SMITH.
FRANK WICKSON.
J. GEMMELL.

[The names of the successful competitors are: 1. "Romanesque," (Mr. Melville P. White), Toronto; 2. "Penny," (Mr. Charles P. Band), Toronto; 3. "Arrius," (Mr. Elmer H. Russell), Toronto. The successful designs will be published in the New Year number of the CANADIAN ARCHITECT AND BUILDER.—THE EDITOR.]

MATHEMATICS AND CONSTRUCTION IN THE ECOLE DES BEAUX ARTS.*

THE reputation of the architectural department of the Ecole des Beaux-Arts of Paris is based almost wholly on its strength in design. The curriculum, however, necessarily includes a fairly thorough course in mathematics and construction, because graduates of the school are granted diplomas permitting them to practice architecture. Nominally they are also required to have had two years of office practice, but in reality a few weeks suffice.

The students are divided into two classes, known as first and second, and to pass from the second to the first fifteen "mentions" are necessary. They are one each in mathematics, descriptive geometry, stereotomy, construction, perspective, modelling and archeology, two in drawing and six in architecture. A bright student will accomplish this work in about two years, but it is possible for one who enters in March to do it in sixteen months. The first five mentions, which represent rather more than half the work, are the subject of this paper.

The instruction is given entirely by lectures, which are an hour in length, and usually come no oftener than twice a week on any subject. A French lecturer includes much more in a lecture than do our professors, and the result is that the subject is less thoroughly grasped by the pupil. It is hoped that the reader will be able to form some conception from the number of lectures in a course, and from the problems and drawings required during it and on examination, of how carefully the ground is covered. The examinations will serve as the best criterion of the thoroughness attained. Merely outlines of the problems are given, and without the details the reader will be apt to conceive them as simpler than they really are.

Of course, any wording offers considerable opportunity for different interpretations of the amount of work expected, but there is such a spirit of competition pervading the school that the fullest interpretation usually results. In forming an opinion of the course the reader must bear in mind that all subjects are taught from the standpoint of their application to the study or practice of architecture, and everything not having a direct bearing on the subject has been eliminated from the curriculum.

The examinations are oral, but are supplemented by problems worked en loge, which means that the student is assigned to an alcove and required to work out a problem in a specified time, varying usually from six to twelve hours.

The course in mathematics comprises about thirty-six lectures, and includes the subjects of algebra, trigonometry, conic sections, analytical geometry and mechanics. The algebra includes equations as far as the solution by successive approximations of numerical equations of the third degree, decreasing geometrical progression, logarithms and interest.

Trigonometry includes the solution of plane triangles in general, the calculation of triangles by logarithms and the relation between a plane in space and its projection.

Conic sections receive much more attention than the two preceding branches. Quite a careful study is made of the curves, resulting from the intersection of the cone and cylinder by a plane, and of practical methods of drawing them and tangents to them; also of methods of measuring surfaces and volumes frequently met with in construction.

Analytical geometry is only touched upon, and is taught mainly for its application to the curves of flexure of beams. It includes the curves of the second degree except the hyperbola, equations of the line and circle referred to polar co-ordinates and in geometry in space, the equation of the line and plane and the angle between two planes.

Mechanics includes only statics and simple machines. Under the first are considered parallel and concurrent forces, composition of forces, parallelogram of forces, couples, moments, general equations for equilibrium, centres of gravity and resolution of forces; under the second, the lever, balance, pulley, tackle, windlass, gears, inclined planes, the wedge, screw and various applications.

The examination on this course in mathematics and mechanics is both written and oral. The written one usually consists of two questions, one of which is almost always the solution of a triangle and the other on mechanics. The oral is about three questions chosen at random.

As a course in mathematics it is certainly very incomplete; whether as a course specially designed for students of architecture it is also incomplete is a subject affording ample opportunity for discussion. Enough is included to suffice for the courses which are to follow, and the deficiency seems to be more in drill than in subject matter. Though the French seem to have found it sufficient to answer the actual needs of an architect, the American practice of adding a little more for the sake of the mental drill is a most excellent one.

*A paper by James M. White, Assistant Professor of Architecture in the University of Illinois, published in the Technograph.

In contrast with it is the course in descriptive geometry, which is very thorough, being the principal basis of stereotomy and perspective. The course includes fifty or sixty lectures, of which about ten are a review of the part required for entrance and ten on the finding of the most common shadows.

The best conception of the course is to be obtained from the examination questions, a list of which, divided into six series, is furnished to the students. The oral examination, part of which comes at the middle of the course, is on questions from the list, one being chosen at random from each series. The first series contains about twenty-five questions on the line and plane; the second, thirty on the sphere, cone and cylinder of revolution, problems of angles, the solution of trihedral angles and regular polyhedrons; the third, thirty on cones, cylinders, pyramids and prisms; the fourth, twenty-two questions on surfaces of revolution; the fifth, twenty-five on ruled and helicoidal surfaces, and the sixth, twenty-five on shadows.

Twenty-two plates of about forty of these problems must be drawn, and constitute part of the examination. The problems on the first six plates are to be chosen from the first two series, on the second six plates from series three, four and five, and the remaining ten on shadows.

One problem must be drawn en loge, for which six hours is allowed. The problem given last year was: A cube stands with its diagonal vertical; a second cube of the same size has its diagonal coinciding with the first, but is turned through an angle of 22½ degrees. Draw in plan and elevation the intersecting cubes, and find the shadows at 45 degrees on the solid and on the plane of projection. Pillet's text-book on "Descriptive Geometry" is closely followed in the lectures.

The course in stereotomy is also a thorough one, and includes all of Pillet's text-book except the skew-arch. Under the division of masonry the lecturer treats of the methods and instruments used in stone-cutting, the principles of jointing, and of vaults, niches, domes and cupolas; the arranging and proportioning of treads of stairs, also vaulted and suspended stairs. Under the division of wood-work, the general rules of framing are considered, the methods of assembling pieces, general principles of roofs and the special ironwork of carpentry. This course also includes the methods of finding patterns of stonework and bevels of rafters, and two problems are given, the one in wood and the other in stone construction. Of those given last year the first was a small railway station, which involved the design of the building, the framing plan of the roof and the principal bevels, also the framing of the stair and the patterns for the front string; the second was a building entirely in stone, to be erected in a public market square and to contain a fountain and other sources of water supply for the market. It was to be a vaulted structure, with the vaulting visible both inside and out, and a decorative motive based upon the structural form of the vaults. In the centre was to be a large stone basin, and around the walls small basins supplied with both warm and cold water for washing purposes. Outside were to be troughs for the watering of animals. The basement was to be used for storerooms, and was also to contain the apparatus for heating the water; a stone stairway was to serve as a means of communication with it. Drawings were required of the plan, facade and section, showing the jointing of the stonework, besides patterns of three voussoirs, one of which was to be from the vaulting of the stairway. A course in surveying, consisting of six or seven lectures and three days' practical field work, is appended to the above course.

The work in construction comprises twenty lectures on theoretical and thirty on technical construction. Burn's text on "Construction" is followed in outline, but in a condensed form, and the formulae which are given are demonstrated whenever possible by means of the mathematics already enumerated. The following outline is very general and the reader is expected to supply many headings which are necessarily preparatory to some of those enumerated. The lectures include internal and external forces acting on beams, application of formulæ to all usual cases, beams of equal resistance, also beams subject to inclined pressures, columns, lattice girders, roofs, calculation of strains and deformations, curved roofs, metal ribbed vaults, expansion, friction, effect of wind, stability of masses and distribution of pressures, retaining walls, problems of stability, applications to foundations in general, reservoir walls, stability of vaults and their supports, curve of the centre of pressure and its application to vaulting.

The technical part includes a description of the materials of construction, methods of handling and transporting them, foundations, rules for masonry work, walls subject to thrust, buttressing, shoeing, piers and columns. Vaults are treated first historically, after which follow descriptions of different kinds, methods of construction, centrings, piers, abutments and buttresses, stone stairs, paving with flagstone, brick and asphalt, and the draining of rain water. The lectures on wood-working include descriptions of woods, methods of preservation, general principles of wood-working, assemblages, walls, floors, scaffolding, roofs, dormers, spires, towers, effect of wind and snow, roof coverings, stairs, joinery and special iron-work. This is followed by lectures on metal work, descriptions of the useful metals, commercial shapes, iron walls and floors, masonry work of floors, roofs, trusses, arches, awnings, glazed roofs, water pipes, gutters, iron blinds and shutters, elevators, grilles, balconies, hardware, plumbing and gas-fitting, heating and ventilating, electric bells and lightning conductors.

Three problems are worked en loge during the lectures on theory, and three general problems are required during the latter part of the course. Besides these problems there is an oral examination on each of the two parts of the course of about three questions. The nature of the problem to be worked en loge is known beforehand, so the student may be supplied with whatever data and formulæ may be necessary. One of these problems called for the design of a lattice I-girder of equal resistance throughout and to maintain a uniformly distributed load and two concentrated loads at equal distances from the end. Given the size of the angle irons, height of web, width and thickness of cover plates and diameter of rivets, calculate the number of cover plates required at the centre and at what points they may be successively discontinued, also the spacing of the rivets for the cover plates and the lattice bars. Another problem was the design of a six panel triangular truss, sustaining dead load only, by both analytical and graphical methods.

The three required during the lectures on technical construction involve design as well as construction. The first usually includes the investigation of a vault, such as: Design a grand stairway leading up to a terrace, the principal landing of the stair being vaulted. Calculate the vault and its buttresses. The second in one case called for the design of one bay of a riding school, the walls to be of half-timbered work, trusses 38 metres centres and 20 metres span. Submit plan, elevation, details of framing, and the calculation of the principal parts. The third is called the general problem, and includes about all the ordinary problems of construction which can be centred in one building. The following one will serve as a sample: Design a museum building, consisting of central glass-covered court, surrounded by galleries, three stories and basement high. On the third floor is to be a library. The basement ceiling is to be vaulted, the other floors to be of iron and masonry, the roof of the court to be of iron and glass, while that of the galleries is to be of wood and metal. There are required complete general drawings, problems of the stability of the vaults, and notes on the calculations. These drawings are quite elaborately worked out and rendered in color, even the construction details having the shadows all cast at 45 deg. The feature of design enters every problem that requires drawing, no matter what the study.

The course in perspective consists of twenty lectures, and is very thorough. Three problems are required besides one en loge. The following may be considered as samples: Design a pedestal bearing a statue, the base to be about 1.5 metres across and either square or circular. Make a drawing of a public place, surrounded by arcades and with a monumental fountain in the centre. No side of the square is to be parallel to the picture plane.

Make a drawing from nature of an ensemble or architectural detail, the drawing to be at least 0.25 × 0.35 metres. The problem given to be drawn en loge last year was the capital, architrave and frieze of the Greek Doric order, without triglyphs. The shadows were also required.

The above is, I believe, a fair representation of the work of the school not classed under the head of design, except the diploma drawing, which is a thesis design and involves details of construction and specifications. A candidate for a diploma is also required to pass quite elementary examinations in physics, chemistry and building law.

The usual problems in design do not include any calculations of construction, as no construction is expected to be shown on the drawings.

POINTS ON PLASTERING.

By "Plasterer."

Perhaps some information on the general practice of lathing and plastering will be interesting. There is undoubtedly much bad plastering, and in every case the mortar and plastering material is blamed. This is not just.

The first essential of good plastering is good preparation to receive it. For plastering on brick or terra cotta, have your work straight and true, the joints rough. Don't use dry press brick, nor terra cotta with smooth face. If your walls are not straight don't expect to get a straight wall in two-coat work—lime mortar cannot be made that is equally good when used half an inch thick and two inches thick in the same wall.

Don't plaster with cement made from gypsum or similar compounds, such as acme, royal, agatite, etc., on Columbian fire proofing, or on Portland cement, unless you have them dry enough to prevent sweating or condensation. Portland or native cements, or even lime mortar is preferable in such work. Don't allow mortar to go on thicker than ¾ of an inch at one time, and have your brick or cement free from dust or dirt. Don't plaster on smoked bricks or old bricks from chimneys; they will stain badly.

In preparing for lathing have your joisting, trimmers, etc., heavy enough to prevent vibration, and strap all large ceilings, using 2" × 2" strapping on 16" centers. If you don't strap, at least have all joisting and studding sized; very much crooked work would be avoided by enforcing this rule. Have all angles made solid. See to this yourself and don't rely on lathers who work by the piece to inform you of the carpenter's defects, and have trouble with him in consequence.

Use white pine lath, seasoned but not too dry. 1⅜" × ⅜" lath are light enough; 1" × ⅜" lath are only fit for use on joisting or studding at 12" centers. 18" breaks are frequent enough, but don't allow lath to break at door posts; the slamming of door or even the nailing of trim will cause a crack here. Don't blame the plasterer for this when you have allowed the carpenter to center his work so as to cause waste of time and lath to avoid it. Don't be unreasonable. Contractors are working at close figures for a living. Blame the right party. When you see a crack at an internal angle just above base, you did not have that angle made solid, and nailing the base caused it to crack.

Lath stains cannot be avoided in two-coat work, and are even more liable to appear when patent plasters are used, as the first coat is put on much thinner to save cost. Two-coat work is also liable to have every lath and joist show through when work gets old you can count them through the plaster.

Lime mortar properly made makes good work, but you can't make a poor plasterer do it. Mortar made and used at once will get as hard if not harder than what is allowed to age. There is of course more danger from lime pitting; there is also a greater danger from the shorter nature of the material that the key will fall from all wall work. These objections are enough to condemn its use, but it is both unnecessary and impracticable to ask that it be made two or three weeks before using. Very sharp sand is not best for ordinary mortar; a good clean sand of sharp grain or a mixture of soft and sharp is better; it requires the strength of cement to bind coarse sharp sand.

Don't allow mortar on lath to be used too soft—you will have no key. Don't have it too rich with lime for same reason. See that it is of proper consistency to require some force to apply it. If too poor (too much sand) key will fall off on wall work. Mortar of proper consistency for good work will crack badly in very hot weather, or if dried too quickly. For second coat on lath or for brick work one-third more sand may be used.

The term "hard white finish" is a misnomer; the hardest lime finish is made with sand. If enough sand is used to avoid use of calcined plaster, work will be uneven in color when dry. Don't allow finishing before base coats are dry—you are in greater danger of lath stains, cracks, lime pits, etc.

These remarks might be continued indefinitely. If they prove interesting I will be happy to give you some more.

THE QUEBEC CASTLE.

In describing the antique castle, several writers have mixed up dates and incidents referring to the Fort St. Louis begun in 1620, with those relating to the Chateau St. Louis, which, after several changes and transformations, assumed that name only in 1647, under Governor de Montmagny. Hawkins is quite correct in saying that "The Castle of St. Louis was in early times rather a stronghold of defence than an embellished ornament of royalty. Seated on a tremendous precipice

> On a rock whose haughty brow
> Frown'd o'er St. Lawrence's foaming tide.

and looking defiance to the utmost boldness of the assailant, nature lent her aid to the security of the position. The cliff on which it stood rises nearly two hundred feet in perpendicular height above the river. The castle thus commanded on every side a most extensive prospect, and until the occupation of the higher ground to the south-west, afterwards called Cape Diamond, must have been the principal object among the buildings of the city.

"When Champlain first laid the foundation of the Fort, in 1620, to which he gave the name of St. Louis, it is evident that he was actuated by views of a political, not of a commercial character. His mind was in better keeping with warlike enterprises than the acquirement of wealth. He was perfectly disinterested in all his proceedings. Foreseeing that Quebec would become the seat of dominion and invite a struggle for its future possession, he knew the necessity of a stronghold, and determined to erect one in opposition to the wishes of the Company of Merchants." The building was commenced in July, 1620. - J. M. LeMoine in the December Canadian Magazine.

WATER CURTAIN PROTECTION.

A somewhat novel system of fire protection has been tried at Boston to save a building from being ignited from adjacent premises. The chief fire station is in a dangerous lumber district, and a five-inch stand pipe has been erected, with connecting perforated pipes running along the front and side of the building near the top. There are also a number of spraying nozzles. By this means a complete water curtain is formed, affording perfect protection. At the trial 1,000 gallons of water per minute was used.

TESTING OF CEMENT.

The Master Builders' Exchange of Philadelphia having reported on standard specifications for cement, basing its clauses largely on those of the American Society of Civil Engineers, Mr. Cecil Smith, of McGill College, Montreal, criticises them in the Brickmaker in the following terms:

1. Specific Gravity.—During the last three years I have tested very carefully about forty brands of Danish, German, Belgian, English and Canadian Portland cements and not one of them has gone as low as 3.00 in specific gravity; therefore, I consider a clause demanding a value of 3.00 for specific gravity is of no value whatever to prevent under-burnt products. Natural cements, also, usually range from 2.90 to 3.05; therefore, there is little use in specifying a minimum of 2.50 for natural cements.—A specific gravity of about 3.09 for Portlands and 2.90 for naturals would really obtain what was intended,—namely, well-burnt products.

2. Fineness.—Why should there be two classes of tests? Surely any two persons can sift cement the same, whether in a laboratory or in a contractor's shanty. What should be specified is that a certain amount of cement should be used in sifting, and that the sifting should be continuous such a number of minutes; then uniformity will be obtained. For myself, if I use 10 ozs. of cement, and sift two and one half minutes on a No. 120 sieve, then sift the residue one minute on a No. 100 sieve, then the residue three fourths of a minute on a No. 80 sieve, then the residue one half minute on a No. 50 sieve, I find the residues are about uniform in size and color. I obtain close uniformity. If only a No. 100 and No. 50 sieve are used, the same method could be employed.

Regarding the actual amount of residue demanded, that is entirely a matter of dollars. Fine grinding must be paid for, but the clause, as set forth in the specifications being dealt with, is so lax as to call forth a protest.

Any natural cement having more than 15 per cent. residue on a No. 100 sieve should be certainly rejected, because they are so lightly burnt as to make it very easy to grind them finely. It is quite easy to obtain Portlands and naturals with only 10 per cent. residue on a No. 100 sieve, and this is the requirement of the standards of Canadian Society of Civil Engineers, formulated in 1894.

3. Checking or Cracking.—No checking when exposed in air or water! How long are we supposed to wait? The report does not say, but from a great number of experiments I have made I would say that cements with a slight amount of free lime in them will stay solid in cold water for several months, but finally crack. The only way to develop "blowing" in a short time is to subject the cement pats to hot air or hot water.

4. Strength.—With ordinary care, neat cement briquettes made in the ordinary way, by using sufficient water to make a plastic mortar, then putting the mortar into the molds with a trowel, and shaking the molds well to drive out air bubbles, will give fairly uniform results; but in making sand tests the method of putting the mortar into the molds is the whole matter; a one week test, three to one, can be made to vary all the way from 25 to 150 or even 225 lbs., depending entirely on the manner of placing the mortar in the molds. Therefore, a clause not stating how this is done is of no value whatever, even if the clause stated that the mortar should be rammed into the molds. There are as many ways of ramming as there are operators, and the result might vary by at least 100 per cent.

Personally, I consider sand tests are of little value, because if the clauses of specific gravity, fineness, blowing (or checking), and neat tensile strength have been sacrificed, then one can predict the comparative sand test value; but if sand tests are wanted, then I believe firmly that there is only one way to make them strictly comparable, and that is to put the mortar into the molds in a soft, plastic, condition, such as is used by masons, and let it be forced into the mold under a uniform dead pressure. This method I have used for over a year, and I feel I can determine accurately the desired knowledge of the actual cementing strength of sand mixtures as used in practice.

The city hall at Chicago threatens to collapse. An official inspection shows that the two ends are settling, and pulling the building apart, which is shown by large cracks through the centre. Immediate repairs are necessary.

GOOD ADVERTISING METHODS.

Mr. Chas. Austin Bates, in his department of criticism of advertising methods in Printers' Ink, says:—

Gara, McGinley & Co., of Philadelphia, have been successful advertisers in a line little advertised. They are roofers and makers of architectural decorations in metal. They make metal ceilings, skylights and store fronts. The inexperienced or unposted observer would say, from looking at the mass of advertising matter that they send out, that they were spending more money than the business would justify. That this is not true is proven by the fact that the business becomes bigger and more profitable every year. And apparently the more money the firm spends in advertising, the more money they have to spend. They have made quite a feature of advertising what I believe to be a very insignificant part of their business. That is the repairing of roofs.

One of the best phrases I ever saw in an advertisement is one of theirs, which says: "We do one thing well. We mend roofs." Another phrase is: "We are leak finders." One ad that they have used has stuck to me, and amuses me every time I think of it. It is a funny ad, and is the exceptional funny ad that proves the rule that all funny ads are bad. It is: "How much better it is to sit by a cosy fireside, and think how much better it is to sit by a cosy fireside than to be on the roof cleaning the snow off, thinking how much better it is to be sitting by a cosy fireside than cleaning the snow off the roof. We are snow removers and leak finders. Gara, McGinley & Co."

The last smart thing the firm has done was to get out a handsome little booklet entitled, "Pointed Suggestions." I think it would have been better to call the booklet "Pointed Suggestions to House Owners," or "Points on Roofs," or something of that sort, letting a man see immediately what the book was about.

It is liberally and suitably illustrated with half-tones of wash drawings. From a mechanical standpoint, there are only a few criticisms to be made. One is that on some pages the matter is arranged in a spotty sort of way. It is broken up too much and isn't sufficiently cohesive. The best thing in the whole book is a thing that certainly deserves praise as a plain and convincing piece of advertising. It is a series of half-tone pictures of Gara, McGinley & Co.'s office as it was and as it is. First there is a picture of an old-fashioned, three-storey brick house, in the architectural style of sixty or seventy-five years ago. The next picture shows this house in process of demolition. The third picture shows the addition of another storey. The fourth picture shows a part of the building covered with rock-faced metal plates. The other part is uncovered, giving the idea of the method of applying the plates. The fifth picture is the finished building, a stately, dignified, artistic piece of architecture, which no one who is not admitted to the secret would ever suppose to be the same house as was portrayed in the first picture. This is a practical illustration of what Gara, McGinley & Co. are prepared to do with other old houses.

Mr. Joseph Bourque, of Hull, Que., is taking action to compel settlement of balance of account of the court house and jail contract, which has been standing for two years.

As a result of a recent accident in Ottawa, a scaffold inspector for that city will probably be appointed. It is proposed to have all contractor's plant inspected and branded, and to insist on its being placed under cover during the winter.

NEW CANADIAN PATENTS.

AMONG the new patents granted in Canada as announced in the last Patent Record are the following relating to the building trade:—

Cleaner for Cisterns—Charles A. Butterfield, Dewitt, Iowa.

Window Fastener—Ernest Peters, Tompkins, Mich.

Door Fastener—M. P. Pirtle and J. W. Miller, Louisville, Kentucky.

Fastening for Window Sashes and Slide Doors—D. A. Crichton, Los Angeles, California.

Fancy Brick, Etc.—The National Opalite Glazed Brick and Tile Syndicate, London, England.

Fire Escape—Wilbrod Bourdon, Valleyfield, Que.

Hasp—Wm. Firfield, Perth Amboy, N.J.

Weather Strip—Chas. M. Becker, Port Rowan, Ont.

Chimney Cowl—Cyrus N. Shannon, St. Cloud, Minn.

Building Brick—Geo. S. Balsley, Detroit, Mich.

Hot Air Flue—Wm. H. Brinker, Pittsburg, Penn.

Sash Cord Catch—John Wheatly, Hamilton, Ont.

Heating Drum—Thos. H. Wilson and Robt. Humphreys, Logansport, Indiana.

Indicator Door Bolt—Wm. S. Burgess, Three Rivers, Que.

Heating and Ventilation System—Wm. Bruce, Leeds, England.

Heating Furnaces by means of Liquid Hydrocarbon—La Compagnie Internationale pour l'Exploitation des Procedes, Lyons, France.

Window Fastener—Laura Hofheimer, Brooklyn, N.Y.

Double Flushing Water Closet—Philip Nicoll, Toronto.

Bath Tub—Robt. M. Wilson, Rome, N. Y.

Brick Kiln—Geo. S. M. Rutter, Canton, Ohio.

Stench Trap—Geo. Dunstan, Lorain, Ohio.

Window—J. A. Cleveland, Duluth, Minn.

Metallic Roof—L. S. Flutan, Dallas, Texas.

Hot Air and Steam Bath Apparatus—Salli Maschke, Berlin, Prussia.

The Laughlin-Hough Drawing Table Co., of Guelph, have received an order from Ottawa for six of their large size tables.

Electricity is being used to operate the large stone saws at the government buildings at Victoria, B. C., now in course of construction.

Mr. J. R. Booth, of Ottawa, has purchased the Reefer stone quarry in Nepean, from which stone will be taken for the new central depot to be erected at the capital.

The contract for 30,000 tons of cast iron pipe for the waterworks at Yokohama, Japan, was awarded to an Alabama iron company. It is said to be the largest order ever given for American iron for foreign shipment.

MANUFACTURES AND MATERIALS

A mortar composed of brick powder mixed with quicklime is largely used in France.

The Maritime Nail Co., with an authorized capital of $50,000, has been organized at St. John, N. B.

The Northumberland Stone Co. has been formed, with a capital of $10,000. The incorporators live in Shediac, Sackville and Botsford, N. B.

Mr. H. Horskin and Mr. Hurlburt have entered into partnership at Bedford, Que., for the manufacture of sanitary ware, general plumbing goods, etc.

Arrangements are about completed whereby the partners formerly interested in the British Columbia Pottery & Terra Cotta Co. will regain the ownership.

The Brockville Pressed Brick Co. are building railway sidings, arranging for the purchase of bush land for fuel supply, and otherwise improving their facilities.

The Union Bank has sold the C. B. Wright brick yard near Hull to Messrs. Arthur, Walter and Thomas Farley for $20,000. The new firm will put in new machinery and operate the yard.

Attention is being directed to large deposits of asphalt which exist on the Athabaska River, N. W. T. Tests made of specimens collected by members of the geological survey show it to be well adapted for the construction of roads, footpaths, courtyards, granary and warehouse floors, and also for roofing.

The Whitton Granite Quarry Co. has been incorporated, with capital of $50,000. The incorporators are: Senator Boldue, Mr. Rufus H. Pope, M.P.; Mr. Louis Israel Frechette, M.P.; Dr. G. H. Lacoureiere, of St. Victor de Tring; Mr. Wilfred Trudeau, of Fall River, and Mr. D. Alfred Roy, merchant, New Bedford, Mass.

A company has been formed in the United States to supply contractors and builders with ready-made mortar. Their buildings at Pittsburg will be seven storeys high, and the mortar will be mixed on the top floor, and when it reaches the ground will be ready for use. It is claimed a better quality of mortar can be thus supplied.

The announcement recently published that a deposit of the finest quality of roofing slate had been discovered in the township of Euphemia, Lambton county, Ont., proves not to have been well founded. Mr. Archibald Blue, Director of Mines for Ontario, has lately visited the locality and found the deposit to consist of ordinary bedded shale.

INTERIOR WORK

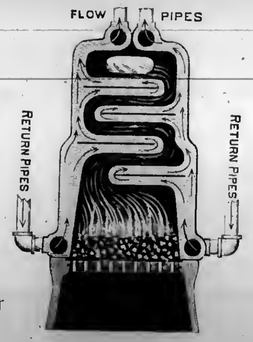
... OF ...

ECLIPSE

Hot Water Boilers

SHOWS { EASE OF CLEANING
PERFECT CIRCULATION
POWERFUL HEATING SURFACE

This combination is worthy of your serious consideration.



Let us help you with our Catalogue "D"
Yours for a postal request.

R. McDOUGALL & CO. GALT, ONTARIO

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

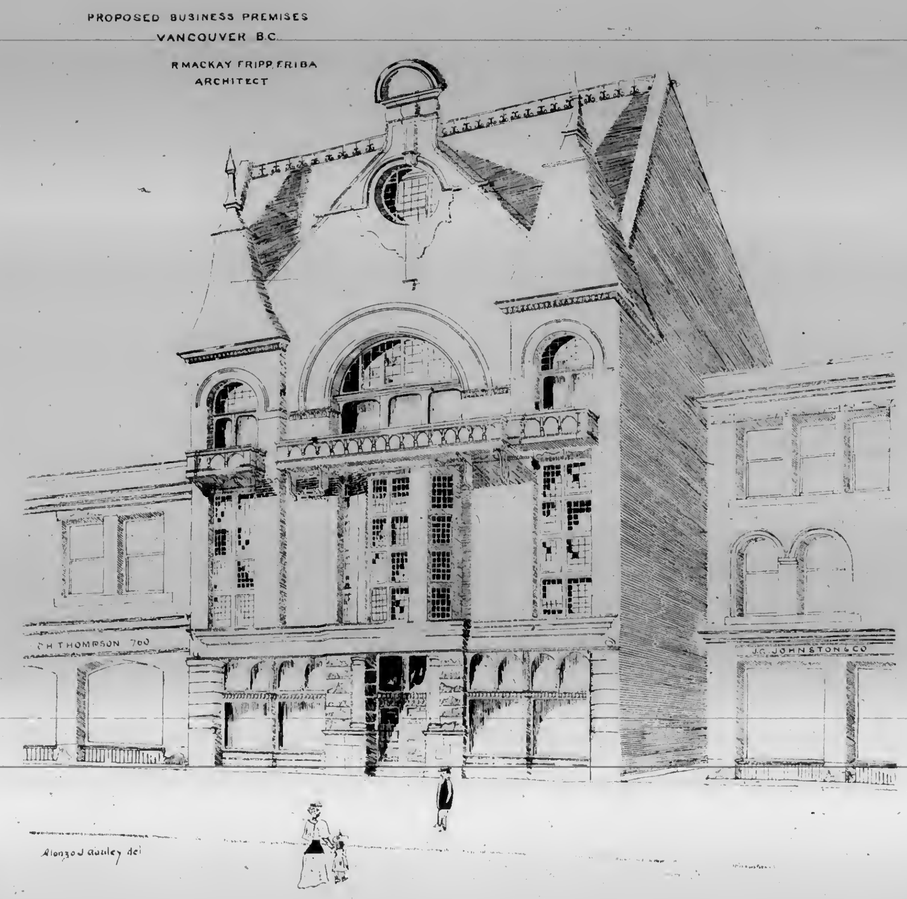
TOWN HALL, CARLETON PLACE, ONT.

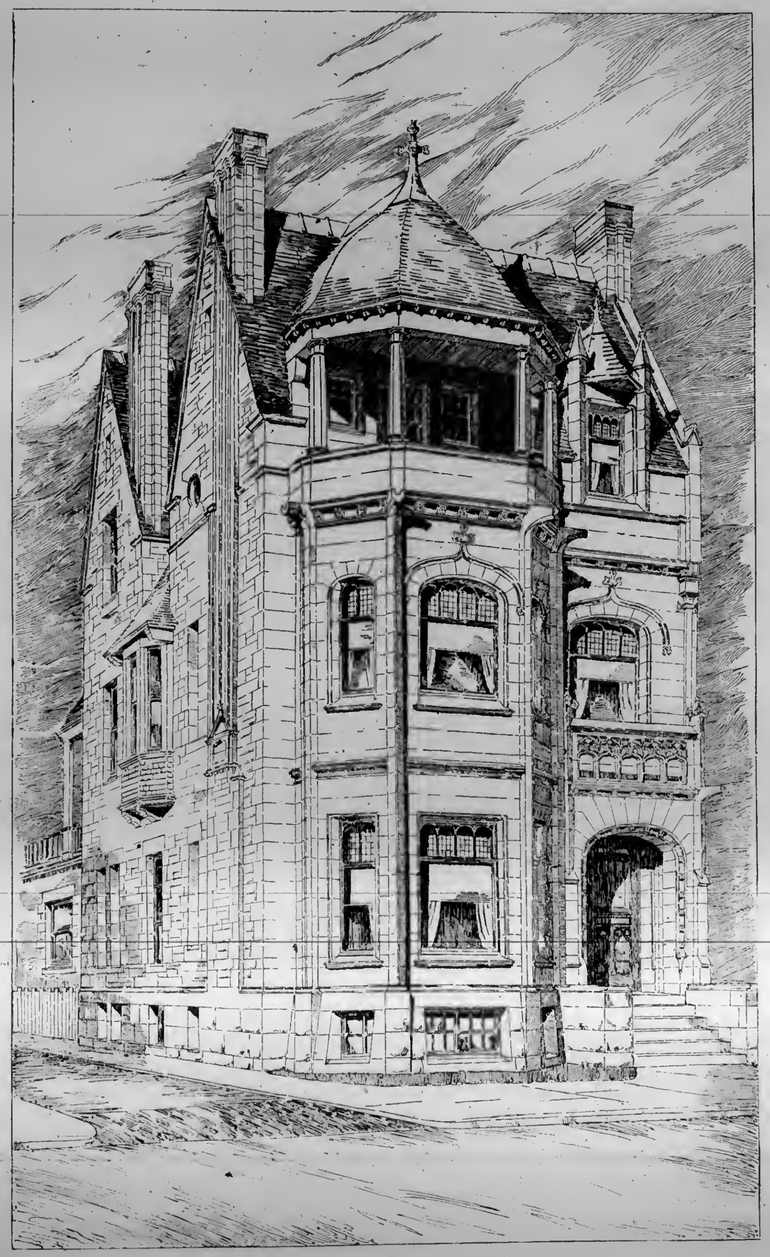
G. W. KING, ARCHITECT, TORONTO.

FACTORY BUILDING FOR THE METALLIC ROOFING COMPANY, TORONTO.

HENRY SIMON, ARCHITECT

PROPOSED BUSINESS PREMISES
VANCOUVER B.C.
R.MACKAY FRIPP F.R.I.B.A.
ARCHITECT





RESIDENCE, BISHOP STREET, MONTREAL, FOR DR. F. GURD.

ROBERT FINDLAY, ARCHITECT

CANADIAN

ARCHITECT AND BUILDER

VOL. IX.

1896:
C. H. MORTIMER, Publisher.
TORONTO CANADA

INDEX

	Page
Architecture of Sicily, Reminiscences of	1
Atwood, the Late Mr.	46
Australian Architecture	37
Architectural Tour in England and France, Notes on an	59
Aldridge, Mr. John	68
Asphalt Pavements, Defects of	99
Arch and Vault Tests of the Austrian Society of Engineers and Architects	74
Arts and Crafts Association	75
Architectural Terms Explained	93
Arched Roof Rink in America, the Largest	115
Asbestos	118
Ancient Babylon	121
American Institute of Architects	132
Architecture, Modern Toronto	173
Architecture in the University	174
Architects' Materials, Duty on	142, 147
Building in Canada in 1895	10
Builders' Exchange	10
British Columbia Parliament Buildings	10
Building Timber	37
Brick, Uniform Size for	37
Building Stones of Eastern Ontario	41
Building Rights and Measurements	44
Bricks, Canadian, Tests of	44
Building in Summer, Advantages of	59
Building Trade Dissensions	71
Building Inspectors, Examinations for	103
By the Way	67, 114, 147, 182, 175, 193
Building Conditions	71
Builder, The	72
Building and Sanitary Construction	77
Boiler Coverings, Experiment with	81
Blacklisting, Penalty for	102
Building Regulations in Toronto	117
Book of Competitions, a Chapter from	123
Builders' Estimates	129
Building By-Law, Proposed New, for Montreal	171
Brickwork, Italian	175
Brickwork, Early English	183
Building Materials, Production of	156
Bricks for Wall Linings	170
Buffalo Breakwater, the	192
Building Conditions	192
Building Material, Duty on	193
Bricks Made from Sand	147
Country Builder, What He Should Know	8
City of Toronto vs. Neelon	9
Concrete as a Fireproof Material	41
Correction	41
Canadian Society of Civil Engineers	44
Color in Brickwork	45
Combination of Stone with Brick, the	47
Canadian Country Architecture	81
Convict Labor the Utilization of	86
Construction, a Problem in	103
Canadian Slate Its Formation, Extraction and Uses	106
Contractors' Estimates	106
Color Effects	115
Concrete Floors	130
Canadian and English Brickwork, Tests of	94
Copper	147
Competition Conditions	170
Cement Sidewalks	170
Competitions	173
Cheapening Production	175
Chicago Drainage Canal, Effect on Canadian Water Levels	177
Canadian Furniture	132
Concrete, Tests of	44
Cement Works in Germany	174
Chimney Building	176
Capper, Prof. S. H.	178
Cisterns	183
Combination Heating	183
Concrete, Tests of	194
Carroll, Mr. P. J.	196
Dangerous Structures	1, 81
Domestic Architecture	2
Draftsmen, Maxims for	43, 106
Defective Construction	4
Dominion Master Plumbers' Association	9, 106, 170
Dissentient View, a	9
Derrick Marks in stone	9
Design in Examination, Omission of	9
Damp Courses	17
Dredging, Novel Method of	17
Designing, Care in	192
Electricity in Stone Quarries	8
Errata	8
Electric Wiring, Defective	7
English Working Rules, Revised	9
Educational Standard for Architects, an	17
Elevators, Safety of the	170
Examinations, Conduct of the	186
Fire Resisting Structures	34, 44
Foundations, Movable	37
Floors, Concreting	39
Free Silver Agitation	111
Floors, Painting	115
Fire Risk in Toronto, the	132
Fires from Electrical Appliances, to Avoid	146
Fireproofing Tests	147
Finishing Hardwood	141
Floors, Warm	143
French Methods of Construction	192
Flowing Material, a New	196
Generous Offer, a	8
Granite Cutting Apparatus	10
Guild of Sculpture of Ontario	41
Granite for the United States	77
Grotesque in Carving, the	81
Gurney Foundry Company's Exposition	86
Good Roads Movement, the	103
Gypsum, Nova Scotia	103
Girders, Strength of	143, 145
Hamilton Art School	2
Heating Problem, the	2, 137
Hardwood Finish	141
House Painting, Tests on	80
Haskins, Mr. Wm., C. E., the Late	101
Heating and Ventilating Buildings	101
Heating Trade, the Conditions in	132
Handy Rules, a Few	184
House Plumbing, Good, Requirements of	187
Hanging Doors	84
Improved Fire Protective Appliances, Value of	7
Iron Construction for Churches	91
Interesting Suit, an	110
Irish Competition, an	174
Insanitary Dwellings, the Cause of	127
Inferior Wiring, Modern Practice in	127
Ironwork, Wood Wall Ties	144
Inside Blinds, Hanging	177
Information Required by Builders	177
Influence of Steel Construction and Plate Glass upon Style, the	202
Kitchen, the Location of	152
Keep at it	xviii
Legal	17, 33, 103, 131, 140
Lord Leighton, the Late	19, 47
Lien Law of 1895, the Ontario	47
Labor Troubles, the Recent	54
London Master Plumbers' Banquet	70
Leaks, Small	73
Lumber, Care of	84
Lime and Mortar	84
Laying Base	85
London Strike, Settlement of the	124
London Builders, Picnic of	128
Leaden Iron for Supply and Vent Pipes from a Plumber's Point of View	187
London Plumbing Establishment, a	207
Legislation Affecting Plumbing and Drainage, Proposed	208
Montreal Correspondence, 7, 19, 33, 54, 70, 103, 114, 177	
Manufactures and Materials	2, 11
McGill University, Chair of Architecture at	8, 45
Modern Fall Building Construction	46
Mosaic, a Great	73
Mortar of Brick Dust	173
Modern Ornament	57
Museum, the Establishment of a	91
Mortar under Shingles	103
Master Plumbers' Outing	125
Maximum Loads	130
Modern Architecture	134
Mouldings	138
Mortar, the Preparation of	140
Marble in Interior Work	152
McGill University, Teaching of Architecture at	171
Marble in Nova Scotia	182
Marble, Artificial	195
Montreal Master Plumbers	206
National Association of Builders, the	34
Nails, Wire and Cut	109
Novel Idea, a	114
New York Municipal Building, Competition	131
Novel Plan of Building, a	132
Nails, Tests of	144
Native Building Materials of the Canadian North west	147
New York, Cathedral, the Foundations of	196
Office Methods for Architects	4
Ontario Association of Architects	15
Ontario Land Surveyors	200
Objections Answered, Some	44
Ontario Architects, Visit of	115, 174, 177, 182
Offering Rebates to Architects	82
Our Public Schools, What Should be Taught in	82
Outlook, Brightening, a	114
Ottawa Letter	115
O. A. A., Act, the Proposed Amendment of	124
Ontario Association of Architects, the, Convention of	156
Plasters, Patent	1, 81
Personal	1, 8, 11, 19, 33, 46, 70, 81, 103, 114, 126, 140, 147, 156, 170, 182, 194, 207
Patents, Recent Canadian	17, 81, 140, 175, 207
Professional Journals, Value of	1
Point of Law, an Interesting	1
Public Schools, Aesthetic Teaching in the	2
Plumbing Department, Transfer of	2
Plumbers' Supply Merchants Organize	34
Party Wall, What Constitutes a	34
Pilasters, Mensuration of	71
Paris Exhibition, Building for the	103
Paving Brick, Tests of	110
Plastering and Decorating	140
Publications	141
Prismatic Glass	140, 170
Painters, Methods of Estimating for	156
Point of Law, a	167
Progressive Architect, the Modern, Methods of	171
Plumbers' Association	172
Private Residence, Design for	187
Parisian Exhibition, Building for the	188
Queen's Park Improvement	77
Quebec, Province, Association of Architects	111, 152, 158
Quantity Sheets in Building, the Use of	126
Qualification, Practical, by Architects and Builders	134
Questions and Answers	206
Roof Construction	2
Ready-Made Mortar	6
Roofing Tiles of Pulp Wood	8
Realty, Mr. J. P., the Late	8
Roofs, Shingled	82
Reading Drawings	102
Ritchie, John, the Late	124
Russian Houses	125
Roads, Loads and Strength of	130
Roads, Repairing	131
Required Distinction, a	201
Roofing, Lead, Copper and Zinc for	204
Sketch Club, Toronto	1, 81, 18
Sheets and Buttresses, Flying	3
Staircase, the	3
Suburban House, the	18
Students and Draughtsmen's Competition, R. C. A. & R.	32, 69, 80, 77, 106, 152
Sketching Competitions in the Second Class of the School of Fine Arts	32
Safe Scaffolding	60
Sound in its Relation to Buildings	69
School Sanitation	97
Safe Construction	72
Slates and Slating	88
Sketching by Students	92
Sham Competitions	125
Stone Crusher Operated by Electricity	126
Students' Department, Our	132
Stairs	141
Storm Windows	165
Storm Doors	165
Safety, True Factor of	176
Stone Cutting with Wire Rope	181
Steam Heating	185
Stone Cutting, Electric	190
Sanitary Committee, Meeting of	207
Troubles of a German Architect	48
Toronto Master Plumbers and Steam Fitters	80
Truth in Architecture	86
Toronto Builders' Exchange	68, 86
Tully, C. E., Mr. Kivas	79
Taking Quantities	77
Tips for Builders	107
Toronto Waterworks System	127
Toronto, Building Methods in	135
Traps, the Ventilation of	145
Terra Cotta	149
Trade Combines	9 viii
Travelling, the Practical Side of	151
Taylor, Mr. A. T., F.R.I.B.A.	164
Tall Building?	174
Testing Quicksand	191
Useful Hints	107
Uprighting a Tall Brick Stack	6 viii, 130, 145, 210
Ventilating and Warming Stables	179
Ventilation, Points on	155
Why Stone Walls are Damp	117
Windows, Early English	68
Wood, Characteristics and Properties of	100
When Carving Should be Executed	110
Windows, Notes on	122
Waterproofing Brick	129
Water Flush and Diameters of Drains	150
Word of Caution	152
Wired and Ribbed Glass, Fire Retardent and Light Diffusing Properties of	160
Wrought Iron Pillars, Increasing the Resistance to Fire of	173
Young Contractors, Points for	14

ILLUSTRATIONS.

	No.
Aspect Compass	III
Bank of Toronto, Montreal	I
Bank of Montreal, Montreal	I
Block, for, Hastings & Homer sts., Vancouver, B.C.	II
Business Premises at Gananoque, Ont	IV
Broadview Ave Congregational Church, Toronto, Design for	VIII
Bridge at Island Park, Toronto	VIII
C. A. & B. Competition for a Jewelry Store	I, II
Club House, Design for	VIII
Cantilever Bridge over the St. Lawrence River, Montreal, First Prize Design for	X
Design for a Town Hall	III
Diocesan Theological College, Montreal	XI
Houses on Linsley Place, Toronto	V
High School Building, St. John, N. B., Competitive Design for	VIII
House at Ilfora, Design for	IX
House at Montreal for Mrs. Joseph Levy	XI
Illustrations of Results of Tests of Structural Metal Work	IX
Jamieson Building, Toronto	I
Market Building at Winnipeg	I
Merchants Bank of Halifax, Montreal	I
Normal School, Hamilton, Ont.	XI
Proposed East End Depot for the C. P. R., Montreal	III
Post Office, Customs and Inland Revenue Offices, Victoria, B. C.	VII
Private Residence, Design for	VIII
Public Lavatory, Toronto, Design for	IX
Robertson Memorial Window, Sick Children's Hospital, Toronto	V
Residence Spadina Road, Toronto	VI
Residence at London, Ont.	I
Residence of H. Vincent Meredith, Montreal	I
Residence for W. H. Moore, Acton, Ont.	II
Residence for J. J. Frost, Smith's Falls	III
Residence on Madison Avenue, Toronto	IV
Residence for W. M. Knowles, Montreal	IV
Residence of Mr. Columbus Greene, Toronto	X
Residence for Mr. H. R. Miller, Montreal	XII
Stokesay Castle, North Tower	I
Stores on St. Catherine street, Montreal	I
Summer Hotel, Design for	IV
Sketching Competitions in the School of Fine Arts, Paris	V
Stokesay Castle, Solar Room	V
Stained Glass Window, St. Andrew's Church, Belleville	V
Reading Drawings	VI
School, One-Room, at Portage la Prairie	V
Shoring and Strutting	VI
Stokesay Castle	VI
Stable and Coachman's Dwelling at Oakville, Ont., Proposed, Preliminary Sketches for	XIII
Stained Glass Window, Presented by Archbishop Walsh to the Chapel of the Sisters of St. Joseph, Toronto	XII
Toronto Sketch Club Competition for Entrance to a Park	II
Toronto, Hamilton & Buffalo Railway Station	II
Wells Cathedral, Somersetshire, England	I
Wells Cathedral, Entrance to Vicar's Close	X
Young Men's Christian Association Building, London, Ont.	X

CANADIAN ARCHITECT AND BUILDER.

(Price of this Number, 35 Cents)

VOL. IX.—No. 1. JANUARY, 1896 { PRICE 20 CENTS / $2.00 PER YEAR.

THE

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1895.

PRESIDENT	FRANK DARLING, Toronto.
1ST VICE-PRESIDENT	THOS. FULLER, Ottawa.
2ND VICE-PRESIDENT	J. GEMMELL, Toronto.
TREASURER	H. B. GORDON, Toronto.

COUNCIL:

D. B. DICK	Toronto.
W. A. EDWARDS	Hamilton.
F. J. ALEXANDER	Ottawa.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. C. HUTCHISON, Montreal.
1ST VICE-PRESIDENT	A. T. TAYLOR, Montreal.
2ND VICE-PRESIDENT	J. F. PEACHY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

CHAS. BAILLAIRGE	Quebec.
ROBT. FINDLAY	Montreal.
J. Z. RESTHER	Montreal.
A. H. LAPIERRE	Montreal.
G. E. TANGUAY	Quebec.
THEO. DAOUST	Montreal.

AUDITORS—A. J. FOWLER and C. CHAUSEE, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

GEO. OAKLEY, President.	FRED. WAKEFIELD.
JOHN ALDRIDGE, 1st Vice-President.	WM. BOOTH.
WM. PARK, 2nd Vice-President.	JAS. ISAAC.
DAVID WILLIAMS, Treasurer.	H. LUCAS.
JAS. CRANG.	H. MARTIN.
WM. PEARS.	THOS. CANNON, Jr.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journa is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

TO OUR READERS, GREETING.

WITH this New Year Number the CANADIAN ARCHITECT AND BUILDER begins its ninth year of publication. This is the largest, and in many particulars is believed to be the best number of the journal that has yet been published. Placed side by side with the productions of earlier years, it is a gratifying evidence that the journal has maintained steady progress. An expression of our indebtedness and hearty appreciation is tendered to Mr. Ernest Wilby, of Buffalo, N. Y., formerly of Toronto, for the beautiful design which adorns the cover of this number, and to Mr. Henry Beaumont, sculptor, of Montreal, who modelled the design in clay so that a photograph giving the necessary relief effect might be obtained. The skill of both designer and sculptor is more effectively expressed in their work as reproduced in this number than by any words of ours. This is believed to be the first instance in which this method of illustration has been employed by a Canadian journal. A plaster cast taken from the clay model is being exhibited at the annual convention of the Ontario Association of Architects, now in session in the School of Practical Science, Toronto.

Our thanks are also due to the gentlemen who have contributed interesting and instructive articles to this number on a variety of subjects relating to architecture and building. We should be pleased to receive the assistance of a larger number of readers in this direction, not only on special occasions like the present, but throughout the year. In the multitude of counsellors there is said to be wisdom. If every reader would feel himself under obligation to give as well as to receive information, the pages of each number of this journal might be made much more helpful than they have hitherto been. May we not expect an improvement in this direction this year?

We appreciate also the support which we have received in the form of advertisements from manufacturers and dealers in all classes of materials employed in the erection of buildings, and without which it would be impossible to supply a publication of this character at such a small subscription price. The advertisements form a valuable directory to which the architect, engineer and contractor may at all times conveniently refer. Much care has been given to make the advertisement pages and attractive an interesting feature of this number, and we bespeak for them the careful examination of our readers.

HAMILTON ART STUDENTS' LEAGUE.

ART circles in Hamilton have been stirred into somewhat unwonted action this season by the organization of the "Hamilton Art Students' League," formed on the usual lines of such art clubs with the view of mutual improvement and help as well as the promotion of art and good fellowship among amateurs and professionals. It is not entirely a new departure, for some years since there existed a Sketch Club in the Ambitious City comprising most of the wielders of the brush and pencil then active, and being known as the "Black and White Club," holding its meetings in the studios of J. R. Seavey and exhibiting occasionally groups of sketches by the members.

The new movement began in November last at a largely attended meeting of ladies and gentlemen held at the Canadian Club, the prospect being so promising that without delay the organization was effected. Mr. J. R. Seavey, the artist, was elected President; Miss Clara Galbraith, Vice-President; Mr. C. L. Wright, Secretary, and Miss Tutty, Treasurer.

A commodious and centrally located atelier at 8 King street west was secured, lit by electricity. The main room being formerly a large photographic operating room with skylight, makes it convenient for both night and day work. There is room for a semi-circle of 25 members to sketch in the front row about the model throne.

A Board of control, consisting of active and ex-officio members, manages the League, while a House Committee, elected each month, supply models and attend to details. Two evenings each week are devoted to drawing and painting from life, the monthly dues being one dollar, which covers the expense of models, rent, etc. Associate members who have a vote in the elections, and the entree of the exhibitions, pay an annual fee of two dollars. No instructors are at present employed, but as the League is composed of many enthusiastic artists and students, the work is earnest and thorough. About thirty-five active members are enrolled, many of whom are ladies.

The first week in June the annual sketch exhibition will be held in the rooms, and in December the annual exhibition of finished work by the members, active and associate, at the Canadian Club.

House of H. Vincent Meredith, Montreal.

MONTREAL.

(Correspondence of the Canadian Architect and Builder.)

It is evident to whoever has studied the development of architecture in this province, or at least in Montreal, that it has perceptibly retrograded during the last decade owing to the wholesale building by speculators, without the aid of the architect, or at least, intelligent architects. From the foundation of this country up to about thirty years ago we can easily trace the influence of the architecture of the older countries of Europe, especially of France in the first period and England in the second; while since then we have reflected all the mixed styles which have held sway in the United States, from the Neo-Grec to the revival of Colonial; or in other words we have built regardless of style at all. This is the case with the majority of structures of modern construction.

Stores on St. Catherine Street, Montreal.

American architecture commenced to get a foothold here, with the erection of the Standard building on St. James street, which was built from the design of an American architect. Whether people were prejudiced against the architecture done by local architects is an open question, but it is nevertheless true that since the erection of that building many works of importance have been entrusted to American architects, as exemplified in the New York Life building on Place D'Armes, the Y. M. C. A. building on Dominion Square, and in the more recent example of the Board of Trade building on St. Sacrament street, which seems to have had the effect of forcing our architects to study the architecture of our neighbors in order to meet the popular demand and craze of the day for Americanism.

Merchants' Bank of Halifax, Montreal.

Branch Bank of Montreal, Montreal.

Westmount, formerly called Cote St. Antoine, is the locality for excellence where we will find in large numbers examplos of American domestic architecture, which, it cannot be denied, is especially fitted for this country.

Much difference of opinion will exist as to whether Montreal should be blamed or praised for its frequent change of styles, but it will be agreed that it is not so much the question of style we should advocate as that we should strive to obtain in whatever style we choose the highest possible excellence by studying the same thoroughly and intelligently.

Where architecture in Montreal has retrograded has been in the erection, during the last ten or twelve years, of dwelling houses on a grand scale by speculators, from the plans of an inferior class of architects, or more often still from the plans of builders. This class of building far outnumber the better class, which accounts for the distorted perspective one meets with in the streets of some localities.

A few illustrations are here given of some of the best buildings of recent erection, for photographs of which we are indebted to Mr. Cajetan Dufort, architect, of Montreal. Fig. 1 represents the residence of H. Vincent Meredith, at the corner of Pine avenue and Peel street, Mr. Edward Maxwell, architect, the work of which is finely executed. The walls are built in fine pressed brick, red in color and relieved with sand stone trimmings. Fig. 2 represents two stores with dwellings above, on St. Catherine street, near Mansfield street, Messrs. Cox & Amos, architects, built in sand stone of two different colours. Fig. 3 is the Merchants' Bank of Halifax at the corner of Notre Dame and Seigneurs streets, Mr. Edward Maxwell, architect, the ground floor of which is in olive green sandstone and the remainder in buff pressed brick. Fig. 4 is the branch of the Bank of Montreal, situated on the opposite corner from the last named building, entirely built of red sandstone. Fig. 5 represents the new building of the Bank of Toronto, at the corner of St. James and McGill streets. Mr. A. T. Taylor, F.R.I.B.A., is the architect of these structures.

Bank of Toronto, Montreal.

OFFICE METHODS FOR ARCHITECTS.

A PROGRESSIVE firm of architects in Western Ontario, have by request, favored us with particulars of their office methods, including copies of their printed forms for various purposes. These forms and particulars are given herewith

No. 895 .....189..
$..... Progress Certificate No....
Ledger Folio.....
Building.....
.....
Client.....
Contractor.....
Trade.....

STATEMENT.

Amount of Contract...	$	$
" Previous certificates		
" Present "		
Total paid to date....		
Balance in hand		$

No. 895 .....189....
$..... Progress Certificate No.....
Office of.....
Architect.
Building.....
To.....
..... hereby certify that .....
is or are entitled to a payment of..... /100 Dollars
.....on account of contract.....

STATEMENT.

Amount of Contract...	$	$
" Previous certificates		
" Present "		
Total paid to date....		
Balance in hand		$

.....
Architect.
Received payment $.....
.....189....
.....

FORM OF PROGRESS CERTIFICATE BOOK.

No. 59 .....189..
$..... No.... and final
Ledger Folio .....
Final Certificate.
Building .....
.....
Client.....
Contractor .....
Trade.....

DETAILED STATEMENT.

Amt. of Orig'l Contract		$
" additional and extra work		
Total Amt. including add'l and extra work		
Amt. of deductions and work not executed		
Net amount		$
CREDITS.		
By cash paid per cert's	$	$
To balance due.....	$	
		$

No. 59
$..... Office of..... No.... and Final
Architect.
Final Certificate.
Building.....
To.....
..... hereby certify that .....
.....entitled to a payment of...../100 Dollars
in full on contract and extra work .....
.....

DETAILED STATEMENT.

Amt. of Orig'l Contract		$
" additional and extra work		
Total Amt. including add'l and extra work		
Amt. of deductions and work not executed		
Net amount		$
CREDITS.		
By cash paid per cert's	$	
To balance due.....		
		$

.....
Architect.
Received the above amt. $.....
.....189....
.....

FORM OF FINAL CERTIFICATE.

No. 87 .....189.
$..... Ledger Folio.....
Order for Extra Work.
Building.....
.....
Client.....
Contractor .....
Trade.....
.....
Amount of Order $.....

No. 87
$..... .....189....
Order for Extra Work.
Building.....
To.....
.....hereby extend the time for completion of contract.....days
and authorize you to accept .....
tender of $.....for the following additional work, viz. :—.....
.....
.....
.....
.....$.....
.....Owner.

FORM OF ORDER FOR EXTRA WORK.

in the hope that they may prove of interest and value to the architects of the country. We shall be pleased to receive expressions of opinion upon them and suggestions for their improvement :—

PROGRESS CERTIFICATE BOOK.

For convenience two kinds of certificate books are used, viz : progressive and final in conjunction with a "Contract Ledger."

The certificates in both books are consecutively numbered and a ledger folio space is left on counterfoil to mark the page on which the building account is kept.

The perforated stubs are large enough to enter all information relating to the certificates. The memorandum in lower left hand corner for noting the amount of contract previously paid, etc., and balance due, if properly filled out will serve as a short general statement to the client. Contractors can receipt payment at the bottom of the certificate.

FINAL CERTIFICATE.

The final certificate detailed statement somewhat differs from the "progress," a space being allotted for extras and deductions, which greatly facilitates obtaining a balance where extras and deductions are concerned.

Some final books contain under credit column a complete list, month and dates of progress payments, but if the contractor's ledger is regularly posted it is unnecessary to repeat that work for owner's benefit.

ORDER BOOK FOR EXTRA WORK.

When extra work is desired by client or his architect, a price arranged and an order given beforehand will lessen the time spent on the final adjustment of account.

CONTRACTORS' LEDGER.

The Ledger consists of a 3 money column or bank ruled book. The top of page gives name of client, kind of building, street, location, in city or town. Across

JOHN SMITH
House No.....Street.....City.

1895		MASON'S WORK.			$		$		1895		CARPENTER.			$		$	
		John Brown									J. Jones						
Oct.	3	By Contract.....			1208	00	1208	00	Oct.	3	By Contract.....			2000	00		
Nov.	9	To Certificate...	186	400 00			808	00	Nov.	14	To Certificate...	189	100 00			1900	00
"	25	" "	194	125 00			683	00	"	7	By Extras.....			26	50	1926	50
Dec.	20	" "	205	500 00			183	00	"	16	" "			1	50	1928	00
									"	20	" "			18	66	1946	66
									Dec.	20	To Certificate...	202	500 00			1446	66

CONTRACTORS' LEDGER.

CLIENT .....
Building.....

CONTRACT FOR MASON WORK.

Contractor.....
.....
Date of Completion..... Amount of Contract $.....
Payments to be made .....
.....
Year

Month	Day	Dr. or Cr.	Ledger Folio	Certificates	Contract	Balance

CONTRACT FOR CARPENTER, ETC.

Contractor.....
.....
Date of Completion..... Amount of Contract $.....
Payments to be made .....
.....
Year

Month	Day	Dr. or Cr.	Ledger Folio	Certificates	Contract	Balance

FORM OF RULING FOR CONTRACTORS' LEDGER.

June Wednesday, 12, 1895. (163-202)

Hour	Client	Remarks	Ledger Folio	$	c.

FORM OF DIARY.

.....

When made Month	Day	Description of Drawing	When rec'd Month	Day	To Whom Delivered	Returned

FORM OF RECEIPT BOOK FOR DRAWINGS.

the page the name of the contractor is inserted, with sufficient space allowed between it and the next amount to admit the placing of amounts of his account, and so on with all parties engaged on the works.

It can be readily seen that in closing a building account the architect has a complete list, avoiding the tedious task of searching through the counterfoils of a score or more certificates, occasionally missing some account from final statement the commission on which, overlooked on each job during the year, might involve a considerable loss to an architect's bank account.

A second class of ledger is ruled and printed for noting in a condensed form the entire contracts relating to a job or structure. One column contains all of the information relating to the masons, another to the carpenter, etc. Payments made are quickly entered on the lower half of the page. It is unnecessary to refer to the contract or to the certificate book for information. If carefully kept, this book will save much valuable time, both for immediate and future reference.

DIARY.

This book may be had from any stationer, and ruled by hand to suit.

The first column denotes the hour or time occupied, next the name of client or building, remarks, ledger folio and money columns. The lower half of page may be used to keep draughtsman's time on special work. The time spent on each drawing is placed under the remarks column. The dollars and cents columns can be used for entering the cost of the drawing, or they may serve for noting expenses of every description, such as car fares, travelling expenses, etc., incurred while superintending buildings or other work.

As extensive and complicated work usually requires more time than at first estimated upon and extra work frequently is added, disputes with clients relating to charges for time spent on their orders can be satisfactorily adjusted. The record always speaks for itself, and if necessary the men who were engaged on the work can be called to verify their figures and time.

Very little time is wasted by an employee in making the entry, as nothing need be written but the description or number of work and the number of hours spent thereon.

The diary may also be used to mark the general business in, and posted into a ledger.

At the top of page are written name of owner, class of building and location. When drawings are taken out of the office a receipt taken at the time of delivery will greatly assist in bringing them back, and a history of the case may be obtained without delay or inconvenience.

SPECIFICATION COVER.

A neat form of keeping specifications clean and easily handled is by using the "Lawyer Brief Covers." The marginal references would then be made in the centre of the paper between each paragraph.

REMINISCENCES OF THE ARCHITECTURE OF SICILY.

By A.C. Hutchison, R. C. A.

The growing towers like exhalations rise,
And the huge columns heave into the skies.
—Pope.

THE Island of Sicily, so rich in its historical associations and in examples of the architecture of the different people that from time to time have been its rulers, from five or six centuries B. C. down to the present day, was visited in the month of February last, but in so hurried a manner as to only afford time to glance at buildings with whose history former study had made me somewhat familiar. Seeing many of these buildings, though but the skeleton of their former glory, was like renewing old acquaintances, and only served to whet the appetite and induce longing for an opportunity for more minute examination and leisurely study.

This island, which has had such a varied and chequered career during the 2,500 years with which history makes us acquaint, and has served under many and varied masters, some of whom, highly advanced in art, have left us monuments which, though now shorn of their original beauty, bear mute testimony to the status in art, skill in construction, and power of the people who erected them.

The imprint of the art of the different nations and people who from time to time have held sway on the island, and whose nationalities and art instincts were so widely different, being thus brought together within small geographical limits, enables one to study a great variety of styles, and the influence which in some cases one had on the other, without having to travel very far.

So many of the more important buildings of this island have been minutely described and illustrated in works which are in the hands of many of your readers, that it would be useless to attempt any detailed description in a short article. I will, therefore, only briefly describe the representative buildings of the different styles, and the impressions produced on coming in contact for the first time with the art of the Orient and Occident, where they met on this classic island.

Naturally Greek architecture will first claim attention, and if along with the examples of this art to be found in Sicily, we include those at Paestum in southern Italy, we find a group of buildings that for size and skill in construction, rival those of Greece itself, and for beauty of design are only surpassed by those of Athens. Greek architecture in Sicily and Italy, as in Greece, is illustrated in temples, while the constructive and engineering skill of the Greeks is shown in city walls, forts, and aqueducts, which remain to the present day. The principal groups of temples in the island are to be found at Selinunto, Segesta and Girgenti, and if we include with them the temples at Paestum, we have in all fourteen buildings illustrative of this architecture. Some of these buildings remain nearly entire, while others are in utter ruins and can only be judged by the remains of the columns, capitals and entablatures, which lie round the site of the temple of which they were a part. Syracuse, in the south east of the island, the largest and most powerful of the Greek cities, no doubt contained many temples commensurate with its wealth and importance, but so utter has been its destruction that, with the exception of a few columns of a temple incorporated in the cathedral of the modern city, and a few fragments near the seashore, nothing remains of its temple architecture.

The erection of the temples in Sicily, of which we have remains, dates from about 600 to 400 B. C., thus covering the best period of Hellenic art. Portions of the entablatures, with the sculptured metopes of several of the temples at Selinunto, were removed some years ago to the museum in Palermo, where they are now set up in a large hall. The sculptures on these metopes cover a period of about 200 years, and as the latest in date is about the time when Hellenic sculpture had attained to nearly its greatest excellence, we can in the study of them trace the development of sculpture from early beginnings to its highest development. The largest of the Sicilian temples is one at Selinunto—and if I am not mistaken the largest of all Greek temples. It measures about 370 feet long by 175 feet wide. The temple of Zeus at Girgenti only lacks a few feet of the same dimensions. The intercolumniations of the latter temple were so great that no single stone could be found of sufficient size to form the architrave. To overcome this difficulty, the columns on the sides of the building, instead of being detached, were attached to a wall from which they projected a little over half their diameter. The wall to which they were attached was carried up to the top of the capitals and formed a support for the architrave, which in each intercolumniation was composed of several pieces and overhung the wall about half a diameter. In the end or joint of each stone of the architrave is a square sinking three or four inches wide and deep, made in the form of the letter U; these were probably used for placing the rope or sling in, with which the stones were hoisted to their position, the form and size of the recess allowing for the rope being withdrawn when the stone was set. The stone used in the Sicilian temples is coarse grained and incapable of being worked to a smooth surface. They appear to have been covered with a thin coating of stucco, which was probably painted. The ashlar forming the walls of the cells of some of the temples at Girgenti is so closely jointed that the point of a pen knife can not be inserted in the joint, and the stones appear to have been set without mortar or cement.

The temples at Selinunto and Paestum, standing, as they do, all alone in a solitary plain far removed from habitation or life, present a picture of desolation that is difficult to describe; while the four temples at Girgenti, though placed in the midst of more pleasing surroundings, being situate in line on the crest of a ridge along which once stood the massive city walls, and now surrounded by olive groves, stand solitary reminders of departed greatness.

Besides the temples which tell the story of the art of the Sicilian Greeks, there are remains of city walls, forts, quarries, etc., at different places on the island, which is evidence of their skill in engineering. The most extensive remains of this character are to be found at Syracuse, the most important of the cities of Magna Graecia. Probably the most interesting of these ruins is that of Fort Euryelus, situate at the extreme west of the ancient city, on the apex of a ridge of rock from which the whole of the city could be overlooked. All that now remains of this ancient fort are the foundations and base of the four towers which formed the angles of the fort. These foundations are of the most massive description and composed of huge blocks of dressed stone. Extending from one of the towers, the wall which enclosed the south side of the city may be traced along the crest of a ridge which formed a natural defence on that side; this was also composed of large blocks of hewn stone. Below the fort itself the rock is honeycombed with passages wide enough to permit the passage of cavalry, and vaults to contain stores. These passages and the fort were cut off from the continuation of the rocky ridge by a deep moat cut through the solid rock. This moat was crossed in times of peace by a movable bridge supported in the centre on a pier of hewn masonry, which stands to the present day. About an hour and a half's walk from the fort, over a plain covered with piles of stone, presenting a most desolate appearance, we come to the remains of an extensive theatre. As we pass over the piles of stone in our walk, we can trace here and there the foundations of houses of the ancient city, and can define the width of some of its streets. Of the architecture of the theatre nothing remains. The foundation of the proscenium and stage and the semi-circular tiers of seats, cut in the rock on the face of a hill, can be distinctly seen. In rear of the theatre a small mill daily grinds corn, the power being two turbine wheels, driven by water, conveyed to them through one of the ancient Greek aqueducts.

Two large quarries, from which stone for the ancient city was obtained, are of great interest, on account of the extent of the excavations and the fantastic caves and grottoes that were formed in the rock as the stone was extracted. The marks of the picks used in cutting the rock (the same kind of tool as used in Sicily at the present day) are plainly to be seen.

Besides the theatre at Syracuse, there are the remains of a Greek theatre at Taormina on the east coast, but as the columns and walls now remaining have been restorations during the Roman period, they may be classed as Roman rather than Greek architecture.

In the long interval that elapsed between the overthrow of the Greek power and the advent of the Saracen in the island, an interval during which Carthage and Rome were in succession its rulers, followed by barbarians, ostrogoths, and then by Byzantine power, none of whom, except the Romans, left any imprint of their art, the remains of Roman art are very meagre; with the exception of the remains of a few arches of an aqueduct, an amphitheatre, a bath and small temple, and a few isolated columns at Syracuse, and the remains of Greek theatres restored and Romanized at Taormina and Catania, there is little else to tell that this great power ruled over Sicily.

With the advent of the Saracens in the 9th century, a new life was given to the dead, lifeless art that preceded their coming. New forms of construction and ornamentation were introduced; mosques took the place of the Christian churches which had superseded heathen temples. Of the mosques and other buildings of the Saracen period we have no remains by which to judge of the style. We can, however, judge somewhat of its spirit by the influence it exerted upon the Christian or Norman architecture which superseded it in the 11th and 12th centuries, and still later upon Gothic art.

In the 11th century the art of the east and west first came in contact in Sicily, and while the crescent went down before the cross, the change did not annihilate Saracenic art. Mosques gave place to churches, but the influence and spirit of eastern art remained, softening and modifying Christian architecture, represented by the heavy sombre Norman with which it first came in contact. Under this influence the heavy massiveness that characterizes Norman architecture, as practised in its Northian home, gives place to lighter forms and modes of ornamentation, and the dome takes the place of the semi-circular vault, or is used in conjunction with it. In the cathedrals of Palermo and Monreale, more particularly in the east ends, we find examples of this modifying influence in the forms of mouldings, and in the decorations of the plain surfaces of the walls and arches by the insertion of black marbles in geometrical forms. In a more marked degree we see the same influence in the church of St. John, near the Royal Palace, erected during the Norman period, and in which domes are the dominant feature. The church of La Matorana, near the centre of the city, is a curious mixture of Norman and Saracenic details. As a mosque occupied the site of the present church, the materials of it were no doubt used in the erection of the Christian building. Adjoining the church is a Norman chapel in which the nave is covered by these semi-circular domes, supported on six columns of marble, two of them taken from some heathen temple, two of Saracenic or Byzantine design, and the other two of Norman design; in each case the columns rest on Norman bases. The arches and domes of this chapel have been stripped of their mosiac, so that their construction is plainly seen.

In the royal palace, the Capella Palatena, also built in the Norman period, is one of the most interesting chapels to be seen anywhere. It consists of a nave with aisles, the east bay of nave being rather larger than the others, and surmounted by a dome. The whole of the walls, arches, vaults and domes are covered with the most beautiful mosaics, surpassing even those of St. Marks in their richness. These mosaics, with the details of the nave columns, the pointed arches, and the screens enclosing the choir, all indicate the preponderating influence of Saracenic art in this most beautiful chapel.

Gothic architecture scarcely affected Sicily. With the exception of the cathedrals at Monreale and Messina and one or two churches and part of the cathedral at Palermo, there are no examples of any note. Even in these examples Saracenic art is so interwoven with the gothic as to make it difficult or almost impossible to fix the date of erection by the architectural features, as can so readily be done in buildings of the Gothic period in France and Britain.

Of the buildings of the Renaissance I will not write. While there are a few good examples here and there, none of them are of any special note.

The Court of Appeal at Toronto has recently given judgment sustaining a former judgment of the Ottawa courts in awarding damages to Mr. Brune, the contractor for the isolation hospital on Porter's Island, against the city of Ottawa, for breach of an implied contract on their part to return to the contractor the work in the same or in no worse condition than at the time of the suspension of the said work by the defendants.

WHAT A COUNTRY BUILDER SHOULD KNOW.

By F. T. H.

Semblant art shall carve the fair effect
And full achievement of thy great designs.
—Prior.

TALKING some time ago to a country builder, or rather to a man who styled himself a "builder and contractor," I was somewhat surprised to discover that he had but very little knowledge of the improvements made in building matters during the last ten years. He came to town to buy glass, hardware, paint and nails, for a farm house he was building some twenty miles away; and he turned up his nose at the hardware merchant who showed him wire nails, loose joint wrought butts and steel clad mortise locks with solid knobs. He wanted "no such new fangled stuff in any building he put up." The old cast butt, the clumsy cut 10 penny nail, and the comparatively worthless cast rim lock, and its equally worthless companion, the mineral knob, were to him all that could be desired.

Endeavoring to persuade him of the superior qualities, durability and economy of the later makes of hardware, elicited from him the expression that "he knew his business, and didn't want any city fellow to give him pointers." I dropped him as a hopeless case, and afterwards discovered that he made it a boast that "he never took any stock in fellows that read books and papers to find out all about building. He learned it all when he was a young fellow, and that is the reason he knows it all."

Unfortunately, too, many country builders are imbued with the same spirit as our friend. They have arrived at a certain point a wall of prejudice, as it were—and beyond that it seems impossible for them to get. It is not my purpose to enquire into the reasons of this condition or prejudice, for I do believe there are reasons, psychological or other, that are accountable for the state of mind the country builder seems to drift into, to his own and to his employer's disadvantage, and it will be my object in this short essay to offer some suggestions to my country brother, by which, I am persuaded, if he adopts them, he may better his own condition and give better and more satisfactory service to those who honor him with their patronage.

As farm houses, stables, barns and the other necessary out-buildings on a farm are generally planned by the owner and the builder jointly, or by the builder alone, it is incumbent that the latter should have some knowledge of drafting, that he should, at any rate, be able to sketch on a board with a lead pencil, to some workable scale, a plan and elevation of the proposed work. Such sketches, no matter how rudely executed, if correct to scale, will give the owner an idea of what he is going to get, and to the builder himself they will prove of inestimable value, both as a guide for obtaining his quantities and also as an object lesson in suggesting the best method to set to work to build it.

The country builder should also possess some knowledge of the "fitness of things," a quality that will enable him to design a house, barn or stable, with some degree of good taste. At any rate, he will not create a monstrosity. He should have a fair knowledge of figures, and should be especially expert in the mensuration of surfaces, for largely on this knowledge will depend the accuracy of his taking out the quantities, and his consequent estimate of cost. That he should have some knowledge of mason work, limes, mortar and sand, goes without saying, inasmuch as foundations, cellar walls, piers, cisterns and other stone work will often be under his supervision. It follows also, that he should be posted on plain brickwork, even if he constructs nothing more pretentious than a frame building, as he must see that the chimneys, fireplaces and flues are properly and economically put up and finished. If he is fortunate enough to be called upon to erect brick buildings, he should make himself acquainted with the various kind of "bond" used in brickwork, the quality of mortar required, and the necessary terms used, in order that the bricklayer may understand that the contractor knows just what he wants. The same with regard to the plasterer's work. While it is not necessary that he should be a chemist, yet he should be fairly posted regarding the qualities of lime and sand, so that he would be able to prevent the introduction of inferior materials in the work if necessary; in fact, he ought to be able to see at a glance the difference between good, bad and indifferent materials and fitments of all kinds—knowledge he can only obtain by expending effort and study.

As the country builder is generally the person who not only builds, but also who designs the farm house, he should possess knowledge enough of sanitary plumbing, drainage and conditions to be able to advise the owner correctly on these important subjects. He should not leave the laying out of the plumbing to a plumber, unless the latter is an expert or has devoted considerable study to the subject; then, of course, the whole plumbing and drainage had better be left for him to arrange. If the building, whatever it may be, is to be heated with a furnace placed in the cellar or basement, the builder should have a definite understanding with the parties furnishing the furnaces as to the position of pipes, ducts and registers; for nothing destroys the strength and harmony of a house more than to cut for pipes, ducts and registers, after the building is nearly completed.

As the heating and water service of a house in Canada are important matters, the builder should inform himself as to the different kinds of appliances, their efficiency, their cost, and the fuel they consume items the house owner will require to know before purchasing. As wind mills are now in common use among farmers for pumping and other purposes, a knowledge of them is indispensable, and as they enable the house-owner to have a water service if he so desires, it is essential that water pipes should be provided for as the building progresses, and as it is likely the builder will be asked to estimate and provide for this service, it follows he should be able to do it intelligently, for if he does not some one will be the sufferer.

While a chemical knowledge of paints, oils and coloring pigments is not necessary, yet the contractor should be able to distinguish the good from the poor, and should have on call a full knowledge of the cost of the various brands. He should also be able to tell his employer what colors harmonize, what are contrasts and what are suitable to the work in hand—matters that will require but little effort on his part to understand, if he applies himself to the proper sources. It is also essential that the contractor should possess some knowledge of proportion. It is not to be expected that he is to take a regular course, or make a special study of Greek examples, but he should at least know a few of the elementary principles of proportion that may be obtained from many of the low-priced architectural works now in the market. This knowledge is necessary in laying out windows, doors, stairs, and the sizes of rooms, and in a more aesthetic sense, in proportioning cornices, plinths, bases, capitals, mouldings, and the thousand and one other things required about a building.

So far I have said nothing of lumber and timber required, for as a rule, in this Canada of ours, it is the carpenter who is called upon to design and build the farmer's house, barn, stable or other outbuildings, and it goes without saying that so far as the wood employed in the building is concerned, he knows, or ought to know, all that may be said about it here, so far as quality and durability are concerned; but, under this head it may not be out of place to say that he sometimes lacks a proper knowledge of the prices charged for manufactured wood-work. Like many other manufactured goods, factory wood-work is subject to variations in price, and the difference in their price may materially affect the profits expected in a building, and this makes it important that a correct knowledge of prices current be obtained before an estimate is given. The same rule applies to hardware, glass, paint, and in fact, to everything employed on or about a building.

The next thing to be considered is, "how is the country builder to obtain the knowledge suggested in the foregoing?" At first sight it does appear as though it would cost considerable in money, energy and time to acquire this knowledge. I think, however, I will be able to show that with the aid and good will of the country builder, it will not require much energy, less money, and but a little effort to reach the desired goal. In the first place the "country builder" should subscribe for an architectural paper, similar to the CANADIAN ARCHITECT AND BUILDER, or more than one if he can afford it. This will keep him posted as to the various styles of building in vogue, methods of construction, new materials, new appliances, and all that is going on in the building world. It will also bring the builder face to face with the dealers in the numerous requirements for building purposes, if he scans the advertising pages, such as heating apparatus, hardware, glass (white, stained or plate), bricks, tiles, roofing materials, finished wood-work and plumbing fitments. Letters or postal cards sent to their manufacturers or dealers (always mentioning the journal from whence the address is obtained) will be sure to bring by return mail all the information possible regarding the goods mentioned in the advertisements. By looking over the advertising pages carefully, the builder will be sure to find the name and address of some party or parties who make or deal in the goods required, and by following this method a very useful and a very interesting collection of catalogues, circulars and price lists may be secured, that will prove serviceable to both builder and manufacturer. So far as heating appliances are concerned, I may say that many of the prominent manufacturers issue catalogues of their work that are really a credit to the firm and to the house publishing them, and to the recipients they must prove of great advantage, as they not only show the heater and its construction, give its price, weight and capacity, but frequently give plans for piping with full descriptions, size of pipes, etc., etc., and ofttimes easy and intelligent essays on the principles of heating and ventilation. A little study of these catalogues and a memorizing of sizes, capacities and prices of the goods catalogued, will make the country builder an authority on such matters at once, and this end can be obtained with a minimum of effort and cash.

With regard to the other requirements mentioned, I may say that I append a list of books which cover the ground, and which in my opinion are best suited to the wants of a country builder, who has not had the advantage of a liberal education or a city training.

I do not offer this list as the best of the kind to be had, but as the best for the purpose discussed. For general purposes either Gwilt or Nicholson would be preferred to Loudon, but, as the latter's "Village and Farm Architecture" just answers a country builder's wants, I name it as the main book he should possess after his monthly architectural journal or journals.

LIST.

The Canadian Architect and Builder, per year	$ 2 00
Loudon's Village and Farm Architecture, price	8 00
The Canadian Contractor's Hand-Book, price	1 50
The Builders' Guide and Estimator's Price Book, price	2 00
The Painters' Hand-Book, price	25
Plaster, How to Use and How to Make, price	1 00
Plumbing, Heating Drainage and Ventilating, price	3 00
Hardwood Finisher, price	1 00
Total	$18 75

With this expenditure, to which will require a little brains added, and some application, the country builder may equip himself with sufficient knowledge to become an authority on farm buildings, which should redound to his profit as well as to his fame. Loudon is brim full of excellent ideas that the bright and snappy contractor will avail himself of, and his treatise on stone and brickwork contains ample food for all the reasonable wants of country practice. The other books, besides being instructive, will guide the contractor on correct lines of estimating, which, if followed, will prevent him from taking work below its actual value, a custom that has ruined many "A Country Builder."

ANOTHER dispute on a school house case is reported from East Toronto. The School Board having determined to wait until next year before erecting a school building suitable to the wants of its population, trouble arose with the architect. His plans for a four room section of a 12 room school were accepted by the Board, the understanding being that the cost should not exceed $6,000. The lowest tender received, however, was in the neighborhood of $8,000 and because of the great discrepancy the Board returned the plans. The architect now asks for some $400, but the Board thinks a tenth part of this sufficient. The matter has been referred to arbitration.

THE Supreme Court of Louisiana held, in the recent case of Maas vs. Succession of Hernandez, that where a contract for a fixed amount is entered into between the owner of the property and a builder according to certain specifications to which a plan is annexed as explanatory thereof, no charge, in the absence of an agreement to that effect, can be made for extra services in the preparation of the plan; that the builder appears in the transaction not as an architect, but as a contractor, and that a builder claiming renumeration over and above the contract price of a building for certain labor and material as having been furnished for extra work, must establish with reasonable certainty that they were used for that particular purpose.

BUILDING IN CANADA IN 1895.

REVIEW OF THE SEASON'S OPERATIONS IN THE LEADING CENTRES.

FOLLOWING its usual custom, the ARCHITECT AND BUILDER presents herewith a review of building operations in the leading centres of Canada for the year 1895. The hopeful feeling which existed at the beginning of the year has, we regret to say, not been realized to the extent which could be wished. Business has not experienced that revival which was anticipated, and as a result neither corporations nor individuals have felt justified in launching out into enterprises which involved the expenditure of considerable sums of money. Nevertheless, at some points there has been considerable building activity, notably in Toronto, where the disastrous fires of last January left blanks in the business part of the city which could not be allowed to stand unfilled. The low price of material, especially lumber, has induced a certain degree of activity among those possessed of capital, this remark applying more to residential than to business property. As compared with the previous year the reports which have reached us would seem to indicate a falling off in the value of buildings erected, taking the country as a whole, though it is impossible to arrive at anything like accurate figures, especially in the rural districts.

TORONTO.

We cannot convey a better idea of the building operations of the city of Toronto for the year than by giving a list of the permits issued by the City Commissioners's department, which will show at a glance the number, class of building and value. As will be observed the permits numbered 371 and the value considerably over a million and a quarter dollars, a very respectable showing for a year when money was tight and the encouragement to build, especially business premises, not great. Of course quite a proportion was the result of the disastrous fires, and a good many of the permits were for alterations and repairs, but these in many cases amounted almost to an entire reconstruction. Here is the list:—

		$. c.
75	Brick Dwellings	194,700 00
25	Brick Fronted and Rough Cast do	24,700 00
105	Alterations to Dwellings	59,395 00
13	Brick Stores	25,450 00
37	Alterations to Stores	79,000 00
12	Factories and Workshops	80,125 00
11	Alterations to Factories	41,200 00
6	Warehouses	55,500 00
8	Alterations to Warehouses	28,000 00
5	Alterations to Office Buildings	16,500 00
9	Schools and Alterations to Same	87,100 00
4	Churches and Alterations to Same	34,500 00
2	Fire Halls	10,700 00
8	Hotels and Alterations to Same	33,425 00
21	Stables	18,375 00
2	Alterations to Theatres	9,200 00
2	Charitable Institutions	27,000 00
2	Exhibition Buildings	6,500 00
5	Storehouses	8,200 00
1	Simpson Building	200,000 00
1	Osgoodby "	35,000 00
1	McKinnon "	45,000 00
2	Globe (2) "	32,000 00
1	Jamieson "	27,500 00
1	Dental College	29,000 00
1	I. O. O. F. Building	130,000 00
11	Miscellaneous	8,740 00
371		$1,346,810 00

By far the most important building in the above list is the departmental shop for R. Simpson, built with iron skeleton, encased with brick and fire resisting material. The McKinnon building is also of the skeleton type. Such buildings are expensive, but they have manifest advantages, and are likely to grow in favor as wealth becomes greater. The Globe building is of the same class.

Of the sum set down for churches, by far the largest portion is for the new synagogue, not yet built, though the permit has been taken out. It is to cost $25,000. Toronto has not added much to her ecclesiastical architecture during the year.

The two charitable institutions are the House of Providence and the Fegan Boys' Home. Neither of them present any very striking features.

Two new fire halls figure among the new buildings. They are situated on Dundas and Richmond streets. The former contains apparatus for the protection of a part of the city which is entitled to fuller projection, the latter provides accommodation for the new apparatus procured after the fires of last winter.

The principal new manufacturing buildings are those for the Toronto Lithographing Co., the Metallic Roofing Co., the Gendron Manufacturing Co., and a large addition to Kemp's stamping works.

A considerable sum has been spent on eight hotels. The new building on the corner of Church and Carleton streets represents a large proportion of this outlay.

The Jamieson building on the corner of Yonge and Queen streets, which forms the subject of an illustration in this number, is a good specimen of architecture for mercantile purposes.

The Foresters' Temple, in course of erection, will be one of the most striking of the season's additions to Toronto's modern structures. It is the most expensive by far for which a permit has been taken out, with the exception of the Simpson building.

Considerable progress was made with the new municipal building, and it is now almost ready for the roof. The new Union Station has been completed and occupied.

There have been a number of handsome residences erected. Brick is the prevailing building material for these as well as for business blocks. The class of brick is improving.

Though Toronto has not recovered from the disastrous effects of the boom days, a substantial advance has been made in her growth the past season, and she is yearly assuming a more metropolitan appearance.

MONTREAL.

The year 1895 was an exceedingly poor one in Montreal for those engaged in building operations. Although 1894 was an unsatisfactory year, 1895 was much more so. Comparison can best be made with the aid of figures, which speak more eloquently than words:—In 1894, 382 permits were issued, representing an aggregate value, according to the Building Inspector's report for the year, of $1,634,900; while in 1895 only 109 permits were issued, representing an aggregate value of about $900,000.

The buildings erected are classified as follows: Dwellings, residences and stores, 98; warehouses, 2; convent, 1; school, 1; departmental store, 1; miscellaneous, 6. The principal buildings now in course of construction being not very far advanced, only a small proportion of their cost can be included in the year 1895, as, for instance, the Canada Life Building and the Bell Telephone Building. The Departmental store now in course of erection, mentioned above, is that of Messrs. Ogilvie & Sons, at the corner of Mountain and St. Catherine streets. The convent is that of the Camelite Congregation that can be better termed monastery as it will not receive any pupils and is simply destined as a place of retreat for the ladies of that congregation. The school is the one erected by the Sisters of the Congregation on Roy street.

OTTAWA.

At the Dominion Capital building operations have been about the same in extent as in 1894, and represent an outlay of about $325,000. There has been a considerable expenditure by the city for permanent pavements, some $80,000 having been spent in that way. The new Union Railway station on the canal bank has necessitated a large outlay for approaches, etc., and a handsome building will be erected the coming year, but at present a temporary building only occupies the site. The work on the approaches, etc., represents an expenditure of about $200,000. The principal business buildings erected during the year are the Carbon Works, $35,000; Cluff's Hotel, $35,000; Cousin's office and shop building, $35,000; and a car shed for the Electric Co., $12,000. The amount expended on business buildings will foot up some $157,500, and on residences $115,500. The finest under the latter class is that erected by Mr. T. Birket, at a cost of $20,000. Public buildings represent an outlay of about $52,000, half of which was for additions and extensions. The material used was principally brick and stone, the residences being chiefly of the former material with sandstone dressings. The price of material and labor was about the same as in 1894.

The architects under whom the building in Ottawa was principally carried out were Messrs. Arnoldi & Ewart, E. L. Horwood, F. J. Alexander, A. M. Calderon, and Wm. Hodgson, and the

contractors were Messrs. Holbrook & Indertaut, P. Kennedy, A. Garvock, W. Matthews, T. A. Shore and A. Sparks.

As for the coming year, besides the railway station there will be an addition built to the Protestant Hospital, at a cost of $60,000, and a block of new stores on Sparks street to cost about $50,600. Other than these there is not much new work in sight yet.

HAMILTON.

In Hamilton there has been a considerable decrease in the value of the buildings erected. An estimate of the year's operations gives the figures at $293,465, a decrease from 1894 of $113,000. Beyond the new station and freight shed of the Toronto, Hamilton and Buffalo Railway, and the Hunter street tunnel for the same line, there is nothing calling for special mention. The Centenary church erected an addition in the form of a Sunday School building, otherwise operations have been pretty well restricted to residences. Brick is the principal material employed.

Outside the city, however, the Smelting Works Co. have been erecting extensive buildings and plant. The value of these is not included in the above figures, though it was principally Hamilton material and labor that was employed.

The prospect for this year is bright. A new collegiate Institute and school of pedagogy is to be built, which will cost some $60,000 or $70,000.

LONDON.

The year has been a very satisfactory one for architects and builders in the Forest City. No less than 150 buildings have been erected, at a cost of over $420,000. Residences have predominated, but there has also been great activity in church building. Two large Methodist churches have been erected to take the place of two destroyed by fire within a short time of each other. The power house of the Electric Railway Co., with its necessary adjuncts, represent a large outlay.

The following are the principal buildings erected, with their cost and the names of the architects engaged:—Queens' Avenue Methodist church, $100,000, E. Burke, Toronto, and H. C. McBride, London, architects; Dundas Street Methodist church, $50,000, John King, Toronto, architect; St. Matthews Church of England, $10,000, Moore & Henry, architects; Free Library building, $15,000, Herbert Matthews, architect; Y. M. C. A. building, $15,000, Moore & Henry, architects; London Street Railway Co.'s power house, $10,000, American architects; residence for Jos. Smith, $10,000, Herbert Matthews, architect; D. S. Perrin's residence in the country, $10,000, and biscuit factory, $12,000, Geo. Craddock, architect. Knox Presbyterian church, in London south, has also undergone alterations to the extent of $8,000.

Other large works have been completed, such as the two large steel bridges on the London and Port Stanley R. R., built by the Dominion Bridge Co. O. A. Graydon was the engineer. These bridges are 624 ft. long by 69 ft. high and 512 ft. long by 71 ft high respectively, costing together $54,000. Another bridge, by the same company, was placed over Javitt's pond, with a 264 ft. span and having a height of 30 ft. It cost $10,000.

Over a mile of asphalt pavement has been laid on Richmond street, from the G.T.R. station to Ridout st., at a cost of $6,600. The Barber Asphalt Co., of Buffalo, laid it.

The prospect for the coming year is considered good.

KINGSTON.

Very little building was carried on in Kingston during the year, the amount expended not exceeding $70,000, which is less than for the preceding year. Operations in business and public buildings were confined to alterations and repairs, and any residences built were of the cheaper class. Materials and labor commanded lower prices than in 1894. It is a little too early to say what the year 1896 will bring forth, but at present there is no prospect of much activity.

BELLEVILLE.

As anticipated a year ago building has been much more active in this young city than in 1894, nearly double the amount having been expended on new buildings. The structures calling for special mention are St. Andrew's church, to replace that destroyed by fire, at a cost of about $30,000, and an annex to Albert College, representing an outlay of some $20,000. Messrs. Darling, Sproatt & Pearson, of Toronto, were the architects of the former, and Messrs. Geo. M. Miller & Co., of the latter. In addition there have been a number of fine residences built, Mr. Thos. Hanley, architect, having had the oversight of four. The material used was principally brick. Material and labor were about the same in price as in 1894. The total outlay was from $170,000 to $200,000. An electric street railway has been built. The prospect for the coming season's operations is hopeful.

BROCKVILLE.

There has been greater activity in this town than for several years, a spurt having set in in the building of terrace houses renting at from $20 to $30 a month. Several such have been erected. Additions have been built to both the General and St. Vincent R. C. hospitals, at a cost in each case of somewhere about $10,000. A goodly number of small houses were built by workmen for their own accommodation, while at the new asylum, just east of the town, a number of cottages have been completed and occupied. Work has also been commenced on the International bridge, and considerable stonework done on the piers. The outlay for buildings (the asylum and bridge not included) will amount to some $175,000 or $200,000. The Cossitt terrace represents $20,000 and the Publow terrace $23,500. For the former Mr. G. A. Allan was the architect and Messrs. Simpson & Hagarty contractors for all trades except plumbing and heating, which was done by Barsalow & Co.; for the latter Mr. O. E. Liston was architect, with the same contractors, except plumbing and heating, which went to Mr. W. S. Gamble. The prospect for the coming season is promising. A summer hotel is talked of, and an electric street railway is a certainty.

ST. THOMAS.

There has been a falling off in building operations in St. Thomas the past year and operations have been confined pretty much to a good class of brick residences and a few business places. The price of building materials has been a little higher than in 1894, but labor has been about the same. One firm of architects, Messrs. Long & Long, have had work in hand representing an outlay of $57,100, a considerable share of which was, however, outside the city, including a number of churches, and the Industrial Institute at Mencey for the education of Indians, which cost $30,000. The prospect for the coming year is only fair.

STRATFORD.

About $85,000 has been expended in Stratford, which includes $15,000 spent on the restoration of the post office. The balance was chiefly on residences of a cheap class, largely brick veneer, and the total shows a falling off of $20,000. Work being scarce, labor could be had at a lower rate than formerly.

CHATHAM.

Chatham having reached the dignity of a city the people have felt prompted to put on metropolitan airs, and building operations took on a briskness accordingly, the record showing a considerable excess over 1894. Probably $150,000 will approximate the outlay. The principal buildings were a fanning mill factory, costing $25,000, T. J. Rutley, architect, Richard & Co., contractors; Presbyterian church, $8,000, Jas. L. Wilson, architect; Methodist church, brick veneered, $1,800; and brick houses costing from $5,000 down. Both brick and lumber were cheaper. Wages were about the same.

SARNIA.

Sarnia erected a general hospital of brick at a cost of $25,000, of which Mr. H. G. Phillips was architect. Other operations were confined almost entirely to a cheap class of residences, largely of wood, and $35,000 will probably cover the cost of buildings erected in the town during the season.

COLLINGWOOD.

A marine hospital costing $5,000, a Presbyterian church, $5,600, the Globe hotel $14,000, and additions to the Collingwood Meat Co.'s buildings, $4,000, help to swell the value of building operations in this town. The outlay has been some $20,000 more than in 1894, and the total will not be far from $88,000, the balance being principally residences. Brick was the principal material used. Skilled labor was higher. For the hospital Mr. Fred T. Hodgson was architect and Peterman & Sons contractors; for the church, Gregg & Gregg, Toronto, architects, Bryan Manufacturing Co., contractors; for the hotel, F. T. Hodgson, architect, and Wilson Bros., contractors; for the Meat Co.'s buildings, John Wilson, architect, and the Bryan Mfg. Co., contractors. Next season it can hardly be expected that so many new buildings will be erected.

QUEBEC.

The ancient capital, respecting which a falling off was noted in last year's review, has experienced a further retrograde movement, which does not augur well for the future of this interesting old city. About $350,000 has been expended, of which $125,000

was spent on a new city hall, and a considerable proportion of the balance on the Church of the Patronage. About 40 per cent., 35 per cent., and 15 per cent. respectively—will indicate the proportions of the total spent upon public, business, and residential properties. The material employed was about one-half stone, and one-fourth each brick and wood. Brick has been about 20 per cent. lower in price, stone and wood about the same. Bricklayers' wages were about 50 cents per day less, joiners' 20 cents less, and laborers' about the same. For the city hall Messrs. Tanguay & Vallee were the architects, and Messrs. Gingras, Gurcherean, Kane & Picard, contractors. For the church, Mr. Berlinguet was the architect and Mr. Paul Breton contractor.

OTHER TOWNS.

Other towns from which reports have reached us do not seem to have experienced much activity. Buildings have been erected in Galt to the value of about $30,000; Owen Sound, $20,000; Guelph, $120,000; Brantford, $150,000; Woodstock, $100,000; Berlin, $117,000. In Guelph five miles of electric street railway and five miles of cement sidewalk (making a total of 12 miles) have been built, and Woodstock rejoices in a new market building. Operations in the towns consisted principally in the erection of dwellings, the condition of business not warranting much outlay for premises to be used for purposes of trade and commerce.

MARITIME PROVINCES.

During the last eighteen or twenty years building operations have been very brisk in the principal parts of the lower provinces, particularly in the smaller towns and villages of Nova Scotia and New Brunswick. These include buildings for various purposes, churches, factories, mills, hotels, colleges, schools, stores, post offices, public halls and dwellings, the greater number, of course, being of the latter class.

Travelling through the provinces one cannot help wondering at the lack of taste displayed in the erection and locating of recently built dwellings. Few indeed, comparatively speaking, possess any of those pleasing architectural features such as are seen on houses designed by skilful architects.

Occasionally an architect's services are called into requisition in designing a dwelling for the country or smaller towns, and if the owner gives him a chance at all to spread himself in his efforts to produce a good design, the result is usually satisfactory to the architect, client and all who chance to see the building.

Unfortunately, however, when people outside the cities contemplate the erection of dwellings, the usual course is to consult a carpenter, get his ideas and apply a few of their own, adopt some features from one neighbor's house and some from others, regardless of harmony and architecture. In some cases the patent medicine system is adopted and buildings are erected from plans found in some American publication. In either case the owner usually finds at the end that he has made a mistake and got an unsatisfactory house.

When an architect is employed the owner invariably makes the amount to be expended so limited and requires so much house for the amount, that there is little margin for ornamentation.

Building is more expensive in the lower provinces than in Quebec or Ontario. Handsome brick and stone residences have been built in the latter provinces for less money than an ordinary frame house of similar dimensions costs in the former. This is owing to the lack of facilities in the shape of manufactories in the lower provinces, and to some extent to the scarcity of good local woods for finish purposes, spruce being about the only stock of any importance obtainable. Good pine is a thing of the past, and birch, maple, oak and ash are not to be found in trees of sufficient size to make good finish stock.

Many builders in the country towns, and some in Halifax, import their pine doors, mouldings and other finish, from Ontario factories.

In the cities there is a lack of good general system among builders in carrying on their operations. They are slow to adopt new and improved methods to facilitate works. Still owners are inclined to stand by the old hands and very wary about letting work to outsiders.

Building in the lower provinces is done almost entirely by contract, the several trades being let to one party, who sublets all but his own trade, and is responsible to the owner for the whole.

ST. JOHN, N. B.

The number of building permits issued in St. John for the year was 82, being about one-third more than in 1894, and the outlay on the same $178,475. This does not include Carleton, on the opposite side of the river, which is a separate municipality. Including that suburb probably $250,000 has been expended. The only buildings calling for special mention are a Baptist church, cost, $18,000, H. H. Mott, architect, W. L. Prince and Robt. Maxwell, contractors; the Aberdeen Schoolhouse, cost, $20,000, R. Dunn, architect, B. Moony & Sons, contractors; Wygoody buildings, store and warehouse, $20,000, H. H. Mott, architect, Charles F. Tilley, contractor. Mr. G. Ernest Fairweather has built an addition to the Royal hotel, and three saw mills have been rebuilt, and a corn mill. Other operations were principally in the way of two-storey wooden dwellings. Twelve buildings of brick and stone cost $93,050, and seventy of wood cost $85,425. Material and wages stood at about the same figures as last year.

HALIFAX, N. S.

The capital of Nova Scotia reports a considerable increase in the total value of buildings erected, but a larger number of cheap dwellings. The details are, dwellings 97—brick 4, wood 93; business erections 50—brick 6, wood 44; public buildings 3—brick 1, wood 2. The value of these structures is about $600,000. The most important building for which a permit has been granted is the drill shed, a brick and stone building estimated to cost $200,000. Other buildings calling for special mention are: Deaf and Dumb Institute, $50,000, brick, J. C. Dumaresq, architect, S. A. Marshall, contractor; Electric Railway Co., car building, $25,000, brick—Rhodes, Curry & Co., contractors; I. C. R. freight house, $30,000, brick, R. C. Donald, contractor; Peoples store, $15,000, brick, J. C. Dumaresq, architect, S. A. Marshall, contractor. Brick and iron have been slightly cheaper in price, other materials about the same. Wages have remained about as in 1894, except that the demand for carpenters and labourers being great there was a slight advance. New sewers, new streets and pipe laying for the new gas company have made a demand for labour, and next season a new drill hall and new gas works will keep up the record for building.

WINNIPEG, MAN.

About $650,000 will represent the building done in Winnipeg the past season, $200,000 of which was expended in putting stone foundations under old buildings, with the necessary plumbing, heating and drains. The speculative building which we condemned in last year's review has been well eliminated, and a remarkable degree of caution exercised. This has resulted in keener competition among contractors, leading to low prices and less profit. Building materials have been a shade under former prices, skilled labour has stood at the old prices, but unskilled has been a little less. Three new school-houses have been built and Wesley college completed. A few good business blocks have been erected, and a considerable number of houses, but not so many as the previous year. The Dufferin school house cost $26,000 and the Argyle $25,000. Mr. C. H. Wheeler was architect of both. The Mulvey school-house represents $23,000. Mr. Geo. Browne was architect. The expenditure on Wesley College was $35,000. Peters and Brown were its architects. Mr. Wheeler also supervised the erection of the Campbell block on Main street, cost $17,000, and a fine red brick and stone house for Mr. Hugh John Macdonald, costing $11,000. Mr. Browne was the architect of a Masonic Temple costing $16,000. Mr. H. McEwen had the Christie block in charge, costing $17,000. Mr. Peters planned Ashdown warehouse, costing $40,000, and Mr. Griffiths a warehouse for Mr. Ryan costing $10,000. Wood is still the predominating material in the city and nearly all the dwellings are built of that material, on stone foundations.

The outlook for the coming season is uncertain. Though there has been an immense crop in Manitoba, prices are low, and there is not much encouragement to launch out into enterprises involving considerable expenditures.

OTHER NORTH WEST TOWNS.

At Brandon the season's building represents some $20,000; at Minnedosa $32,000; at Carberry $22,000, and at south Edmonton, a four year old town, $75,000. The most important building at the latter is an oatmeal mill of Brackman & Ker.

VANCOUVER, B. C.

This has been an exceedingly dull year in British Columbia, except perhaps in some of the mining centres, and in common with the rest of the country the cities have not progressed to any marked degree. Building operations have been backward and there has been a great scarcity of employment. Vancouver, the most progressive city of the province, can show new buildings to the amount of $100,000, and these are chiefly small cheap dwellings of a speculative class. Any business structures are of most similar class, and the only public building reported is a small wooden school house. Both materials and wages are down in price, and the trade generally is much depressed. There are too many men to do the work required. The only building of any account in prospect is a large hotel for Messrs. Crean & Thomas, of which Mr. Wm. Blackmore is the architect.

NEW WESTMINSTER.

What has been said of Vancouver is also true of New Westminster. Only two buildings of any consequence have been erected, a drill hall of wood, costing about $7,000, and additions to the provincial lunatic asylum, principally for a doctor's residence, costing $6,000.

VICTORIA, B.C.

In Victoria, though operations on business and residential properties have been restricted as in other British Columbia towns, a large sum has been expended on government buildings. Work has been pushed forward on the new parliament and departmental buildings, which, when completed, will represent an expenditure of not far from a million dollars. They are of handsome architectural design and will be a credit to this young province. In fact they are quite beyond present requirements, but the government has faith in the future, and has built with an eye to a large increase in public business in the time to come. The work was executed from the plans of Mr. F. M. Rattenbury. The contractors were: masons, McGregor & Jeeves; joiners, Bishop & Sherborne; plasterer, R. Drake; iron work, Albion Iron Works; coppersmiths, Perry & Turner; plumber, R. J. Nott; heating, Bennett & Wright Co.; painter, E. Spillman.

The new post office, which is also under way, will when completed be a handsome building. It is being erected under the superintendence of the government architect, and will cost about $175,000. The contractors are Messrs. Elford & Smith. These two works have given employment to a large force of men, who would otherwise have found it difficult to obtain work. Besides the public buildings mentioned above, about fifty small houses have been erected. Considerable alterations to existing buildings have also been made. Wood and stone have been used to the greatest extent, and the price of materials has been about 10 per cent. below the previous year.

In other British Columbia towns there has been great stagnation, any buildings erected having been of the cheaper class.

POINTS FOR YOUNG CONTRACTORS.

By David G. Baxter.

The lids are ivy, grapes in cluster lurk
Beneath the carving of the curious work.
—Dryden.

WHAT apprentice boy in the building trades, let him belong to what line he may, if he possesses one grain of inherent ambition, does not look forward to the dim and distant future with a burning desire that he, like his principal, shall be a contractor, an employer of men, a purchaser of material, a director of works; yet little seems he to dream of the hard study, the unremitting work, anxiety and worry, the rough unsympathetic buffeting he must pass through before he obtains his final settlement on his first job, ner that the harder he studies in the following lines, the more he is guided by the following facts, the more satisfactory this settlement will be, the more gratifying all future settlements shall be found.

Every effort is the result of some cause. A man decides to take contracts, to become a contractor—there must be some cause leading this man's brain into this groove and producing from him a contractor. Will he succeed or will he not? It all depends upon his ability, his resources, his education, yet affected and modified to a great extent by that cause, that chain of circumstances may we call it, that led him into this branch of human endeavor. This man would not go into the dry goods or into the grocery business because he knows that he does not understand either of them, and that he would naturally be unsuccessful. For a like reason he should not undertake to set up as a contractor unless he understands fully and completely that line of contracting he intends to take up. Throughout the country we find men without any previous preparation taking or endeavoring to take contracts because they are out of work through hard or dull times affecting their former contractor employers, or because they have become dyspeptically dissatisfied with things in general and with ordinary hard work in particular. These men float aimlessly around figuring on proposed jobs, and having no previous reputation, are forced to take what work they can manage to get at ruinously low prices, much to the detriment of good work and to the injury of reliable, established contractors. These men are to-day working day work and to-morrow contract work; we cannot call them "contractors," but must designate them "jobbers," and as such dismiss them from consideration.

There is another class who, with inborn wish to succeed and to make the world brighter and better, before commencing business study for years their work in its every phase, its every form and give it—their chosen life work—the full consideration and deliberation that it deserves; these, when they do start out, instil confidence, and in confidence get better prices and more satisfactory settlements than the men who, without previous preparation, assume to take contracts because they were dissatisfied workmen.

It is to this class of ambitious men that these words are addressed, especially to those located in places outside the larger centres of civilization, when the question of what or what not to do, as preparatory for the future, is often a very serious one with many young men in the building trades, in whose breasts is firmly implanted a desire to excel. I do not want to be interpreted as saying that a building mechanic suddenly thrown out of work should do nothing till some contractor can give him work—that he must not take work direct from the layman himself—far from it; let him do anything and everything in his power to make an honest dollar, but I do most strongly dissuade him from thinking of becoming a permanent contractor or firm, himself as principal, taking anything except small repairs and such like, unless he be thoroughly equipped for the work. This for his own good. In regard to the omnipresent genius of dissatisfaction, the sooner he taketh his departure for the sunny slopes where the woodbine twineth, the better for all.

A contractor to be successful in turning out good work and in making money, must possess a great amount of practical ability; he must thoroughly understand, practically, every branch of his work in its ever-changing phases; besides he must have acquired a fair smattering of the theoretical side, to understand, if not to calculate, the laws of strength and stability. If he be a bricklayer he must have an idea of the principles of foundations, arches, piers, buttresses, etc., besides a rough knowledge of the chemical and physical properties of limes, cements and other materials. If he be a carpenter, a knowledge of the governing principles of roof and other trusses, beams, columns, etc., is indispensable, and an intimacy with the nature of woods is also essential. If he be a plumber a familiarity with sanitary science and an insight into the laws of traps, vents, flow of water and a hundred and one other points is imperative; and so on through every trade; in short we are brought face to face with the survival of the fittest ultimatum—that to attain to full success a contractor must understand all about his particular line of work that he can learn by watchful experience and by incessant unremitting study during his spare moments.

It may be said that it is impossible for a contractor to study any theory because his education is as a rule such that it does not fit him to understand formulas and technical terms, and even could he elucidate them, he as a rule cannot spare the time. All that can be said in reply is, that if he has the slightest desire to get to the top of the ladder he will find the time or make it, and he will repair or replenish his education up to the point which is necessary to understand the said formulas and technical terms. This can be no very difficult task, for in the market there are hundreds of plain, simple, reliable books on each trade, easily gotten hold of and as easily understood, teaching the computation of strains and how to meet them, the guiding rules, etc., in such simple form that the most ordinary education can fully grasp them. Then again he will contribute greatly to his own interests by subscribing to a couple of trade journals devoted to his own line and to at least one architectural paper. These will keep him in touch with new methods and practices being perfected or brought out and with newly introduced materials, tools and other mechanical devices. In addition, he should be the possessor of a library of trade catalogues, which he should study carefully and repeatedly. Technical journals supplemented by trade catalogues are without doubt the very best educative mediums that a contractor or mechanic can possess. The more knowledge a contractor can acquire the more confidence he naturally will receive from his employees, and this knowledge he should try as far as possible to transmit to them; he should endeavor to make them thinkers and students as well as workers.

A thorough acquaintance with business methods is imperative. Book-keeping, banking, exchange, correspondence, etc., should be to the contractor familiarities. This knowledge can be easily acquired if both eyes be kept open and a little assistance be sought from some qualified friend, or a short time might be profitably spent in some good business college, no more than merely enough to acquire simply a rough proficiency in business practices; more would only be a waste of time. On this score of business methods the embryo contractor need suffer no uneasiness, for these points are so very easily acquired and from so many sources.

The acquisition of a reliable unfailing judgment of human nature is of inestimable advantage. The power to judge character and motive in employer or employee is a very beneficial adjunct to success; it teaches the contractor the various whims and caprices of his men and just how to handle each individual one so as to get from him the greatest amount of perfect work in the shortest possible time. This faculty comes quite naturally to some, but it can be easily acquired by all; any rule for its study other than "watch faces" would be hard to give.

Interpretation of plans and a knowledge of the customary terms used in specifications is of course an absolute necessity. Let our embryo contractor look over and study every plan he can possibly lay his fingers on, and a friendship formed with some architect's clerk will be a great benefit in the way of explanations of lining and coloring, use of scales, rules for estimating, and many other valuable points.

Then there is what may be called the legal aspect. An acquaintance with the law relating to contracts, liens, garnishes, etc., will save a great deal of troublesome uncertainty and worry. A wonderful amount of information on this point may be obtained from reading the various technical journals. That this is a point of great moment to contractors as well as to architects seems to be recognized by these papers, which are giving a good deal of attention to it by publishing particulars in general, and judgments in building cases. Take an interest in and carefully follow all trials of building cases that you possibly can, especially those in your own locality, and note the legal points brought out by counsel and judge.

It is, of course necessary before beginning business to have a certain amount of cash capital, at least enough to carry through the first few jobs till returns begin to come in, and in no case should the new beginner allow himself to be seduced into taking more work than his capital will warrant, no matter how glittering the prospect, no matter how sure the success may appear. His ability and willingness from the start to pay promptly for materials will engender confidence in, and reliance on him by the supply dealers, and when he comes to take larger contracts it will be pleasantly surprising how his custom will be sought and how much better the bargains he can make than can his slip-shod brother contractor who has no such reputation.

Estimating correctly is a very vital point with any contractor. A faulty estimate may mean a very heavy loss or it may be the means of throwing him out of the work. Estimate carefully, considering every point in the plans and specifications; miss nothing. Low estimates are often caused by an improper conception of what is to be done, a loose consideration of the values of different features; get the quantities and qualities correct and the values as low as possible, and if this does not secure the work let the other fellow have it and welcome. Never sign a contract before again considering the amount and class of work to be done and materials to be supplied, and should at any time some unscrupulous proprietor request that the job be taken at a certain reduction from the tendered price, don't jump it! Consider it first; don't take work for the sake of work. When figuring make out the quantities in tabulated form, entering every article, every item with its estimated value opposite, all being done in a regular form—each proposed job separately. Whether the job be secured or not keep all of these estimates in some permanent shape, for they will be a record of the past and a valuable guide for the future. While the work is progressing for each building separately, keep track of every article sent to the ground, every article returned, and a correct account of all labor spent on the work; enter the cost opposite each item. This record will fill a two-fold purpose—that of showing the relation between estimated and actual cost, being the loss or gain on the whole or on each item, and also teaching a most valuable lesson for future tendering.

Study the markets, the rise and fall in prices of materials not only in your own line but generally in all other lines, and particularly see that the technical journals you subscribe to give you the regular market quotations up to date, of course discounts and freight rates change the face of matters considerably, but the prices quoted will always be a safe criterion by which to follow the everchanging tide of values. These quotations are customarily given for the largest markets and which are always specific-

ally designated. Most certainly when it comes down to buying, correspondence must be resorted to. By the way, let me add that another benefit of the library of technical journals is that they tell in their advertising pages the names and addresses of the principal dealers in each line; this fact alone is worth the subscription price to any contractor.

In regard to extra work a little advice might not be out of place. When a proprietor or his agent, who is as a rule the architect, suggests changes, additions or deductions, at once look up the specifications and see exactly how the matter stands and do not make such deviation from the amount or class of work contracted for until you have first amicably adjusted with the proprietor the price that is to be added to or deducted from the contract amount; then you will know how you stand and the proprietor will know how he stands, and there will be saved all the untold squabbles and dissatisfactions over the "extras" at the final settlement.

A contractor has duties to his employer as well as to himself; this he should always bear in mind. The better he can satisfy his employer the better it will be for his reputation now and to come; one dissatisfied proprietor will by far outdo the good that ten satisfied ones can do him, and he will usually try to do it, too. When I advise trying your level best to satisfy the proprietor, I do not say to exceed the specifications, for that is uncalled for, but success can only be obtained by conscientiously filling them to the last letter.

The relation a new beginner bears to those previously established in his line in the same locality is at first on the part of the old heads often one of suspicion. This is human nature. To speculate on his qualifications, his resources, his everything, is only natural in those to whom he is now to be a rival. Barriers may be thrown in his way—but what of this, fair, square dealing will outlive all. Keep a stiff upper lip; be honest by all and fear none. This procedure if conscientiously lived up to will give to any man a certain noble personality, a certain impress of absolute reliability that all the storms of adversity or enmity cannot shake, that will stamp that man as a man among men, and success is assured.

ILLUSTRATIONS.

RESIDENCE AT LONDON, ONT. HERBERT MATTHEWS, ARCHITECT.

CATHEDRAL-CHURCH OF WELLS, SOMERSETSHIRE, ENGLAND, FROM A DRAWING BY MR. ERNEST WILBY.

Wells Cathedral, 1148-1407, is one of the most interesting of English Cathedrals, and will merit a visit by the travelling architect or student. The view presented shows the easterly end as seen from the Bishop's garden.

MARKET BUILDING AT WINNIPEG, MAN. GEORGE BROWNE, ARCHITECT.

The building is built of stone and local buff brick. The exterior walls above ground line are hollow, pointed and painted on the interior side; no plaster. The roof over centre portion has a clear span without the beams or rods; cost $24,000.

"C. A. & B." COMPETITION FOR A JEWELRY STORE DESIGN SUBMITTED BY "ROMANESQUE" AWARDED FIRST POSITION.

The whole of the front of the first storey, the columns, sills and lintels of first, second, third and fourth floors, the arches, spandrils and string course above third floor windows, the panelling under cornice and the large brackets at ends of cornice to be of the best quality of Cleveland blue stone. The rest of the front wall, excepting cornice, to be faced with the best selected buff bricks of an even tone and backed with good ordinary brickwork.

"C. A. & B." COMPETITION FOR A RETAIL JEWELRY STORE. DESIGN SUBMITTED BY "PENNY" AWARDED SECOND POSITION.

Foundations are to be built of hard gray or sewer brick on footings of stone. All walls except the front are to be of good white brick. The front above the ground floor is to be built of Don Valley buff pressed brick. The ground front is to be of Berea stone, as also are all sills, capping, strings, cornices, pillars, and panels. All the partitions above the ground floor are to be 4½" porous terra cotta.

THE JAMIESON BUILDING, TORONTO.—CURRY, BAKER & CO., ARCHITECTS.

As the land upon which this building is erected is possibly the most valuable in the city of Toronto, it was absolutely necessary to make the most of the site. Every inch of frontage on Yonge street has a value of $200.00, and it was consequently imperative that none of it should be wasted. The glass line of the store windows is within 3½ inches of the face line of building with the supporting columns inside of same. The result has been satisfactory, for although the ground floor of the building is almost all glass it has not the appearance of standing upon spars, which is characteristic of many buildings with large plate glass surfaces. There is an entrance from Yonge street and one from Queen street, the balance of the frontage being devoted to showing goods, thus forming a large and continuous store window extending from entrance to entrance. Along the inside walls there are two galleries about 13 feet wide, through which the elevator and staricase are carried. The gallery at the west end will be used for office, that on the north side for showing goods. The available space on the store floor is very largely increased by means of the galleries. The basement will be used for selling goods, and is exceedingly well lighted. Much thought was devoted to the lighting of the basement, and the result is most satisfactory. Three of the upper floors will be devoted to thesale of goods, while the top floor will be used for manufacturing purposes. The upper floor is lighted by three very large skylights. The floors throughout are carried on steel beams supported by cast iron columns.

The building is not fireproofed, but every care has been taken to prevent the spread of fire. There is no strapping upon any of the walls, and the ceilings are plastered upon metal lath. A stand pipe is run up through the building to the roof with hose on every floor. Ohio free stone is used in the ground storey, including the corner, and stone and brick in the first storey. The balance is built with a very light buff pressed brick with terra cotta arches. The cornice is of galvanized iron painted to harmonize with the brick.

"STOKOSAY CASTLE."

The view given in this number of this interesting old mansion shows the North Tower from the church-yard looking across the moat. On the left is seen the Tudor "black and white" gatehouse, of which a drawing with details and a general description was published in this paper last March. At the northern end of the great hall a short flight of steps leads downwards into an apartment which is probably the most ancient part of the buildings; the very narrow loop holes show that it was intended for defence. In a projection of this chamber is a well, 150 ft. deep, which was nearly filled up, but has recently been cleaned out. A boar and deer skull and a pair of roebuck's horns only were found. An original staircase of solid oak baulks, cut through diagonally, leads from the hall to the first and top floors. On the first floor are two apartments which are named the priest's rooms. The innermost room, probably used as an oratory, is laid with a number of tiles of good design, several the device of a centaur, an archer and coats of arms. A projection in the angle contains a small recess. Little change has taken place except the insertion of an ogee window, which will be noticed on the drawing.

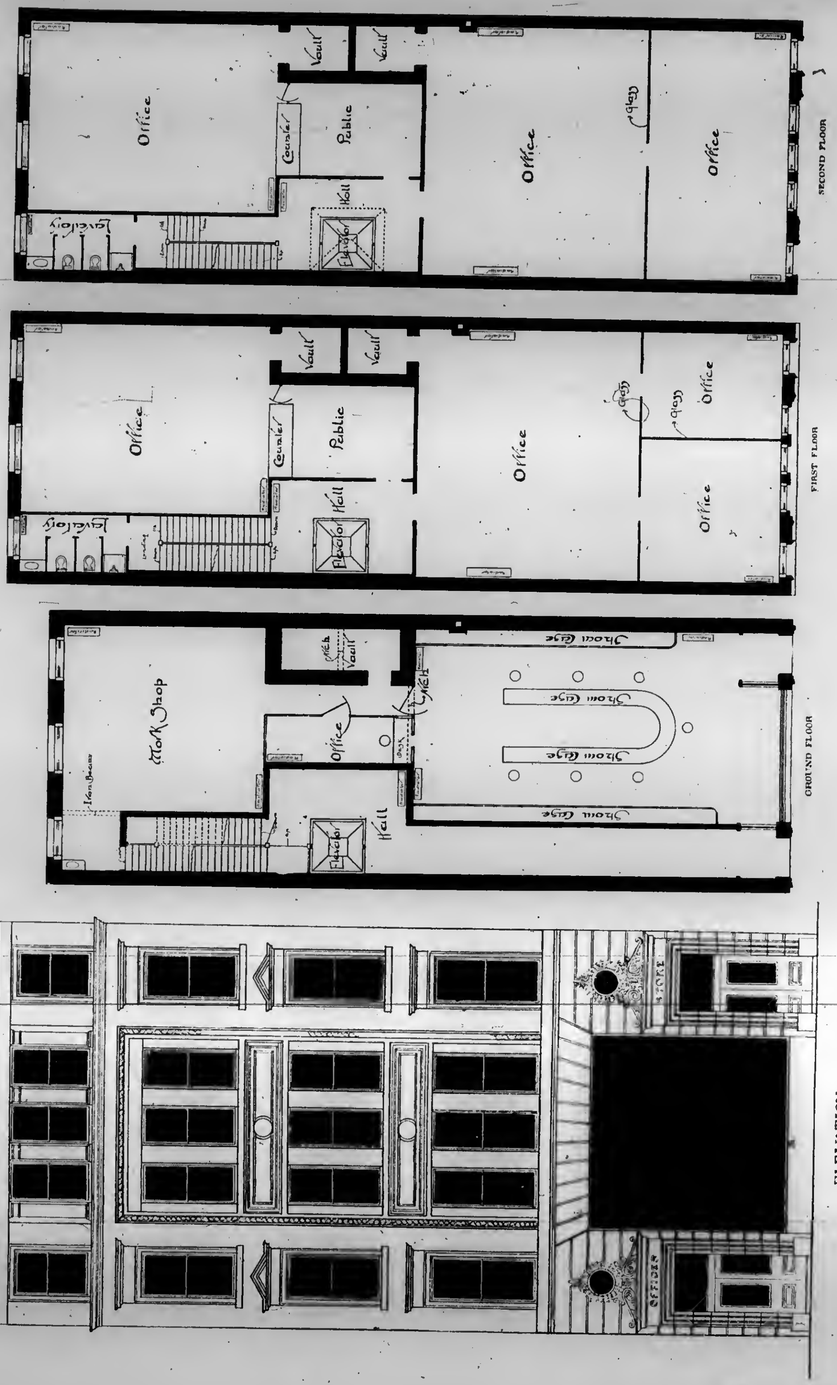
The upper room is of very irregular shape a well lighted apartment 25 ft. x 30 ft. This half timber structure was probably put on at the same time that the gatehouse was erected, and replaced the original parapets of the tower. This room has probably been divided by light partitions. There is a fine example of an early English fireplace, with side pillars, down which runs a rib. A wooden frame resting on corbels which once supported a wooden hood still remain. Though the upper part is gone, the line is defined by the groove in the wall.

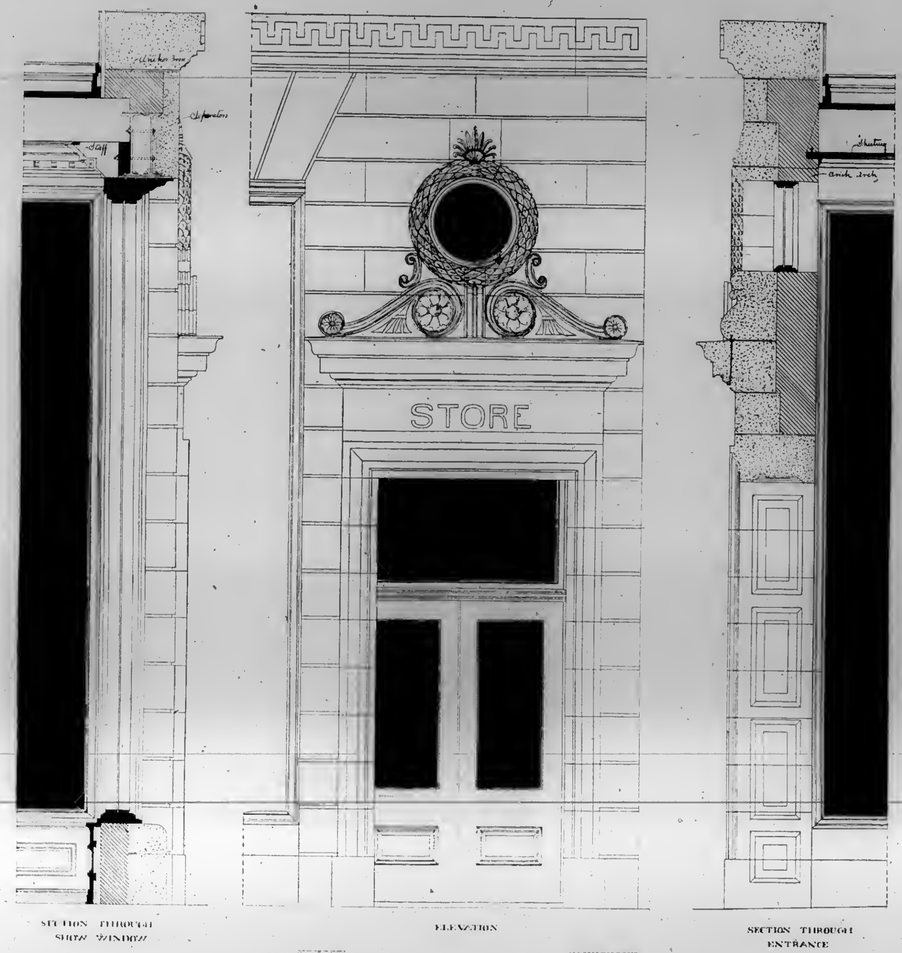
The floor of this room partly rests on brackets projecting from the walls, and is thus of greater size than the lower structure.

The roof principals are very irregular. The ridge is on the twist and anything but level, but they got over these slight difficulties by giving gentle sweeps to the tiling. The basement walls are very thick, and it will be seen they have considerable batter.

The great hall is lighted by three large windows on either side filled with early English tracery, grooved for shutters, and in the lower divisions holes sunk in the stone to admit iron bars. The far gable seen in the sketch is the solar with the battlements of the south tower above.

This is not the general view, which, together with measured drawings, I hope to give at a future date and with a fuller description. EDWARD SWALES.

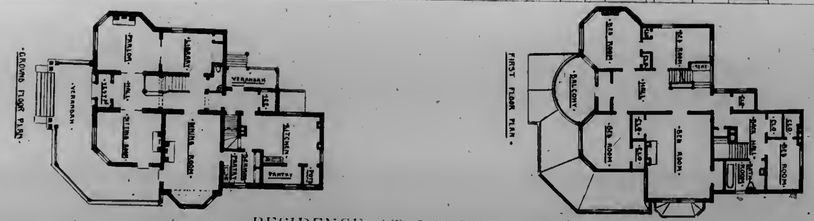




"C. A. & B." COMPETITION FOR A JEWELRY STORE.

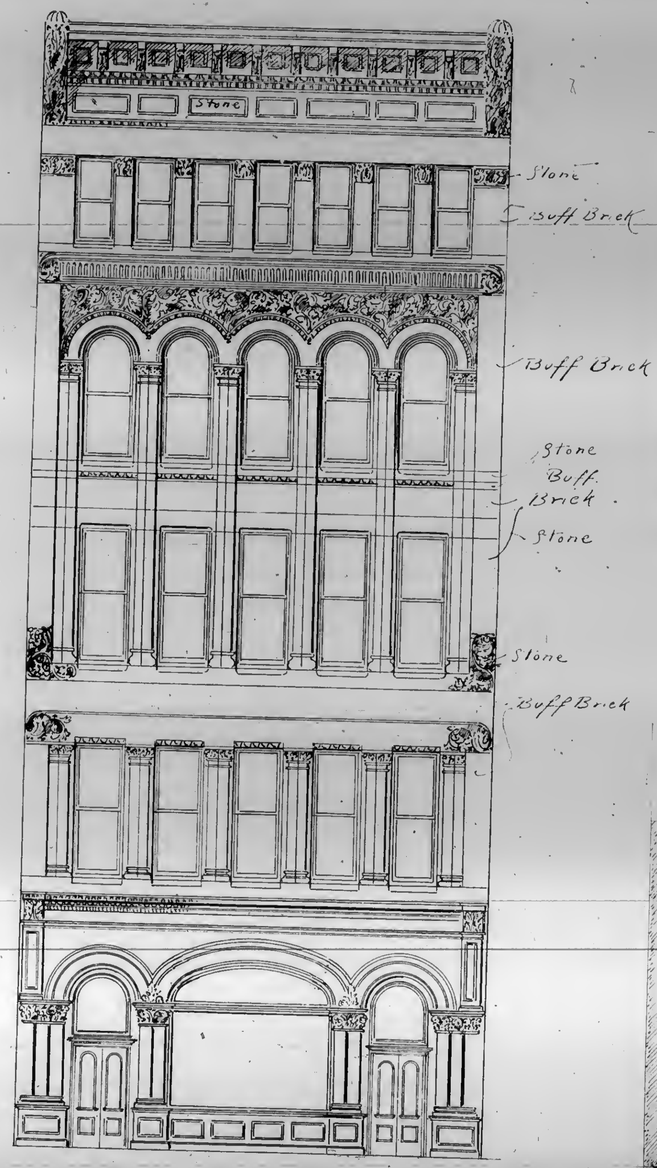
DESIGN SUBMITTED BY "PENNY," (MR. CHARLES P. BAND, TORONTO).—AWARDED SECOND POSITION.

WELLS CATHEDRAL.
SKETCH BY ERNEST WILBY

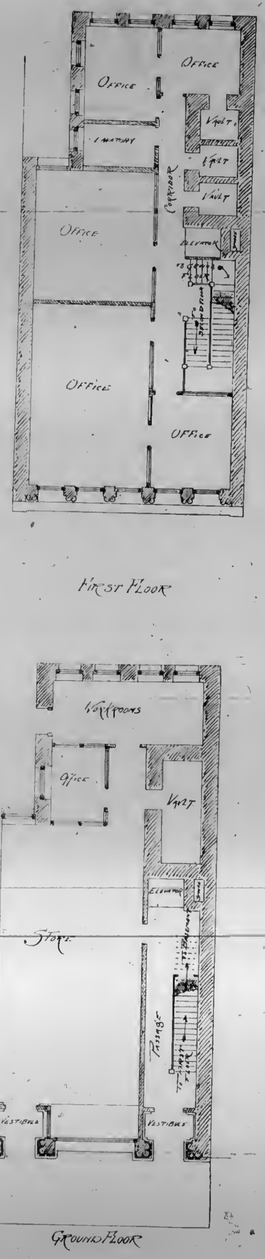


RESIDENCE AT LONDON, ONT.

HERBERT MATTHEWS, ARCHITECT.

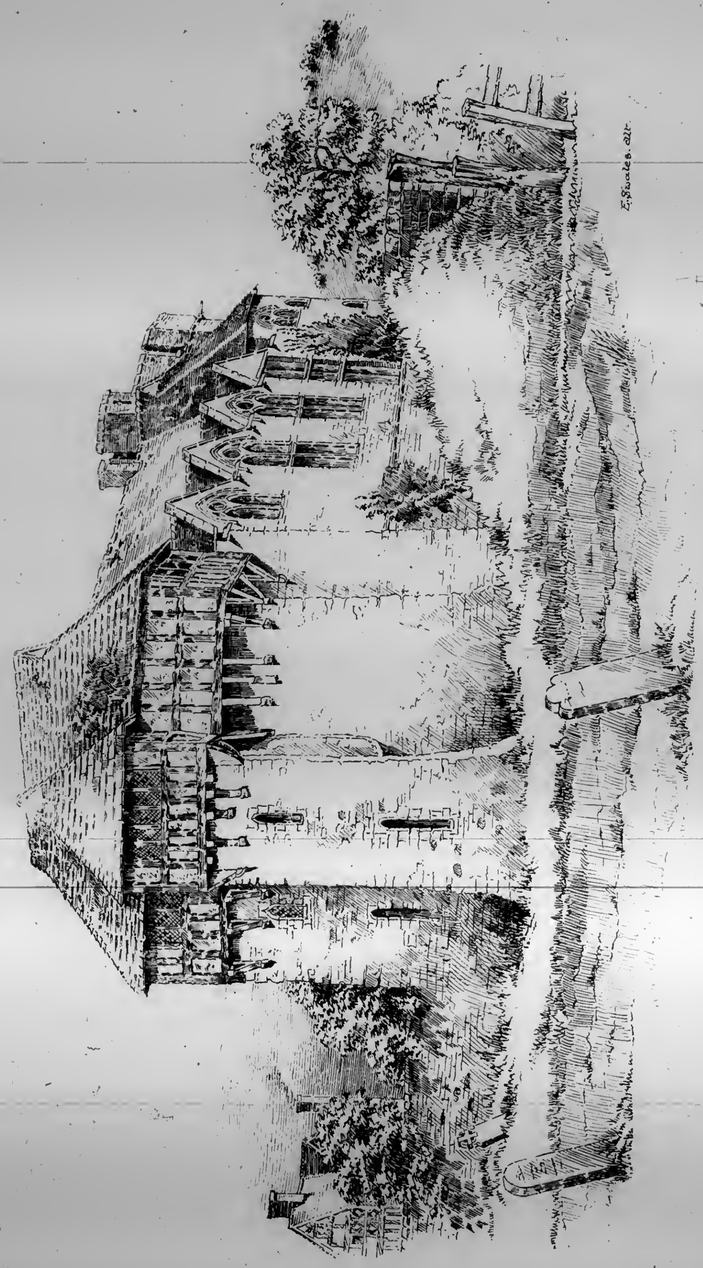


ELEVATION



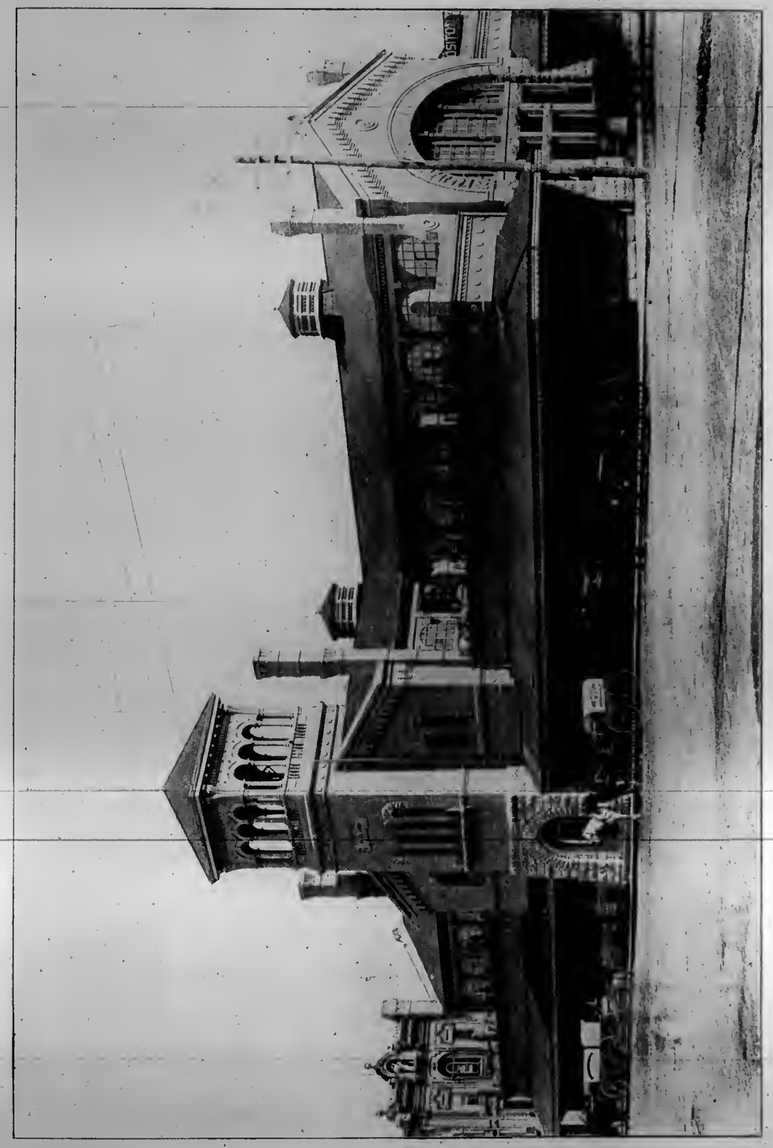
"C. A. & B." COMPETITION FOR A JEWELRY STORE.

DESIGN SUBMITTED BY "ROMANESQUE," (MR. MELVILLE P. WHITE, TORONTO).—AWARDED FIRST POSITION.



STOKESAY CASTLE.—VIEW OF NORTH TOWER.

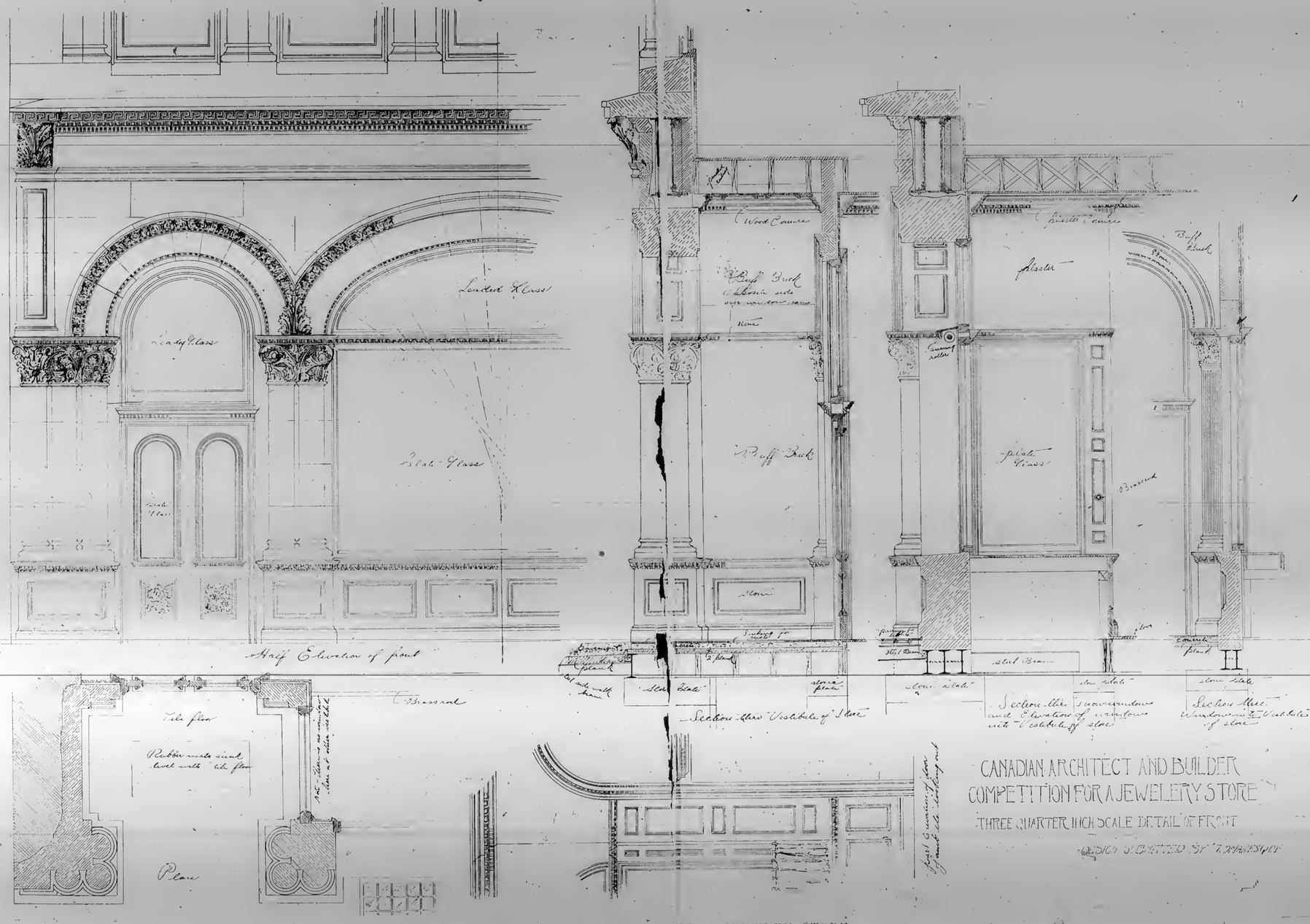
SKETCH BY EDWARD SWALES.



PUBLIC MARKET BUILDING, WINNIPEG, MAN.
GEO. BROWSE, ARCHITECT.

STORE BUILDING FOR P. JAMIESON, QUEEN AND YONGE STREETS, TORONTO.

CURRY, BAKER & CO., ARCHITECTS



"C. A. & B." COMPETITION FOR A JEWELRY STORE.

DESIGN SUBMITTED BY "ROMANESQUE," (MR. MELVILLE P. WHITE, TORONTO).—AWARDED FIRST POSITION

CANADIAN ARCHITECT AND BUILDER.

VOL. IX.—NO. 2. FEBRUARY, 1896 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	H. B. GORDON, Toronto.
1ST VICE-PRESIDENT	J. GEMMELL, Toronto.
2ND VICE-PRESIDENT	JOS. W. POWER, Kingston.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

F. J. ALEXANDER	Ottawa.
THOS. FULLER	Ottawa.
E. J. LENNOX	Toronto.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON — Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. C. HUTCHISON, Montreal.
1ST VICE-PRESIDENT	A. T. TAYLOR, Montreal.
2ND VICE-PRESIDENT	J. F. PEACHY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

CHAS. BAILLAIRGE	Quebec.
ROBT. FINDLAY	Montreal.
J. Z. RESTHER	Montreal.
A. H. LAPIERRE	Montreal.
G. E. TANGUAY	Quebec.
THEO. DAOUST	Montreal.

AUDITORS—A. J. FOWLER and C. CHAUSEE, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

JOHN ALDRIDGE, President.
THOS. CANNON, Jr., 1st Vice-Pres.
JOHN VICK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. BOOTH.
JOHN WICKETT.
FRED. WAKEFIELD.
H. LUCAS.
JAS. ISAAC.
JAS. CRANG.
JOHN M. GANDER.
GEORGE HENRY.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journa is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Proposed Amendments to the O. A. A. Act.

To Mr. Frank Darling, the retiring president of the O. A. A., is due the credit of having delivered at the opening of the recent annual convention, a highly practical address. It may safely be said that to the majority of the members of the Association, who recognize in Mr. Darling the possessor of high artistic attainments, the intensely practical character of his remarks came as a complete surprise. There was no disappointment on this score, however, as every one felt that the address was full of valuable suggestion and sound logic, befitting the occasion. Mr. Darling largely devoted his remarks to showing the reasonableness of the amendments which the Association are seeking to have made to the Ontario Architects' Act. He undoubtedly presents a strong case, and one which clearly has justice as its foundation. We desire to emphasize two or three points which the members of the Legislature and others interested should keep clearly in mind. 1st. The desired amendments to the Architects' Act would not prevent any person from preparing plans for and carrying out the construction of buildings as at present. The only restriction would be in the use of the title "Architect." No unqualified person would be permitted to call himself an "Architect," although he might, under a different title, perform the work of an architect. This restriction is desired in order that those who invest their capital in new buildings may know who are qualified to design and erect the same in a manner that will not involve risk of financial loss to the owner and injury to health or loss of life to the occupants. It is compulsory on the surveyor who lays out the site of a new building that he shall give proof of his qualifications; how much greater the necessity for such proof in the case of the man into whose hands are entrusted capital, health, and even life itself? 2nd. As every person at present practising architecture in Canada would be given three months in which to register under the Act, without being required to give proof of qualification, no injury or injustice could result to them. 3rd. Those who are seeking to have the Act amended have nothing in view beyond a desire to safeguard the public interest, and elevate the standard of architectural practice in this country. As the benefits of the legislation would not be felt to any extent for twenty-five or thirty years, it is clear that the practising architects of the present day can expect to derive no personal advantage therefrom. 4th The School of Architecture established by the government in connection with the School of Practical Science,

Toronto, in recognition of the need for the more thorough education of architectural students, must fail of its object, unless it is made compulsory that students shall pass qualifying examinations. In view of these and other equally good reasons which could be advanced, it is hoped that the amendments to the Ontario Architects' Act, which have been petitioned for, will be granted at the present session of the Legislature.

The O. A. A. Convention.

THERE was less business than usual transacted at the Annual Convention of the Ontario Association of Architects, but the papers were rather more interesting than usual, and, what is more important than all, there was more evidence of fellowship among the members attending the meetings. In particular the portion of the programme devoted to criticism of each other's current work, exhibited by means of the stereopticon, was definite and instructive, and both given and received in a frank and friendly spirit. It is this spirit which is one of the best products of the Association as far as concerns the architects. Inventive workmen, such as artists and architects, require constant association and interchange of ideas to keep up the germinating warmth of thought that must be at the back of progress, without which Art is dead. Until the Association was formed the architects of Ontario, even in the cities, worked alone. It would be hard to return now to the old state of affairs; nor would it be easy to estimate how much architecture in Ontario will owe to the Association for this one gain only. Any comment upon the recent convention would be incomplete without a reference to the liberal assistance to the Association of all connected with the School of Practical Science, beginning with the Minister of Education. Mr. Ross has always shown himself to be a Minister of Education in the widest sense of the term, and the formal vote of thanks to him at the close of each convention is offered not only in return for his permission to use a room of the School for that convention; but is at the bottom an acknowledgement of his promotion or countenance of many ways in which the School has extended its assistance to architects as well as to students of architecture. Professor Galbraith, the principal of the School, not only watches over the association of his teaching staff with the practising body, but gives valuable time in acting as Chairman of the Board of Examiners of the Association, and organizing a scientific method of examination. Mr. Wright, the Lecturer in Architecture, is the familiar friend of the Association, and his unwearying energy and dauntless enthusiasm have done more for it than a mere enumeration of his services would express. The annual conventions in particular owe much not only to his assistance, but to his suggestions. A distinguishing feature of the conventions is the facility of illustration afforded by the electric light stereopticon of the School and the valuable collection of photographic slides of architectural subjects made by Mr. Wright and his assistant, Mr. Keele, for the use of the architectural department of the School. Some of the photographs were taken by Mr. Keele during a visit to England in the last vacation, and are valuable not only as excellent protographs but as having a subject matter chosen by an instructor in architecture. It seems to us not only a good thing for the Association to work thus in harmony with the School, but it must also be a good thing for the staff of the School. There is danger to all professional work in its withdrawal from active life and dealing with theoretical matters only. The college professor too often becomes dry if not inactive in the course of time. To this tendency an association such as now exists between the instructors at the School of Practical Science and the practical part of the profession is a wholesome corrective.

BUILDERS' EXCHANGE.

THE annual meeting of the Toronto Builders' Exchange was held on Monday, Jan. 20th, at their rooms, No. 8 Victoria street. The following members were present: Messrs. Oakley & Holmes, James Crang, Wm. Booth, John Vick, D. Williams, J. Bedford, H. Lucas, T. Cannon & Son, John C. Goddard, William Christie, John Connolly, A. Burnett, Wm. Pears, Jas. Pears, Wickett Bros., Wm. Tasker, John Maloney, Henry & Bottomley, J. J. Blain, Thos. Murray, James Isaac, Thomson Bros., Wm. McGuire, Geo. Wright, J. Knox, John Aldridge, John M. Gander, R. Chalkley, Wm. Stewart, Wm. Harris.

The election of officers for 1896 resulted as follows: President, John Aldridge; first vice-president, T. Cannon, jr.; second vice-president, John Vick; treasurer, David Williams.

The following directors were elected: William Booth, John Wickett, James Crang, John M. Gander, George Henry. The auditors are Messrs. Fred Holmes and George Clay.

The reports of the directors and auditors were presented and adopted, and votes of thanks tendered to the retiring officers. It was resolved to hold the usual annual excursion next summer, a committee being appointed to make the necessary arrangements.

LEGAL.

A CASE of interest to architects came before Judge Morson at Toronto recently, in which Mr. Hynes sued the Roman Catholic Separate School Board for $60, commission for plans furnished for a school building on Earl street. It appears Mr. Hynes was employed to draw plans for a four-roomed building, and that he submitted them when ready to the Sites and Buildings Committee, but that they were dissatisfied. He explained that he could do no better, as the appropriation was limited to $4,500. He understood that he was then authorized to make sketches for a more expensive building, and he accordingly did so for one to cost $6,000, which were submitted to the Archbishop for his approval, and he asked 1 per cent., the regular commission on this amount. After hearing the evidence Judge Morson held that the Building Committee had not authorized the second plans, and as Mr. Hynes had been paid $112.50 for the first plans, judgment was given in favor of the Board.

BRITISH COLUMBIA PARLIAMENT BUILDINGS.

THE exterior stone work of the main portion of the new parliament buildings at Victoria, B. C., has been completed, the last stone having been laid with great eclat a few weeks ago. The contractors, Messrs. McGregor and Jeeves, invited the members of the government and some others to be present. The Union Jack was hoisted and congratulatory speeches made. Both the architect and contractors are commended for the energy displayed and the character of the work. The last stone was laid on the dome, which towers eleven feet. Above it will be a copper covering fifty two feet high.

Among the new industries which appear to have come very rapidly to the front is The Mica Boiler Covering Co. They have recently completed covering all the steam pipes in the Simpson Departmental Store, Toronto, and have also in hand large contracts for the Ontario Government. Last week they were awarded the contract for steam pipe covering for the Halifax Street Ry. Co., besides obtaining considerable orders in Montreal, and in consequence are compelled to run a night shift to keep pace with their orders.

ONTARIO ASSOCIATION OF ARCHITECTS.

PROCEEDINGS OF THE FIFTH ANNUAL CONVENTION.

THE Fifth Annual Convention of the Ontario Association of Architects, was held in the School of Practical Science, Toronto, on January 14th and 15th.

The President, Mr. Darling, having called the Convention to order at 2 p.m., the Registrar read the minutes of the last Annual Meeting, which on motion duly seconded, were confirmed and signed by the President.

PRESIDENT'S ADDRESS.

The President then read his annual address, as follows:—

It is with pleasure, gentlemen, I welcome you to the fifth annual convention of the Ontario Association of Architects. The past year has not been greatly fraught with matters either of great importance or of much interest to the welfare of this Association.

We have had a quiet year, and I cannot, I am afraid, bring before you anything either very fresh or very novel, as it is my intention to deal almost entirely with the question of legislation.

We are, as yet, but a young institution, struggling for recognition and a livelihood; the latter I feel assured of, if the former can be managed, and managed it must be, and can be, if only we will all do our duty—each of us and all of us.

We are nearer the goal of our hopes now, I firmly believe, than we have yet been, but the prize will not be won without a strong and desperate effort. It is the last spurt in any struggle which requires the greatest exertion and determination in order to achieve victory.

We have it in us to win if we but choose to put forth all our strength. It behooves us, therefore, to make up our minds with grim determination to struggle and fight to the last. There is no need to despair. It wants nothing but a steady, persistent and united effort, and the battle will be ours.

Talking it over, however, between ourselves, in our offices, when we happen to meet in the streets or elsewhere, or reading papers and making speeches in yearly conventions, will not bring about the results desired. I wish it would. It's easy. Talk is cheap and there is plenty of it, but unfortunately it is work that is wanted—not talk—steady, persistent work.

Whenever you can get hold of a member of the Legislature, see that do not neglect the opportunity, but seize the chance, and explain to him as clearly and definitely as you can what it is we are asking for, remove his apprehensions, which you will find are many, and do all in your power to make him understand the matter properly.

It has been found by those members of the Association who have done some work about the Legislative Buildings, in the way of interviewing members, that the greatest opposition to the Act arises either from ignorance, ndifference, or from very serious misapprehension of our intentions. It was found, also, that in the great majority of cases, after our views had been clearly set forth and explained, that the opposition was removed or at any rate, very greatly lessened.

I am safe, I think, in saying that the work which has been done for the last few years in making the members of the Legislature familiar with our aims, seems to be gradually bringing about a favorable feeling on our behalf. Neither on the part of Reformers, Conservatives or Patrons do we meet with any definite opposition. Such as does exist is individual, and does not represent the united action of any party. It does not, indeed, appear to be regarded by anyone as being a party measure in any sense.

The Government refuse to introduce the Bill as a measure of their own, but that, we have reason to believe, is from motives of policy, and not because they have any objection to the Bill itself. Mr. Haycock, the leader of the Patron party, was most kind, showed much interest in the matter, and was extremely desirous of being thoroughly informed on the subject, and in the end expressed himself as having no objection to the Act as amended. Mr. Howland, also, gave us much valuable assistance, and very kindly took charge of the matter in the House.

After consultation with him, Mr. Haycock and others, the Council came to the conclusion that, in order to remove as far as possible any chances of defeat, and to bring the provisions of the Act into harmony with the expressed wishes of various members of the Legislature with whom the matter had been at different times discussed, it would be wiser that the fixing of the amounts of the various fees should be left to the decision of the Lieut.-Governor-in-Council, and not in the hands of the Council of the Association. It is presumed, of course, that suggestions as to the amounts of the various fees will be permitted to be made by the Council of the Association, the Government only interfering if, in their judgment, the amounts appear excessive. We need fear no difficulty, however, on this score, if we prove to the Government that the fees are such only as are necessary to allow the Council to properly carry on the work of the Association.

It is really difficult to see what objection can be urged against the Bill in the shape it now is.

Practically all we ask for is—that the Government shall take some steps to assist us in raising the standard of education which it will be necessary for persons to possess who in the future desire to assume the title of "Architect."

It has resolved itself into an educational matter pure and simple, and not, as it was at one time feared by some people, a sort of scheme by which we could make the practice of Architecture what is called a "close profession."

The Act does not preclude anyone either now, or in the future, from carrying on, as at present, the whole business of an Architect. A man will be able to make plans and sell them, design houses and build them, or do anything else he wishes in the way of ordinary architectural practice. He may charge for his services exactly as he does now, five per cent., or less, or more as he himself may deem such services to be worth. He will have the same facilities for collecting these fees (in the courts if necessary) as he at present enjoys—the only difference being that he will not be able to take or use the title "Architect" in any way or shape whatever. He may call himself by any other name he chooses, and may designate his business by any title it may please him to invent, but from the use of the word "Architect" he will be debarred entirely. And this only because he so elects. There are no hindrances placed in his way should he desire to enroll himself in our ranks.

If on the one hand he decides that he will follow the practice of his profession calling himself a "Designer," "A Plan Maker," or anything else, other than an Architect, well and good, no man will say him nay. It is entirely his own business and we may suppose he knows his own business best.

If on the other hand he wishes to use the more honourable title, all he has to do (if he be practising at the time the Act goes into force) is to send in his name and register as a member of the Association.

The Act says, "Any person now practising the profession of Architecture within this province may become a member of the Association by causing his name to be registered with the Registrar of the Association within three months of the coming into force of this Act and by paying to the Registrar such fee as may be made payable in that behalf subject to the proviso hereinafter contained."

Certainly no one can say that any difficulties are created; no man's rights, interests, or privileges are interfered with. If a man does not choose to register it is his own lookout. He can still continue to carry on his business, he can still charge his usual fees, and he can still collect them, all just as usual, only he cannot call himself an "Architect."

No difficulty will however arise from this source for I am proud to say that our Association practically numbers among its members every person following the profession of Architecture in the province of Ontario; if there are any whose names do not appear upon the roll it is owing to inadvertence of some sort and not because of any hostility to the proposed measure.

I am glad to state that we have had no dissentions within our ranks. Almost to a man the whole profession is in favour of the Bill.

It must not be forgotten that the present benefits (should the Bill pass) will be small, so small indeed as to appear almost insignificant. It is to the future we must look if we wish to see the results we hope for. Don't let any of us run away with the idea that just as soon as this Act comes into force something wonderful is going to take place. Nothing will happen at all. Business will be neither better nor worse. We will have just as much bother and just as much worry as ever. Work will be no more plentiful than it is at present and it will be no easier to get. It will be just as difficult to collect our fees as it is now. The modest man who only charges three per cent. will not suddenly find that he is going to have five per cent. thrust upon him. Not at all. These things will always be; they are not to be remedied by the passing of Acts. We will have only the consciousness, and it will be a very pleasant consciousness, that at last we belong to a profession which has some real and proper standing of its own, and that it lies with us to see, that in the time to come when the public find a man calling himself an Architect, they may know that he belongs to an honorable and recognized profession, and that he has acquired the right to wear the title by education, by reading, by work, by application and study, and finally by successfully passing such examinations as will be at any rate, some guarantee to the world at large that he is properly qualified to practice, and is learned in the science of the profession he has undertaken to follow.

I say science designedly, for it is that side of the education of an Architect which these examinations will go furthest to foster, and which, moreover, is most necessary for the safe guarding of life and limb. I put little, if any stress on the artistic side. For the cultivation of that, by means of examinations I have personally no faith whatever. You will never make an artist of a man, who has not had born into him the divine gift of artistic and creative power, by putting him through examinations from now till the day of judgment, and no Acts of all the Parliaments and Legislatures in Christendom will give it to him. You can teach him, however, to put up buildings that will not fall down. You can teach him the science of construction, the property and strength of materials, their proper application and use, the principles and theory of sanitary science, of plumbing, heating, ventilation, and many other kindred matters, and you can so direct his reading and his study that when he is able finally to pass his examinations successfully and attains the right to assume the title of "Architect" and commence the practice of his profession the public may feel justified in considering that they will be safe in entrusting the expenditure of their money into his hands.

It is to this end it seems to me that these examinations should lead, that we should strive to turn out thoroughly educated well qualified practical men, learned in all that pertains to good safe scientific building construction in all its varied branches, for this is the point upon which the public want to be assured of most, and the one about which they are the least competent to judge. If we

can help them in this, the passage of the Act will be more than justified.

The whole benefit of the Act (if passed) will accrue both to the profession of Architecture, as well as to the general public, in the future (and by no means in the immediate future)—not in the present.

It is framed almost entirely in the interests of the young men who are just now entering, and who will continue to enter the ranks of the profession. It is to insist that they shall educate themselves thoroughly and properly for the work they shall eventually be called upon to carry out, and to induce them to take advantage of the various means of study which are so reasonably and liberally offered to them. They can enter the office of some member of the Association in the ordinary way, serving a certain number of years under indentures, or they may graduate from the School of Science (curtailing by so doing the period of office work) but all shall be required to offer themselves for examinations to be held from time to time and pass each and all of them successfully before being permitted to register and practice under the title of Architect.

The Government has only recently established a chair of Architecture at the School of Practical Science. The Association can help greatly in making this Department a success and I can say without a doubt that we are most anxious and most desirous of assisting it by every means in our power. As things are at present, however, it is easy to see that there is little to tempt the ordinary young man to spend the time and money necessary to take the course if, at the end of it, he will occupy in the eyes of the public no better position in the profession to which it leads than that of any other youth who may have passed a year or two wandering from one office to another, or a builder's foreman who aspires to dub himself a professional man, or an auctioneer, or an undertaker, or anybody else who chooses to stick up his shingle and call himself an Architect.

It is only the very exceptional student who will avail himself of the great advantages of the School, and as the supply of exceptional young men is limited in all walks of life, the number of students at the School (if things remain as they are) will necessarily be much curtailed.

The Government must surely wish to see the School succeed—else what on earth was the use of their spending the money wherewith to start it, but if young men are to be induced to enter it at all it must be clearly shewn that it is to their advantage, (and by advantage I do not mean merely the advantage which a man gains over his fellows by means of a more thorough education) but it must be shewn also that the profession which they intend entering (and to which the course they are taking at the School is merely a stepping stone) carries with it a title which will give them a definite standing in the community—that it is a profession which can only be entered by men who have devoted much care, time and attention to their education and to the acquiring of that special knowledge necessary to the satisfactory practice of their calling. I say most unhesitatingly that the Government will discover that these young men having taken the time, and having gone through the labour and exertion of preparing themselves for the necessary examinations, and having passed them successfully, will expect, and very properly, and very naturally, expect, that they will find themselves in a somewhat different position, in that profession, for the practise of which they have spent so much labour and time in preparing themselves, from that occupied by a man who may have given himself no further trouble than having a sign painted.

We follow the shorter road rather than the longer as a rule. The public does not concern itself greatly as to the manner of education previously followed by men who have hung out a sign in hopes of attracting business. Anyone or everyone can, at present, if he so choose, call himself an Architect, and there exists no means by which the public can know whether he derived the title by working through the School of Architecture or by working through a saw-mill—it's all one to them, until something happens, and then the whole profession suffers.

The thing is ridiculous and absurd, and neither the profession nor the School can possibly be the success they might be until things are altered.

We should like above all things to make the young men go through the course of education which is necessary, but we have no means of compelling them. A good deal is done by persuasion and by shewing them the advantages which they will undoubtedly reap in the future. The few who do take the advice and prepare and offer themselves for examination deserve great credit.

But unfortunately the number (at no time as large as it should have been) is growing smaller. They find it irksome and only the enthusiastic ones persevere; the rest become disheartened and drop off. "What is the good," they say, "So-and-So has been studying in an office for a year or two and now he has started up in business for himself, has got several things to do and calls himself a full-fledged Architect. What's the use of my staying away for four or five years and working up a lot of examinations, when so far as the public can tell there's no difference between us."

It is foolish I admit, but it is not unnatural, and the consequence is that the country is being flooded with a lot of half-educated young men calling themselves Architects who can many of them make pretty drawings and sketches, but who can have never in all their lives done any real good honest hard work in reading up the perhaps somewhat dry, possibly uninteresting, but nevertheless absolutely necessary, practical and scientific side of the education of an Architect, (a side which cannot possibly be neglected without very great, and possibly very serious detriment, to the interests of their future clients.)

This Bill would in a large measure stop all this, as students would have to work properly at the practical side of their professional education in order to successfully pass their examinations.

If they did not choose to do so, if they were too lazy, too idle, or too incompetent, why then they would drop out and follow some other walk in life. Or should they see fit notwithstanding their failure, still to pursue the practice of Architecture they would be at perfect liberty to do so, there would be nothing to stop them nor would the Act interfere with them in any way, that is so long as they did not presume to use the title "Architect." That honorable appellation would be reserved for such only as have prepared themselves for the responsibilities of the position by a steady course of honest conscientious study, and that is what after a lapse of fifteen or twenty years the title of Architect will come to mean in the eyes of the public, a distinction by which men can tell the difference between one who has been properly and scientifically educated for his calling in life and one who has picked up such knowledge as he may possess at hap-hazard. Surely, gentlemen, this is not asking much at the hands of any Government.

To us of this generation the passing of the Act can make little if indeed any difference, save that as the years go on the young men will come into the arena better equipped, better educated, and therefore more formidable rivals to the older men who had not in their day the advantages now at the hands of the younger ones.

It is the students of to-day and the public of the future who will reap the fruits of our labours. Certainly we who are moving in the matter can be held guiltless of self-seeking, for of any actual personal immediate advantages there are none. Of a truth it may be said that we are sowing where we shall not reap.

All this I am afraid you will say is going over old and familiar ground, and I feel tempted to apologize for taking up so much of your time with it. But I cannot help feeling very seriously that the importance of it to the very life and existence of the Association is so great that it cannot be traversed too often. I want very much to bring it home to all of you that it is absolutely necessary, in order that we may be able to discuss the question thoroughly, that we should have the whole details of this proposed legislation at our finger ends, and be thoroughly conversant with every phase of it. It is the one great thing we must succeed in carrying out if the future work of the Association is to be crowned with success.

There is still time before the House meets for all of us to do something towards familiarizing the members of the Legislature with our aims, and I shall not I am sure appeal in vain to this Association when I ask them to do all they can in that direction.

Owing to various circumstances, the Act could not last year be introduced until almost the close of the session and it was felt to be unwise to court a possible defeat by bringing it up at a time when full discussion could not have been given to it or the members of the House made fully conversant with all its details. On the advice therefore of our friends in the House we decided to withdraw it.

It is hoped that this year it will be presented early in the session, but before that occurs it will be necessary for us to see that if possible every member of the Legislature is thoroughly informed personally of the details of the measure. If this is done it is hardly possible to imagine that any active opposition to its passage can be offered.

I have occupied so much of your time with this question of Legislation that I fear to try your patience longer, but I should like to say something about what is usually called the ethics of the profession. We hear a lot about ethics. It is a fine high-sounding term most frequently employed when one Architect thinks another has charged less than the usual five per cent. commission. Then the injured one gets on a pedestal and talks ethics. It sounds well and means nothing. It is a sort of architectural form of swearing, for one hears it most when there has been a row of some sort and this row is almost invariably about money matters of one kind or another. Or the injured man writes to the Council asking what they are going to do about it, for it seems to be thought in some quarters that this Association is a sort of trades union and that everybody belonging to it does and must charge all their clients nothing less than the acknowledged tariff list of fees.

I am afraid also that by some it is considered that the legislation we are seeking will in some mysterious way give to every man the legitimate scale of fees whether he will or no. Anyone indulging in that view is going to be disappointed. The legislation asked for, or any other legislation, will never do that for us. We are going to collect the same fees we have always done: neither more, nor less. The passing or the non-passing of the Act will make no difference whatever in that respect. This Association does not say anywhere that every man belonging to it is bound to charge the full fees, and on that ground nobody can blame any member who is foolish enough (or honest enough as the case may be) to ask less than the tariff allows him. The Council have been asked from time to time questions on this subject and have had complaints made that this member or that member is doing work for less than the usual rates. The Council can do nothing in such matters, nor can they take cognizance of any such complaints. There is a table of fees, certainly, which architects are in the habit generally of following, but that list was in existence long before this Association was formed. Members of this Association can adopt it or not just as they deem fit, but the Council have no power to compel them to do so.

This Association is not a Court of Justice, it is not inaugurated as such nor was it ever intended to be anything of the kind. The council does not sit in order to hear charges brought by one member against another with respect to the fees he asks or as to the manner in which he chooses to conduct his business.

True, a member can be expelled for gross unprofessional conduct upon a definite charge being laid and the proper method of procedure gone through, but that clause I take it means that the charge must be of such a nature as involves dishonest dealing towards his clients even though it is not actually punishable by law. It was certainly never intended that we were to have power to punish, expel or fine a member simply because he carries on his business in a way, innocent enough perhaps so far as the public is concerned, but which might not commend itself to the members generally as embodying the highest code of ethics.

I cannot, for the life of me, see why there is all this growling and grumbling about other men's fees. A great deal more practice of ethics and much less talk would be better for all of us. If one man chooses to charge his clients three per cent., another two-and-a-half per cent., another four, and another five, why on earth should anyone complain? The men in question evidently think that that is what their respective work is worth. They are the best judges of its value and in that respect they are honest. I do not see, indeed, why a man should not, if he see fit, advertise that he is a three per cent. architect, or a two-and-a-half per cent. man, or a four per cent. man, ar anything else he thinks his work is worth; he might put it on his letter paper or on his visiting cards or anywhere else. It is his own business; why should anybody mind, that is, so long and only so long as he charges everybody the same. But the individual this Association ought to mind, and ought to frown down in the severest possible manner, and moreover punish (if a way can be found), is the man who adopts a sliding scale of fees for the same class of work. The man who fixes his scale of fees lower than the recognized tariff and having fixed it sticks to it is not the one most guilty of transgressing the ethics of the profession. He may be foolish, but he is honest. But it is the man, who for the same class of work varies his charges, who gets out of one man five per cent., because he is a decent sort of fellow; out of another three per cent. because he is a hard-fisted chap who always drives a close bargain; out of another, two-and-a-half per cent., because if he charges more somebody else will get the work; who is guilty of the grossest form of unprofessional conduct. The other man errs certainly, but to no serious extent. He may say "It's all very well for so-and-so to charge the full fees for everything he does, but I'm not in that position and can't get them!" Very well, that's his misfortune, possibly his fault, let him lower his scale to four, to three, to what he thinks wise, and subdivide that scale in the same proportion as the usual scale of five per cent. is already subdivided, and having done this let him stick to it; nobody can accuse him, at any rate, of dishonesty.

But the other man is dishonest, dishonest both to the profession and to his clients. For instance, A comes to me and commissions me to build a house for him to cost $20,000; he is a gentleman and a descent fellow willing to pay properly for what he gets, and so leaves it to my honor to charge him what the work is worth. Consequently I bill him for $1,000 or five per cent. upon the cost, being the fee I am usually in the habit of charging. Then comes B for whom I do exactly the same work—a house costing $20,000—but B is a hard fisted man who loves to drive a close bargain and so, by reason of that, and for fear that if I do not come down in my charges he will take his work elsewhere, I agree to do it for three per cent. and send him in a bill for $600. Unfortunately A and B meet, they talk about their new houses, and in the course of their conversation the matter of my charges comes up, and it is discovered that I have charged A $400 more than I have charged B, and for identically the same work.

What would A think of me, and what possible explanation could I offer him? Could I feel hurt if he went about complaining that I had swindled him, and could I persuade anybody that my conduct had been that of an honourable man?

It is against this sort of unprofessionalism which we must take the greatest care to guard ourselves. Any conduct on the part of an architect, which, while an offence against his brethren is even more so as regards his clients, must be put a stop to, if the profession of an architect is ever to obtain the honourable position it deserves.

But there is a great deal more in the Ethics of the profession than this everlasting miserable question of money and charges. There is good manners and fair dealing one towards another, consideration of one anothers' work and one anothers' feelings. There might be less backbiting and more generosity, more sympathy for each others' failures and less jealousy about one another's successes and more kindness and cordiality all round, but do, for the sake of all that is decent, let us put an end to these perpetual accusations of unfair and unprofessional conduct which are so constantly being bandied about. If there is nothing in the profession except the money we can make out of it, we had better abandon it, break up the Association and take to some other calling for the chances of fortune in the practice of architecture are few and far between.

I have occupied so much of your time with this question of legislation that I can say but little else, indeed I do not know that there is much that need be said. Matters of purely professional interest will be taken up by the various gentlemen who have been kind enough to prepare the papers which will be read to you. Financial matters will be dealt with by the Secretary and Treasurer. I have confined myself almost entirely to the one real vital question which at present most concerns the very existence of this Association.

I thank you gentlemen, for your attention here to-day, and we may now proceed to business.

The reading of the address was received with every manifestation of approval, and its conclusion was the signal for prolonged and hearty applause.

TREASURER'S REPORT.

Mr. H. B. Gordon then read the report of the Treasurer, as follows:

THE TREASURER IN ACCOUNT WITH THE ONTARIO ASSOCIATION OF ARCHITECTS.

1895	Dr.	
Jan'y. 1st	To balance from 1894	$1,780 00
Dec. 31st	Members' Annual Fees	214 00
"	Members' Registration Fees	30 00
"	Students' Registration Fees	18 00
"	Students' Examination Fees	19 00
"	Sale of Examination Papers	25
"	Interest on Treasurer's Bank Acct., 1895	56 08
		$2,117 33

1895	Cr.	
Dec. 31st	W. A. Langton, proportion of Salary paid in 1895 as Registrar and Librarian	$273 71
"	W. A. Langton, General Disbursements	28 07
"	Travelling Expenses, Member of Council	6 50
"	Caretkr. Sch. P.S. re Convention and Exams.	15 00
"	H. Webb, Luncheon for Convention	15 00
"	C. H. Mortimer, ½ cost reporting Convention	22 50
"	N. R. Butcher, Typewriting	12 70
"	Printing Reports and Circulars, etc.	56 60
"	Printing Examination Papers	25 00
"	General Stationery	14 10
"	Book added to Library	3 35
	Total Disbursements	$ 472 53
"	Balance on hand	1,644 80
		$2,117 33

We have examined the books, vouchers, etc., of the Association, and certify that the above is a correct statement thereof.

WM. R. GREGG,
M. B. AYLSWORTH.

STATEMENT OF ASSETS AND LIABILITIES, JANUARY 1ST, 1896.

Assets.		
Cash in Bank		$1,644 80
Library as per Valuation		
Unpaid Membership Fees:		
1891 ..... 6 Fees	$ 28 00	
1892 ..... 16 Fees	200 00	
1893 ..... 43 Fees	148 00	
1894 ..... 69 Fees	242 00	
1895 ..... 98 Fees	341 00	
	$959 00	
Deduct, estimated doubtful	256 00	
		703 00
Library (cost $232.00), 50 per cent. off.		116 00
		$2,463 80

Liabilities.	
Half Year's Salary, Registrar and Librarian	$ 150 00
Outstanding Accounts	33 60
Balance	$2,280 20
	$2,463 80

H. B. GORDON, Treasurer.

On motion by Mr. Dick, seconded by Mr. Wickson, the Treasurer's report was received and adopted.

REPORT OF REGISTRAR AND LIBRARIAN.

The following report was then read by the Registrar, Mr. W. A. Langton:

REPORT OF THE REGISTRAR AND LIBRARIAN AT THE ANNUAL MEETING ON JANUARY 14TH, 1896.

MEMBERS.

The Annual Register of members for 1895 contained 133 names. One member has since died. The 132 members remaining on the roll are classified as follows:

Class	I.—Practising in York County, 5 years and over	48
"	II.—Practising in York County, under 5 years	4
"	III.—Practising in cities outside of York, 5 yrs and over	38
"	IV.—Practising in cities outside of York, under 5 years	4
"	V.—Practising in towns, villages, etc.	17
"	VI.—Civil servants	12
"	VII.—Not practising in Ontario	9
		132

NOTE.—The number of members in Classes II and IV is variable, and is established by application for the rebate by those who are entitled to it when paying their fees. In the above list the number fixed for these classes is the number of those who have applied for the reduced fee in 1895.

STUDENTS.

Students consist of those called by the Act "existing students" and of new students. Existing students were those who had been articled before the Act was passed and were required only to pass the final examination of the Association before being allowed to register as Architects. Many of these had already served their time—sometimes a considerable time before—but were still working as draughtsmen. The number of existing students registered was 82. The greater part have drifted away to other parts or to other callings, and some are practising architecture without having registered as architects, but there are several still in touch

with the Association. Of these 17 have passed the final examination, 7 subsequently registering as architects, and 1 was admitted to registration as an architect after having passed the examination of the Royal Institute of British Architects.

Of new students the roll is as follows :—

Registered in	1890	9
"	" 1891	6
"	" 1892	11
"	" 1893	6
"	" 1894	2
"	" 1895	2
		—36

These students are nearly all in communication with the Association and seem to be following out its curriculum.

The Board of Examiners for 1895 were :

PROFESSOR GALBRAITH, Principal of the School of Practical Science, Chairman ; Mr. C. H. C. Wright, Lecturer in Architecture at the School of Practical Science, and the following members of the Association : Messrs. Aylsworth, R. J. Edwards, W. R. Gregg, Helliwell, Symons, Townsend and Wickson.

The examinations held this year were as follows :

	No.	Passed.	Plucked.
First Intermediate	3	2	1
Second "	7	3	4
Final	4	1	3

PROCEEDINGS OF THE COUNCIL.

Pursuant to the action of the Convention with regard to improved Municipal building and fire by-laws, a Committee of Toronto Architects, nominated by the Council, drew up a complete set of building by-laws and submitted them to the Mayor and Council of Toronto.

The proposed exhibition of architectural drawings was held in connection with the exhibition of the Royal Canadian Academy, the drawings being contributed to the Academy exhibition and forming the architectural department of the exhibition.

A competition was instituted for drawings of the students' diploma which at the last Convention it was decided to issue. The drawings submitted in competition were not satisfactory. A skilful draughtsman, who is a student of the Association, subsequently agreed to furnish a drawing and is engaged now in completing it.

The most important work of the Council during the year was the endeavor to procure legislation amending the Act of Incorporation. Some difficulty was found in introducing the bill because of the antipathy which has arisen to giving independent power to corporations, and our bill when at last introduced was too low on the list to come on for debate in that session. It is now, however, ready for introduction on the earliest possible opportunity at the next session. It has been discussed with the party principally opposed to giving uncontrolled power to corporate bodies, and in its present state meets with no opposition from that portion of the House. There seems every reason to believe that the bill is now in a position to meet with a fair hearing, and it has been found hitherto that public men who have had opportunity to give it a fair hearing have agreed that it would be a useful measure.

THE LIBRARY.

There has been one book added to the Library—a necessary text book.

There have been 129 lendings, or 18 more than in 1894.

W. A. LANGTON,
Registrar and Librarian.

On motion by Mr. H. B. Gordon, seconded by Mr. Rastrick, the report was received and adopted.

The President then suggested the discussion of any business arising out of the reports.

Mr. W. R. Gregg inquired as to what had been the result of the action taken by the Committee appointed at the last Convention to communicate with the city authorities in regard to amending the then existing by-laws ?

Mr. Gordon stated that several of the gentlemen composing that committee had attended several meetings, and at the cost of no inconsiderable amount of labor had at last succeeded in preparing a complete by-law. In the meantime they had apprised the City Hall authorities that they were engaged upon such a work, and, knowing that preparations were being made for the re-building of some of the edifices destroyed by the disastrous fires which had occurred shortly before, some of them buildings of great extent, and fearing that before they could lay their views in full before the city authorities, permits might be issued for the erection of some of these buildings, without the necessary restrictions which were under discussion, they had submitted an interim communication, presenting those points which the committee regarded as most urgent, and asking the city council to adopt them in the meantime, until they should be supplemented by the complete by-law when the committee completed its labors. The points submitted were discussed by the city committee on Fire and Light, and to some extent adopted, but at the same time some very vital points were not adopted, evidently because very strong interests were brought to bear in opposition to the object the architects' committee had in view. Those desirous of spending the minimum amount of capital and wishing to erect large buildings with undivided areas, and so on, at the very cheapest rate, had been able to so influence members of the city council that the object of the architects' committee was to a large extent defeated. They did, however, succeed in some points, some amendments that were desirable being made to the by-laws, and although the labors of the committee had not brought forth all the results anticipated, he thought two results had been accomplished. First, they had demonstrated to the members of the city council, the fire underwriters, and others, that the Association of Architects was interested in the matter, and fully alive to the necessity of the changes, and that they had gone to a great deal of trouble in order to present their views in a shape convenient to be legislated upon, and, secondly, the action taken had had the effect of bringing the Association more prominently before the public, and presenting in a very effective and tangible form the benefit to the general public of having such an organization in existence.

Mr. H. Paull said he noted in the minutes that any surplus over the expenditure was to be applied to the purchase of books for the library, and he learned from the report of the Librarian that during the year only one book had been purchased.

Mr. Langton explained that the book purchased was a work which was a necessity, but, as a matter of fact, there had been no surplus to apply to that object.

Mr. Gregg called attention to the fact that a committee had been appointed last year to advocate municipal improvements.

Mr. Langton said that the members of that committee were largely from outside of Toronto, Mr. Dick and Mr. Aylsworth being so far as he was aware, the only city members.

Mr. Dick said he was not able to make any report ; he did not remember having received notice of any meetings of the committee in question.

Mr. Langton said he had conversed with Mr. Aylsworth once or twice during the year on the matter, and they had been agreed in believing that the committee could not call a meeting of influential citizens except for an obvious occasion. Their idea was to find some influential person who would become interested in the matter to inaugurate the movement. They had been unable, however, to fix upon any suitable person who would be likely to accept the responsibility.

Mr. W. R. Gregg thought it was very important that this matter should not be lost sight of or allowed to drop, and suggested the retention for the coming year of the same committee, with some additional members, residents of Toronto.

After some further discussion Mr. Gregg moved, seconded by Mr. Townsend, that the said committee be continued for the coming year, with power to add to its numbers. (Carried.)

Mr. Langton said that he had been the mover of the resolution under which this committee was originally created, and that the idea was not that the committee should be expected to accomplish the desired objects within any limited time, but that the objects to be attained were of such a nature that the Association ought to be interested in them, and there ought to be a committee alive ready to act when any favorable opportunity presents itself ; which end would be attained by the resolution just passed.

Mr. Rastrick asked if the resolution applied to the members in outside places, that is, could the members in other places add to their numbers.

The President replied that he understood the resolution to practically have that effect.

Mr. H. Paull suggested the advisability of securing the co-operation of the Canadian Institute, the professors of the University, or any other body which might assist in forming a larger committee, which might influence the municipal authorities.

Mr. Gregg said that under the present resolution the committee had full discretionary power to do anything of that sort which they deemed desirable.

The President thought that the committee was not restricted in its line of action, but could deal with any matter that might arise without anything further being said.

Mr. Burke suggested the advisability of tendering the assistance of the Association in improving the Island Park, in the way of giving advice.

Mr. Gregg said there was a point which was lost sight of last year, the rounding of the corners of Queen and Yonge streets. Had the committee been a very active one perhaps both the corners in question might have been rounded instead of only one.

Mr. Burke pointed out that many opportunities for improvement would be lost unless someone took the initiative, as was the case in regard to one of the corners spoken of, where it was only because of the lack of interest to push the matter that the improvement was not made.

Mr. Pearson, reverting to the subject of the committee on improvements in the building by-laws, expressed himself as not quite satisfied with the report made by Mr. Gordon. He himself was left quite in a maze as to what had been done with the by-law submitted, which seemed to have been taken to the City Hall and there pigeon-holed. He would like a little further information as to what had been done in that matter.

Mr. Gordon said the city authorities had adopted parts of the by-law recommended, and had patched up the old by-law. Of course the by-law submitted by the committee was to some extent a reiteration of much that was in the then existing by-law, only put in a clearer and more concise form, and in some instances with increased stringency. He did not think the matter was by any means a dead issue, and as a result of a paper he proposed reading before the Association during its present sessions he hoped to see, not only in Toronto, but also in outside towns and villages, permanent committees appointed for the purpose of having proper municipal by-laws passed.

The President said that probably the matter was lying in statu quo.

Mr. Gordon replied that that was the case to a certain extent ; it could not be expected that the suggestions made would be adopted in their entirety, because at the City Hall there were so many other things to be considered.

Mr. Pearson thought that in view of what Mr. Gordon said, it would be better to defer further discussion on the matter until he read the paper referred to.

Mr. Wickson then said that it had occurred to him when listening to the very practical address delivered by the President, that if portions of it could be printed and distributed among the members of the Legislative Assembly, it would provide them in a very concise and lucid form a view of the whole question.

The President replied that the matter of legislation was one on which he felt very strongly, and he desired to have a full discussion in regard to it.

Mr. A. E. Paull, in expressing his concurrence in Mr. Wickson's suggestion, said that the President in his address had dealt with the various matters in a very able and admirable manner, particularly in that part in which he dealt with the advantages of architectural education. If not out of place he would move that copies of the President's address be sent to every member of the Legislature.

Mr. Wickson said that a suggestion just made to him by Mr. Gregg seemed to him a good one, viz : that a resolution be passed by the convention to the effect that in the address in question the President voiced the feeling of the Association. The resolution need not necessarily be sent to the members of the Legislature, but it would be reported in the newspapers, and they would see it there.

The President said that a great deal remained to be done before the matter could be dealt with satisfactorily. The action taken in the future would have to be more systematic. In regard to the proposition made, papers sent to the members of the Legislature were not often read, because they were overwhelmed with that kind of stuff. The best way of getting at the members was by having them personally interviewed while at their homes by the members of the Association living in their constituencies. This could not be effected unless the members of the Association took an interest in the matter and were willing to exert themselves. The volume of work to be done was not great, but what was to be done was important. When members of the Legislature came down to Toronto during the session they were very busy, and had any number of men trying to get at them in the interests of various legislation, and they had neither the time nor the inclination to talk, and even when they were spoken to they were apt to soon forget all about what they had heard. But in the country an architect, knowing the member for his district, if he could get hold of him for a short time, could do more than could be effected by any amount of work in Toronto. It was the country members of the Association who must be relied on. The city members he felt sure would do all in their power, but as far as the city members of the Legislature were concerned they were favorably disposed to the objects of the Association.

Mr. Wickson suggested that in addition to sending the proposed copies to the members of the Legislature they should also be sent to each member of the Association.

The President assented to that view, and suggested the formation of a small committee for the purpose of distributing this literature. There had appeared in the CANADIAN ARCHITECT AND BUILDER from time to time articles, portions of which would be valuable, and such a committee might arrange the matter.

Mr. Townsend thought that if members of the Association living in the country would address personal letters to the members of the Legislature in their constituencies, enclosing the proposed matter, it would be more effective than if sent from a central committee in Toronto. Country members might also enlist the sympathy and influence of friends outside the profession who had influence with the members of the Legislature. Indeed, he thought there was hardly a member of the Association in the city who had not a friend somewhere outside who might favorably influence some one.

The President thought Mr. Townsend's last suggestion was a very valuable one. If there were no further suggestions he would now proceed to the appointment of the committee.

Mr. Townsend recommended that the President's address be printed and distributed without mutilation ; he thought selections from it were not sufficient, but that it should be sent out in full.

Mr. Burke was of the same opinion. The main object was to show that the education of the architect was the legislation aimed at, and he thought the address would form an excellent argument for the desired legislation.

The following paper was then read by Mr. Gwynne :

SOME HINTS ON THE LEGAL RELATIONS BETWEEN ARCHITECT AND OWNER.

The first question that presents itself for consideration is the form of the contract between architect and client. Should it be reduced to writing? And the answer is, generally speaking, it need not. But there are two cases in which writing is essential. The first is where the services to be rendered are not to be completed within one year from the date of the contract. This is rendered necessary by the Statute of Frauds, an Act passed in the reign of Charles II, which requires many classes of contract to be evidenced by writing, and was passed as the preamble states, "for prevention of many fraudulent practices which are commonly endeavored to be upheld by perjury or subornation of perjury." The only point to be noted under this section of the Act is that the continuance of the services beyond the year must either be expressly provided by the terms of the contract, or be occasioned of necessity by the nature of the work ; if it may or may not be performed within the year no writing is required. There is a curious case in the early reports in illustration of this point. The defendant agreed with the plaintiff that he would give him 1,000 guineas on his wedding day, if the plaintiff would give him one guinea now. Two years afterwards the plaintiff married and claimed the 1,000 guineas. The defendant set up that the agreement not being performed within the year, could not be sued on as it was not evidenced by writing. But the judges held that the statute only

applied to agreements which are in their terms incapable of being performed within a year, and that there was nothing in the nature of the case before them to prevent the plaintiff marrying the next day. An architect, therefore, who is retained to superintend work which may be completed within the year, need not concern himself to have his retainer reduced to writing, but if by the terms of his agreement or from the nature of the work, his services are required for more than a year, he will not be able to recover his fees by action, unless the agreement upon which action shall be brought, or some memorandum or note thereof, shall be in writing and signed by the party to be charged therewith, or some other person thereunto by him lawfully authorized.

The other case in which writing is necessary is that of a contract with a corporation. It is a rule of the Common Law that a body corporate is not bound by any contract which is not under its corporate seal. There are two exceptions to this rule which I shall mention for the sake of completeness, although they are not likely to concern architects. Contracts with corporations in trivial matters of daily and pressing urgency need not be in writing or under seal, as for instance, the employment of servants, and secondly, in matters which are necessary and incidental to the express purposes for which incorporation was granted, particularly in the case of trading corporations.

To what extent corporations may plead the absence of a contract under seal, when sued, for work or service which they have ordered and accepted, is still a moot point, and was discussed in the Supreme Court as recently as the year 1891, with a very decided difference of opinion. Suffice it to say that in this province, the leaning, if not the law, is to hold corportions liable in such cases, but in England very eminent judges have expressed a contrary opinion. Under these circumstances it is but a wise precaution, to see in all cases of agreements with corporations, that the contract is reduced to writing and sealed.

But this is not the only question to be considered in making agreements with these bodies. We must enquire also whether the proposed contract comes within the scope of their powers, because if ultra vires, no recovery can be had against them notwithstanding that the contract is in writing and under seal, and the corporation has obtained the benefit of the work or services contracted for. To hold otherwise would be a virtual fraud on the shareholders who have subscribed on the faith of the corporation confining itself to the purposes for which it was created. If a company is incorporated for the manufacture of bicycles, it would be manifestly wrong to suffer its funds to be diverted to the operation of a railway.

In contracts with municipal corporations a still further precaution is necessary, for it has been decided that under the Ontario Municipal Act, contracts which have not been carried out, or to use more technical words, executory contracts, can not be enforced unless a by-law has been passed authorizing the contract, even though the seal has been affixed under a resolution of the Council. It would appear, therefore, to be necessary, when dealing with a municipal corporation, that an architect should not merely see that his agreement is under the corporate seal, but that a by-law has been duly passed authorizing the contract with him.

Before passing from this part of the subject, I shall quote the words of Baron Martin, "Persons dealing with those companies should always bear in mind that such companies are corporations, bodies essentially different from an ordinary partnership or firm, for all purposes of contract, and especially in respect of evidence against them on legal trials, and should insist upon these contracts being by deed under the seal of the company XXXXX. There is no safety or security for anyone dealing with such a body upon any other footing. The same observation also applies in respect of any variation or alteration in a contract which has been made."

These words apply with almost equal force to contracts with individuals, and should be borne in mind by every architect who, whether from delicacy or carelessness, neglects to have the agreement with his client reduced to writing, not merely to avoid lawsuits, but as a safe-guard against the misunderstanding which must almost inevitably arise, where the evidence on which contracts are to be established consists of loose and disconnected conversations between persons who are acting under possibly different assumptions.

These remarks are also a suitable prelude to the next question to be considered, as the difficulties which occur arise almost wholly from a failure to observe this necessary but generally neglected precaution. The question I allude to is, the architect's right to payment for his services, and here the difficulties we meet are great, but they arise not from any doubt as to the rules of law applicable, but from the difficulty of applying the rules to the vague and uncertain terms in which the parties are wont to make their agreements. When we remember that it is an almost daily occurrence to find the most conscientious men giving totally different versions of the same conversation or event, it need be no surprise to us if contracts for services which are to be arrived at from a few casual words, are difficult to ascertain with precision, especially when it is possible that one of the parties may have been quite content to leave his liability to inference, for the possible advantage he may thus subsequently hope to obtain. I refer, of course, only to verbal agreements; where the contract is reduced to writing, it is only a matter of construction. It will be well before proceeding to lay down the rules of law which have been formulated in regard to contracts of the nature of those which we are discussing. They are as follows:—

(1). No payment can be demanded for services rendered without request.

(2). If a person employs the services of another, without mention of payment, in matters for which payment is ordinarily expected, he impliedly undertakes to pay a reasonable sum.

(3). Where something is to be done as a condition precedent to a completed contract, no contractual rights or obligations arise until the condition is fulfilled.

(4). No claim can be based on services offered by way of tender, and no obligation arises on a call for services of a like nature.

These propositions you will say are sufficiently obvious, and as general propositions they no doubt are. The difficulty lies in their application. First, no payment can be demanded for services rendered without request. An architect calls on a gentleman who he hears contemplates building, and asks if he may prepare plans for him. The architect spends much time and trouble, and has special interviews with his client, who suggests alterations and evinces the interest usually shown in work done at one's expense; but on submitting the completed work, the architect learns to his chagrin, that his expected client has abandoned the idea of building. The latter swears that he had no idea that he was incurring liability, and the architect is equally emphatic that he had no intention of working for nothing. Under these facts, it is left to the jury to say whether there is a contract or whether it was a gratuitious offer of his services on the part of the architect without any request, and if they conclude it is the latter, no payment can be recovered. Architects would do well to remember that juries are apt to hold the views of the general public in regard to sketches and plans, that they are run off without any cost of time, thought, or trouble, and are of so small account in the eyes of their makers, that if not used, they do not expect to be paid for them, a view for which architects have in some measure themselves to blame, by reason of their readiness to tender their services in much the same manner as I have attempted to show. How then, is this danger to be avoided, a danger which is peculiarly incident to requests for plans? Simply by giving your client to understand that he is incurring liability. Leave nothing to inference and take nothing for granted."

The second proposition which I have laid down is, "If a person employs the services of another, without mention of payment, in matters for which payment is ordinarily expected, he impliedly undertakes to pay a reasonable sum."

The only point here which needs comment is the meaning to be attached to reasonable sum. This expression means neither 7% nor 5%, nor any other percentage, but such a sum as a jury can be induced to think the work reasonably worth. Of course other architects may be called as experts, to give evidence as to the charges usually made for the work in question, but no custom could be proved, that a certain percentage of the contract price of the building is the sum payable for the plans and another percentage for superintending. It may not be amiss to insert here a few words of caution on the question of customs, because I know that many of the architect's most cherished contentions are based on alleged customs. It is an undeniable rule that a custom or usage becomes a part of every contract, whether verbal or written, to which it is applicable, unless expressly excluded by the terms of the agreement. But a custom must be both certain and reasonable, and an unacknowledged one is by no means easy of proof. In cases of doubt is is a far safer plan to express the tegms which are sought to be relied on as a custom, rather than to rely on what laymen are often apt to call customs, where no custom is. As was said on one occasion by Lord Denman, "What can be more difficult than to ascertain, as a matter of fact, such a prevalence of what is called a custom of trade, as to justify a verdict that it forms part of every contract."

My third proposition is, "Where something is to be done as a condition precedent to a completed contract, no contractual rights or obligations arise until the condition is fulfilled." The difficulty here is again one of application; the whole point to determine being, do the words used amount to a condition precedent. The chief, if not the only application of the rule, of interest to Architects, arises where plans are called for, to be submitted for the approval of the owner. This is a matter of every day occurrence; in fact all plans are submitted for approval, but if the approval is a condition precedent, there can be no recovery without the approval, no matter how unreasonable the refusal may be, provided it is based on an exercise of judgment, and not the outcome of mere caprice. But if, on the other hand, there is an order for plans, although subject to the owner's approval, (in the sense that you can not compel him to build a house of which he does not approve the plan and design), in this case the owner will have to pay a proper sum for the work and services, even if he reject the plans, provided they are such as a reasonable man ought to accept upon the instructions given.

In the case which establishes this rule, the wording of the agreement was that the architect should prepare "the necessary probationary drawings for the approval of the committee of visitors," and this was held to mean drawings which shall be approved of by the Committee, and that the plans were not to be paid for unless approved of so as to become useful and available to the county.

If, therefore, trusting to your own ability to please and to your client's honor, you enter into an agreement to supply probationary drawings which shall be approved of by him, you may have all your work for nothing if you fail, and are liable to be dismissed if you do not succeed in a reasonable time. It must, however, be added that doubtful expressions will not be construed as conditions precedent, and the onus will be on the defendant to establish it. The ordinary instructions, therefore, for plans, will not come within the rule, but rather within the second rule, that where work is done at the request of another, if no mention is made of payment, he impliedly undertakes to pay a reasonable sum. There is an American case which aptly illustrates both the point we are discussing and the question of remuneration.

The plaintiffs sued for $170 being 1% of their own estimates. I quote the following expressions from the judgment: "Plaintiffs' theory seems to have been that by employing an architect to make drawings which are not finally determined on, and asking his opinion of probable cost, the employer is bound to pay a percentage on a building such as the architect sees fit to figure out, and at a price which he puts upon its probable cost."

This seems to us an idea which has no foundation in law or common sense and unless such a basis of compensation was specially agreed on, it cannot be allowed.

There is some reason for claiming that if a man is employed to make preliminary sketches, to enable a landowner to determine what sort of building he may profitably erect, in what style and of what material it should be built, he should not do the work without reward, provided such is the understanding. If, however, as the defendant here claimed, the architect volunteered his services with the chances of future employment, it would be different. But it cannot be held that in either case, such preliminary work can be measured by estimates of the cost of the architect's projected building. The only claim plaintiffs could have would be for such time as was actually spent in their work, with the fair understanding that they should be paid for so much as they did, or with such circumstances as would compel defendant to the duty of so understanding; but no custom of architects can be received to fix it on any such basis as is here set up.

It is worthy of note that the judge in this case apparently thought that it was the duty of the architect to see that his client had a fair understanding that the architect expected to be paid or that the facts must be such as to compel him so to understand.

As to the fourth proposition that I have laid down, namely, "That no claim can be based on services offered by way of tender, nor does any obligation arise on a call for services of a like nature," little more need be said than to illustrate my meaning. If an architect offers, even though at the request of the owner, to prepare drawings on the chance of obtaining the work of superintending the proposed building he can maintain no action for payment unless his plans are used. This is quite apart from the question of approval. In fact, although quite satisfied with the drawings the owner may abandon the idea of building without incurring liability, and a public advertisement for drawings of such a nature imposes no obligation to accept any.

How fine the dividing line sometimes is between an order for work and a mere tender may be seen from a case in Lower Canada in which the architect succeeded. Drawings were invited for a church, not to exceed a fixed sum, on the condition that the unsuccessful competitors should receive a certain premium, but the architect whose plans were selected was to receive no premium, but to obtain the work of superintending the building. The plaintiff's plans were approved, but it subsequently appeared that they did not comply with the conditions and were rejected. This would appear to some as near as possible to a case of tender in the hope of being retained if the plans were approved, but the court held that the architect was entitled to recover and allowed him one per cent. of the limited cost of the proposed building.

I fear I have dwelt on this subject of contract or no contract so long as to be tedious. I shall dismiss it with this one remark: although the general proposition that a man is entitled to be paid for his services is admitted, there seems to be an inclination to regard architects' drawings as always tentative offers in the absence of definite evidence to the contrary, thus throwing the onus on him of establishing a contract, as shown by the American case which I have cited.

It is a relief to leave the shifting sands in which we have been endeavouring to pick our steps. Where the parties themselves were not quite sure of their intentions, and have left so much to inference, a lawyer's conclusion on a case submitted to him is likely to be preceded by a series of "ifs"—if your contract means so-and-so, then this is the law; if your agreement were otherwise, then the law is otherwise; and if a law suit follows, and there is, (as is sure to be the case), a conflict of evidence, the verdict satisfies no one, and judge, jury, and lawyers all fall into the same condemnation. Be advised, therefore, and do not fail, either from feelings of delicacy or from confidence in your own powers to give satisfaction or in your employers honour, to have the terms of your agreement reduced to writing; and if the nature of the case is such as to render a formal agreement unnecessary or ill-judged, at any rate write your client a letter, setting forth your understanding of the arrangement, and if he acquiesces, you have a written agreement; and if he does not expressly do so, his silence will be strong evidence of his approval.

There is another point in the making of these contracts in regard to which architects would do well to be wary, I mean in assuming the duty of drawing the contracts between owner and contractors. There is no authority on the subject, but it may safely be assumed that it is no part of the architect's duty, and I am confident that no such custom should be proved. If, therefore, the architect undertakes to draw the contract, whether by or without the request of his client, he assumes work for which he is not paid, unless by special agreement that he should be paid extra. While, however, it is true that in so doing without payment he assumes no great responsibility, being liable probably only for gross negligence, yet if he be paid for it he will be bound to exercise reasonable skill and will be held to a strict account, and that too for work which is not within his province. And it must not be forgotten that the contention that he has not been paid for drawing the contracts would probably be met by the conclusive answer that having undertaken the work, payment is included in the fees.

If, however, at the request of your client, who may be unwilling to incur the expense of employing a solicitor, you agree to draw the contracts, allow me to offer a practical suggestion—see that the contractor reads and understands his contract, otherwise you may find yourself in the unenviable position of being obliged to act as the task master of an unscrupulous man who has no compunction in holding an unfortunate contractor to harsh conditions which he has probably signed without reading. A good instance of this sort of thing is to be found in the case of Jones v. St. John's College, Oxford. In that case the builders undertook to erect and complete a building by a certain fixed day and to execute such alterations as the clerk of the works might order within the time limited for the completion of the contract unless an extension of time were allowed, and in default to pay a fixed sum per day. The builders neglected to obtain an extension. The clerk of the works ordered alterations which it was impossible to complete within the time agreed, in fact the work was not finished until some time after. The owners insisted on the exactions of their penalties, and the unhappy builder was mulcted in a large sum.

I come now to a question which has always been a sore point with architects. Where plans have been prepared, and the architect's fees paid, but the architect is not retained to superintend the building; in the absence of agreement, to whom do the plans belong? This precise point has never been expressly decided. The architect says they are his, and relies upon an alleged custom among architects, that in the absence of other agreement the plans remain the property of the architect. Where the building goes on and is completed under the same architect, little if any difficulty is likely to occur in practice, as the architect gets his full remuneration. The trouble arises when the client by claiming the plans without building, is in effect getting the benefit of the architect's work and knowledge for a much smaller fee than the latter would demand if he had anticipated the result. However, it seems from a case decided in England some years ago, as if the architect's view is not likely to be taken when the question comes up for decision. In the case I refer to, the owner after the completion of the plans determined not to go on with the building, and asked the architect to send in his account and the plans. He refused, however, to give up the plans, setting up an alleged custom among architects, that in the event of an employment of the architect being stopped, he was entitled to be paid for the plans and to retain them. The learned judges in discussing whether such a usage would be reasonable, even supposing it was properly proved, used some pretty stroog language; one of them said that: "It appeared contrary to reason, good sense and justice, that in the event of a contract being put an end to, the architect should retain the plan for which he was entitled to be paid; it would require at least a clearly expressed stipulation in the contract to enable him to do so. The defendant was perfectly justified in refusing to pay until he had the plans. The execution of and the plans themselves formed the work and labor for which he charged the defendant, who was entitled to them if he had to pay for them."

Another judge was even stronger. In his opinion the usage contended for was impossible; he could not help saying that it was perfectly suicidal; so soon as it was brought into being it cut its throat with its own absurdity. "In all common sense," he exclaims, "a man is entitled to what he is compelled to pay for." Before usage could be insisted on, it must be proved to be one well known to prevail. It required the most rigid proof that it actually existed.

I have cited this case somewhat at length, by way of illustrating what I have already said as to the difficulty of proving an alleged custom, and also to show the strong leaning of the Court against this custom in particular; and although, as you will notice, this case does not actually decide the point as to the ownership of the plans, it must be admitted that it trenches very strongly on the architect's position. What it does actually decide is that when an architect agrees to prepare plans and to superintend the erection of a building for which he is to receive a certain percentage in respect of the plans and a certain percentage for the superintendence, if the owner, not having bound himself to build, abandons his intention after the preparation of the plans, the architect cannot recover his charges for the plans without delivering them to his client. Whether the latter can subsequently use them, and in so so doing employ another architect, was not decided. To do so would probably have been a violation of his agreement to employ the plaintiff, for which he would be liable in damages. As far as we can judge from the report, he had entirely abandoned the idea of building. But I do not think that the judges meant so to restrict the effect of their judgment. If so, why the indignation at the architect's contention? If they thought that all the defendant was entitled to was the barren possession of the plans, the emphatic language with which they denounce the architect's refusal to grant so useless a privilege was out of place. They seem to have been clearly of the opinion that the defendant had bought the plans out and out. Perhaps if the architect had been able to put aside the agreement and sue for a quantum meruit, as it is called, that is to say, for a reasonable amount for the time and trouble spent in the preparation of the plans, the result might have been different. However this may be, the broad proposition asserted by architects, that in no case do the plans become the property of the client, seems untenable. It has the appearance of an artificial endeavor to get over a difficulty to which they are liable from the very nature of the case. No doubt it is a hardship that your work should be used by others than those who pay for it, or for other purposes than you originally intended, but it is a hardship to which other professions are also liable. If I employ a celebrated painter to execute an order for me, it would be absurd to contend that the only right I possess in the picture is the right of enjoyment. The truth is that the painter is surrounded by the natural protection arising from the fact that the painting is his production and his only, and no copy can be the same thing. But a copy of an architect's plans are quite as effectual as the original, and being deprived of this natural defence, he is driven to assert a claim which in the other case is admitted to be absurd. Nor is the illustration weakened by the fact that the Legislature has seen fit to afford further protection to pictures and other such works of art, by copyright. This merely serves to show that the hardship which is admitted to exist can only be remedied by legislation, and not by the assertion of a custom, which is apt to ignore the fact that

in protecting its exponents, it in some cases works a correlative injustice to the other party by giving him absolutely nothing for a very fair fee. However, there is no reason why this should ever be more than a theoretical difficulty, if architects were to take the precaution of inserting in their contracts a provision that in any event, the property in the plans remains theirs.

Before leaving the subject of the plans, I may mention that it has been decided that the employer does not guarantee to the contractor the feasibility of the architect's drawings, and in a case where the contract provided that certain caissons to be used in the building of piers, were to be made of the materials and in the form shown by the drawing, it was found that the proposed method was unworkable, and another plan had to be adopted, and although the contractor was put to a good deal of extra expense, he failed in an action against the employer to recover the amount. He would have been equally unsuccessful in an action against the architect, because of the want of privacy between them, and the suit would have been dismissed without coming to a hearing. The rule is that no action for a wrong can be maintained, unless the wrong complained of arise out of a contract or from the violation of a duty.

The extreme limit of this doctrine will appear from a case which has the appearance of working great hardship, if not of doing a real injustice. A person who proposed advancing money on a loan by way of mortgage on a building, wrote to the firm of valuators employed by the owner, telling them of his intention and asking their opinion on the value of the buildings, and the advisability of the loan. The valuators, by gross carelessness, gave too large a value, and the mortgagee suffered a loss in consequence It was held that he could not recover against the appraiser. It will be noticed that there was no contract between them; the defendants had merely given a gratuitous opinion, on which the mortgagee might act or not, as he pleased, and that there was no duty imposed by law on the defendants to show any degree of care towards the plaintiff, as long as they avoided actual fraud. Applying this rule to the architect's specifications, it follows that a builder cannot obtain redress, should he suffer loss by relying upon them; he must satisfy himself before tendering of their feasability.

I have left as the last question for discussion, what is perhaps the most interesting of all, namely, the owner's right of action against the architect for negligence. Until lately the views of the public and of the profession have diverged on this question, quite as emphatically as on the right to the plans, but recent decisions in the United States have happily set the architect's position on a better footing.

The lay view may be stated somewhat as follows: An architect is retained to see that the builder carries out his work properly, and if the builder scamps his work or makes a mistake, the architect must pay for it, because this is what he is retained for; in other words, that the architect guarantees the competence and good faith of the builder and his men.

The architect on the other hand submits that even if perfect accuracy were possible, to insure this he would have to be in constant attendance at the building, and even in two or more parts of it at the same time, and that the remuneration he receives would be no compensation even for the less difficult of these tasks.

The layman's view, it will be noticed, assumes that any imperfection is conclusive evidence of negligence, while the architect says, "I admit my liability for negligence, but it must be brought home to me on the facts of each particular case."

The difference between these two views is fundamental, as will presently appear. In the English cases we have very little to help us on this point, perhaps because the architects there are better advised than to bring the actions which are common enough in the States and in this Province, or perhaps because English architects are more careful. The general proposition which the law lays down is this: Every professional man guarantees that he possesses a reasonable degree of skill in his profession, and that any work entrusted to him will be carried out with reasonable care, and he is liable in damages if he fails to display such skill and care, and loss ensues to his client. The utmost skill attainable is not required of him, but only a reasonable amount, and this will differ according to circumstances. If I employ a village architect whose highest flight has, to my knowledge, been the village inn, to build a concert hall, I cannot complain if the acoustic arrangements are defective.

But in the matter we are now discussing, the question of liability generally depends, not so much on the degree of skill displayed, as on the care shown, or, rather, absence of care, that is to say, negligence.

In one of the American cases to which I have referred, the contract with the mason provided that he should lay out his work himself. When the wood was nearly completed the sills of the front first-storey windows were found to be set 2¾ inches higher from the floor than those of the rear windows on the same storey, although they were intended to be on the same level. When the finish was put in, the trim of the windows cut into the plaster cornice, injuring the appearance of the room. In a suit by the architect to recover his charges it was referred to a referee, who found on the evidence that the plaintiff had bestowed as much personal attendance upon the building as was necessary, and that the variations mentioned were not caused by carelessness, negligence or inattention on his part. This decision was reversed by the Superior Court, but restored by the Court of Appeals. The Court said, It, (the defect), arose from the masons not having accurately conformed to the specification and plans. Was the plaintiff responsible for the fault of the masons? The plaintiff agreed to make plans, sections, elevations, and specifications, and to superintend the progress of the building to be erected. It was not his duty to do the work. I do not think it was the duty of the plaintiff to measure the joists or timber of which the different storeys were to be constructed, and to determine by actual measurement that the ceiling of the first story had an elevation of 13 feet, and the second had an elevation of 11 feet, or to measure the thickness or depth of the brick or stone walls. The defendant however contends that the obligation of the plaintiff to superintend the progress of the building bound him to discover and correct the error committed by the mechanics. The plaintiff did assume the superintendence of the erection of the building, and must meet the obligations of his contract. The plaintiff came from day to day to superintend the progress of the work, and while thus superintending was he bound to have ascertained that the window sills in the front parlor were 2¾ inches higher from the floor than was authorized by the plan? He, (the referee) found that the plaintiff had bestowed as much personal attention on the building as was necessary, and that the variations mentioned were not caused by carelessness, negligence, or inattention on his part. I do not find it necessary to differ with him."

I take the liberty of quoting from the judgment in another New York case, in which the question is discussed if possible with even greater clearness than the last.

"The learned counsel would not claim," says the judgment, "that an architect is bound to spend all his time at a building that is going up under his professional care, so that no fraud or negligence can be committed by any of the contractors. The counsel would not contend that the architect is an insurer of the perfection of the mason work, the carpenter work, the plumbing, etc. He is bound only to exercise reasonable care, and to use reasonable powers of observation and detection in the supervision of the structure. When therefore it appears that the architect has made frequent visits to the building, and in a general way has performed the duties called for by the custom of the profession; the mere fact, for instance, that inferior bricks have been used in places, does not establish as matter of law that he has not entirely performed his contract. He might have directed at one of his visits that portion of the plumbing work he packed in wool. Upon his next return to the building, it might have been covered with brickwork in the progress of the building, If he had enquired whether the wool packing had been attended to and had received an affirmative answer from the plumber and the bricklayer, I am of opinion that his duty as an architect in the matter of the required protection of the said pipes from the weather, would have been ended. Yet under these very circumstances, the packing might have been intentionally or carelessly omitted, in fraud upon the architect and owner, and could it still be claimed that the architect had not fully performed his work? The learned counsel for the appelant is in effect asking us to hold that the defects of the character above named, establish as a matter of law, that the plaintiffs have not fully performed their agreement. An architect is no more a mere overseer or foreman or watchman than he is a guarantee of a flawless building; and the only question that can arise in a case where general performance of duty is shewn, is whether, considering all the circumstances and peculiar facts involved, he has or has not been guilty of negligence. This is a question of fact, and not of law.

It is perhaps necessary to add that in this case the architect had not given his final certificate, and left the building with this manifest defect in it. He had, in fact, refused to give the contractor a certificate, and the owner had settled with the latter in spite of this. But the judges refused to base their decision on this ground. They treated it as a question of negligence or no negligence on the part of the architect, but you will notice that from the peculiar facts of the case, the point for their decision was this, Did the failure of the architect to detect the error at the time it was made establish negligence? The referee had found no negligence, and the Court refused to differ with him, thus treating the alleged negligence as a question of fact and not as an inference of law.

Let us consider now how the architect's liability for negligence has been dealt with in this province.

I find a case referred to in the October number of the CANADIAN ARCHITECT AND BUILDER. The plaintiff, who was obliged to sue for his fees, had been employed to superintend the erection of an hotel in a country village. The defendant set up that there was a defect in the building for which the architect was responsible. The defect complained of was a slight sinking of the floor in the centre of the building, and showing in one of the principal rooms and the main hall. The amount that the floor was out of level was one-thirteenth of an inch to the foot one way, and about one-sixth of an inch across. No plaster was cracked, no doors bound, and no inconvenience of any sort was occasioned. From the report of the case, it does not appear that evidence was adduced to show that the architect had been sedulous in his attendance at the building, nor does any evidence appear to have been offered to prove the contrary, but it was shown that the architect had himself levelled the ground floor joists when they were laid, and left them true and level. The judge, in summing up the evidence, said that undoubtedly there was a defect in the building, and he gave judgment for the plaintiff with costs, less a sum which it had been shown it would require to raise the floor and make it level.

Here we have a case in which the judge was evidently imbued with the idea that wherever a defect occurs, the architect must pay for it. That is to say, in direct violation of the principle laid down in the cases which I have cited, he regarded the mere existence of a defect as conclusive proof of the architect's negligence. Assuming the case has been accurately reported, one would think in the absence of evidence showing that the failure of the architect to discover the error was due to his want of skill or neglect of duty, and no such evidence appears to have been offered; that he had faithfully discharged his duty in levelling the joists himself, and seeing that they were true and level. If architects are to be held to so strict an account as this, their only safety will lie in employing a clerk to be in constant attendance at the works, and putting the charges up accordingly.

If in an action by a surgeon to recover his fees, he were met with the defence that the operation which he had performed had left an unsightly scar, it would be rather a startling conclusion, if the judge without any evidence of negligent or improper treatment, were to lay down the proposition, that as the scar undoubtedly existed, the surgeon must reduce his charges as compensation to the defendant.

But on the other hand, it must not be forgotten that a judgment in a decided case is only of authority for the precise point there decided, and that while the principle laid down by the American cases to which I have referred, seems to be sound and to establish all that architects need reasonably ask, it would be very dangerous to act on the illustration given in one of them, as a rule of practice. I refer to the judge's opinion in the case put by him of the pipes which required to be packed in wool. There are times no doubt in the erection of a building, where the architect's attendance is required to be more frequent than at others, especially where work is being done which can be speedily covered, and it may well be that a jury would be justified in finding negligence, in spite of the most careful enquiries on the part of the architect to ascertain the truth, if at such times work were improperly done during his absence and covered; and again the defect might be so great and the neglect so gross as to justify an immediate finding of negligence which could not be upset by any amount of evidence of careful attention to his duties on the part of the architect. But if the principle laid down in the State of New York finds acceptance in Ontario, architects have the satisfaction of knowing that their liability for negligence will in future depend on the facts of each particular case as established by the evidence, and not on any preconceived idea of his duties in the minds either of judges or juries.

At the conclusion of the paper the President expressed the pleasure and satisfaction he had had in listening to it, and tendered the thanks of the Association to Mr. Gwynne.

Mr. Dick, in seconding the vote of thanks, said that Mr. Gwynne's paper was a very valuable contribution to the literature of the Convention, and when published in the CANADIAN ARCHITECT AND BUILDER would enable architects to avoid many of the pit-falls and snares to which they were exposed. While listening to it he had been impressed with the idea that the life of the architect, like that of Gilbert & Sullivan's policeman, "was not a happy one," because he was always exposed to two fires, the client on the one hand and the contractor on the other. There seemed to be a good deal of uncertainty in the law, and in many cases the decisions seemed to hinge a great deal on who was the judge. There was a certain amount of consolation for the architect in the paper, however, in regard to his liability for defects in workmanship, or for careless, slovenly or scamped work. In regard to the question of the ownership of plans, it seemed to him that where a proprietor paid a recognized fee of two-and-a-half per cent. he was fairly entitled to the plans. He thought it was fair and right that architects should retain copies of plans for their own future reference, but where a client paid the two-and-a-half per cent. which was recognized as the value of preparing plans, he thought it was not unreasonable that they should become his property, especially where he abandoned the idea of building. Of course if the architect believed he was going to be employed to superintend the work at the full commission, and then the owner, under the impression that he could get the superintending done cheaper, should say, "I will pay you for the plans," it would be a rather shabby thing on the part of the employer, though he did not know that morally the architect had very much ground for complaint as long as he got his fair proportion. These commissions, while purely arbitrary, were after all a very fair way of arriving at the value of certain services.

Mr. Langton said he was glad to think that the general drift of Mr. Gwynne's advice to architects was hopeful; that the trouble which was sometimes encountered in settling with clients, and at times, when driven to the last resort, in obtaining a verdict from a jury, could be obviated by taking a little pains in the first instance to give a clear understanding of what the architect expected to receive. In regard to the ownership of plans, it had always seemed to him that the owner had a right to plans, but there ought to be some means of preventing him from regarding the plans as his property to be used again, as for instance, where a design has been supplied for one house and the proprietor subsequently puts up a row. He thought some rights ought to be reserved to the architect in his plans, although no doubt the owner had a right to receive that for which he had paid.

Mr. Burke said that architects when settling up with clients were frequently met by a request that now the building is finished he will hand over the plans. He thought experience dictated the handing over of the plans, because an architect might leave the country, and in a year or two if the plans were wanted they could not be obtained.

Mr. Baker thought the plans without the specifications did not amount to much, as they would not be very intelligible to a builder without the details.

Mr. Dick related an instance where there was a stoppage of the drains in a house, and when the owner who possessed plans was asked where they were she did not know. He thought that was the usual state of affairs. He had understood Mr. Gwynne to say that a proprietor did not guarantee the infallibility of the plans to the contractor, and he would like to know how far that principle applied, because in some instances it might work rather a hardship on the contractor. Suppose a foundation wall was designed too thin to carry the wall above it, would that be a case in which the owner of the building might call upon the contractor?

Mr. Gordon said the question of responsibility was a very broad one, and there was one aspect of it which might be mentioned. There might be points in connection with the drainage or other details which might be covered up, and on which the architect might certify, and the whole transaction be closed as far as the proprietor and contractor were concerned. A year or two after something might transpire which would disclose to the owner for the first time, and also to the architect, that there had been crooked or negligent work on the contractor's part, and the point might be raised that it was the duty of the architect to have investigated. As they all knew, the responsibility of an architect was by no means ended when he was paid his account. The case he had supposed was not at all a fanciful one; he thought there was no architect in the room who was not cognizant of such cases. He did not know of any instance in which an architect had actually been sued, but they had been threatened, and it certainly appeared as if they were open to proceedings. It had always appeared to him that there must be some way of wording the final settlement between proprietor and contractor which would, at least to some extent, protect the architect against these unforseen contingencies, and he thought it was time very close attention was given to the form of both progress and final certificates in order to attain that end.

Mr. Wickson said that in some forms of contract it was specially stated that the final certificate did not exonerate the contractor from liability.

Mr. Gordon suggested that in the meantime the contractor might have failed in business.

The President then put the motion for a vote of thanks, which was carried very heartily.

Mr. Gwynne, in acknowledging the vote of thanks, said that with regard to the last point raised, it must be borne in mind that no general proposition of law could be laid down, each case always depending on its own state of facts, but if as in the supposed case a defect subsequently appeared, it became simply a question of whether such defect was due to the architect's negligence; and the greater the length of the period between the erection of the building and the discovery of the latent defect the greater the difficulty in showing that it was due to negligence, and the more difficult would it be to succeed against the architect.

Mr. Helliwell said that before the subject was dropped there was another point he would like to raise, that was the difference between the duties of an architect and a clerk of the works. In the erection of larger buildings it was usual to employ a clerk of the works who spent his entire time on the building. The supervision of such a man must manifestly extend further into the minor details than that of the architect. He thought if the distinction between the duties of an architect and those of the clerk of the works was more sharply brought out it would prove beneficial to all concerned. It ought to be clearly understood that the architect was only responsible for the general supervision of the work.

Mr. Townsend said he had adopted a course which he thought quite covered the whole question of the ownership of the plans, remuneration and many other points, that was to send his clients a copy of the little pamphlet containing a schedule of fees and other conditions of service and ask them to read it over, as being the terms under which he would act.

The President said he had done the same thing, and in one instance a client had signed the pamphlet.

Mr. Pearson said he would like to refer to the clause in the contract providing for the payment of a penalty by the contractor for the non-completion of work by a specified time. He believed that it was held that to succeed under that the owner had to show actual damage sustained by reason of not having the building at

the stated time. In conversation with the solicitor for one of the railways, that gentleman had suggested as a better way of arranging it that the builder should receive a certain sum if the building was erected at a certain date, if not completed by a certain later date also specified, a smaller sum, thus reducing the amount to be received by him as the time was prolonged. He would like to hear a little discussion on that point.

Mr. Wickson wished to know to what extent an architect was supposed to keep track of this matter. If a client goes to the architect and inquires whose fault it is that the work is behind, the architect may say it is none of his business to know. To whom can the client look? It was his own practice to keep a diary, making note of the progress of the various works almost every day, and he had given a client who made such inquiries a copy of that as nearly as he could. The client afterwards told him it was the most non-committal letter he ever got, but he did not know that he had a right to give him even that information. It was always a very awkward matter to say just who was behind.

The President said he thought the best way was to leave the drawing up of the contracts in the hands of lawyers, because the architect had quite enough responsibility without that.

Mr. Baker had found the bonus system to work well, generally resulting in getting the work through in good time.

Mr. Burke said the difficulty was where there were different contractors for the various trades to locate the blame for delays; he had found it almost impossible to do it.

Mr. Langton said an architect very often found himself bound to carry out what was really an injustice. Where a man had a time contract to carry through, and he was thrown out of his arrangements by delay on the part of those who had preceded him he could no longer do it for the same money, and might very justly say, "I cannot afford to do this work as quickly now as I could before."

Mr. Wickson said he had mentioned that very point to a client, and the client's reply was, "The man should not have been such a fool as to sign the contract."

Mr. Wickson's resolution regarding the printing and distribution of the President's address was then carried, after which the meeting adjourned until Wednesday morning.

SECOND DAY.

The proceedings of the Convention were resumed at 11 o'clock, by Mr. W. A. Langton reading some "Notes of an Architectural Tour in England and France."

Mr. Langton's paper which was illustrated in a very interesting and instructive manner by stereopticon views of the examples referred to, was received with much interest, and called forth very hearty expressions of approval.

Mr. Townsend opened the discussion by saying that he thought the lesson inculcated by Mr. Langton's address was, that there should be on the part of the architect less striving after originality in order to show what he could do, more common sense building and less architecture. He thought that applied more to residence designs than anything else. The speaker had told them what probably many of them had noticed, that in London and Paris the best work was that which was simply the outcome of an intelligent appreciation of and supplying of what was needed in each case. For instance, the building by Mr. Norman Shaw which had been illustrated was simply a square building which, while preserving good proportions throughout, placed the rooms and windows where the proprietor wanted them. Other buildings in which a great effort at display was attempted they had been told were not successful, and he thought that would always be found the case.

Mr. A. E. Paull expressed his gratification at the manner in which Mr. Langton had handled his subject, and suggested that if on a future holiday trip Mr. Langton could visit Vienna, where he thought greater strides had been made than in either London or Paris during the last generation, and at a future meeting of the Association give them the results of his observations there in a similar form, it would be highly instructive and beneficial. It was said that Vienna had more valuable architecture than any other capital in Europe. He had very great pleasure in proposing a vote of thanks to Mr. Langton for his very valuable contribution.

Mr. Townsend, in seconding Mr. Paull's motion, remarked that the members of the Association ought to endeavour to impress the lesson of Mr. Langton's paper upon their clients in residence work; he thought if they could be induced to take into consideration the value of the court it would have a very beneficial effect.

The President, in closing the discussion, said one of the principal lessons to be learned was the cultivation of a feeling of restraint among designers, and a sense that every other man had some rights which ought to be respected. It would be impossible to have a street satisfactory from an architectural point of view if every man insisted upon building as if his was the only house upon that street. New York was said to possess some fearful examples of the disregard of this principle; charming residences were found standing between two monstrosities. Abroad the cornice lines and the main lines were run as far as possible in accord with those on either side of them. He was aware that the problem was surrounded by very great difficulties, but at least an effort should be made in the desired direction. Mr. Langton had said that what most impressed him in Paris was the prevailing color. Owing to that feature the individual house was lost sight of, it was the whole street that gave the impression. Here it was unfortunately the case that even where two buildings side by side were being erected at the same time men would not take the trouble to inspect each other's work, or find out what the other man was going to do. He advocated the casting away of all little, petty jealousies, and a united effort to promote a more uniform style of building.

The vote of thanks to Mr. Langton was then carried unanimously.

A paper was then read by Mr. Andrew Bell, of Almonte, on "Building Stones of Eastern Ontario."

Mr. Bell's paper was followed by an adjournment to an adjoining room, where samples of the various kinds of stone were inspected, and conversation indulged in by the members regarding them in relation to Mr. Bell's address.

Mr. W. R. Gregg, seconded by Mr. Belcher, moved a vote of thanks to Mr. Bell, which was carried.

The Convention then adjourned for luncheon, which was served in the building.

AFTERNOON SESSION.

In the afternoon the first number of the Agenda was a paper by Professor Ellis, on "The Chemistry of Paints."

Professor Ellis's contribution was not committed to writing, but he spoke as follows:

"Being practical men, the members of this Association will expect me to treat of the practical rather than the aesthetic side of this subject, which, however, is one that lends itself readily to treatment from either point of view, because paints are decorative and protective. It is from the protective point of view I am going to speak. Of course, when you change your point of view, the whole subject in this respect is entirely changed, because from the decorative point of view the pigment is everything, while from the protective standpoint the oil is everything, and the pigment is of no importance except in so far as it hastens or retards the process of drying.

It will of course be understood that my remarks must of necessity be of a general character. The use of paints as a protective arises in this way. The cause of decay we will speak of (because we know it is to timber that paint is most commonly applied) is the growth of mushrooms in the timber. Now, we know that when a man wants to grow mushrooms he first

obtains a mushroom spore, and then selects a warm, damp spot in a cellar, out of the light, and provides a bed of decaying organic material and there sows his mushroom spore. He maintains a moderately warm temperature, and then the mushrooms will grow and multiply. Now we know that decaying wood is nothing but a decaying mushroom bed, we know it decays because the mushroom spores get into various lodging places in it, and there develop, and in the act of so growing disintegrate and destroy the wood. Therefore, in order to preserve wood from decay, all we have to do is to prevent the mushrooms from growing in it. Of course I do not mean edible mushrooms, but plants, whether large or small, of the same botanical nature as the mushroom which grow and are propagated in the same way, by means of minute spores.

If you take an ordinary mushroom and lay it on a piece of paper when it is ripe, an impalpable powder will drop from it on to the paper. These are the mushroom spores. These, when submitted to suitable conditions, warmth, moisture and, preferably, darkness, will grow. In fact the requisite conditions are very much the same as required to germinate grain. Therefore the first thing to be done in order to preserve timber is to exclude these spores, and if you succeed in doing so it will not rot or decay. I will assume that the spores are not in the wood when it is cut. That being the case, if it can be completely covered in such a manner as to prevent these minute particles or spores from gaining access to it, then it will be preserved indefinitely from rot. If the spores are in the wood when cut they can be destroyed by exposure to a sufficiently high temperature, and then the entrance of other spores can be prevented in the way I have already stated. The spores may also be killed by applying anything that will poison them, and various antiseptic solutions have that effect. The spores have a very considerable resistance to deleterious agents; they may be frozen, dried up, and so on, and and still will come to life again, but they can be destroyed by heat and by many antiseptic solutions, such as corrosive sublimate, creosote, etc.

In order to protect wood, if it can be covered over with a substance which does not afford nourishment for these spores, and which they cannot penetrate, it may be preserved. Now oils and fats have long been regarded as preservative, in this way. It is found that oils vary very much with regard to their behaviour when spread in a film over any surface. Some oils are practically unchanged, others become changed into a hard, somewhat elastic, insoluble substance something like India rubber or leather. These oils are known as drying oils, and of these drying oils the one which shows those characteristics in the most marked degree is linseed oil, while olive oil may be taken as an example of the other class. Here is some olive oil and some linseed oil which have been spread on pieces of glass and exposed to the air at a temperature not far removed from that of boiling water. That temperature was adopted simply to accelerate the drying process, the result is better obtained by exposing them to the ordinary temperature. You will notice in these specimens that the olive oil is unchanged, it is just exactly as it was when placed on the glass, while the linseed oil has become a hard and firm film or coating on the glass. That is the way in which drying oils behave, and it is that which gives them their value as protectives. Oils when fresh are very soluble in ether, for example, but after drying, the drying oils become insoluble in ether, while the non-drying oils have their solubility unchanged, so that the nature of the oil is profoundly affected by the the drying process. The film is elastic, and resists moisture, and therefore anything which is coated over with this film cannot be effected by moisture.

Now I pointed out that drying up would not destroy the mushroom spores, but so long as they are kept dry they will not grow, so even if they are present in the wood they will not grow so long as they are kept dried up. This film therefore serves a double purpose; it forms a waterproof coating for the wood, and prevents the entry of the spores from without. Of course if the wood is moist when the paint is put on, it will keep it moist, but if the wood is dry it will keep it dry.

Now, what I propose to discuss is, what is it that causes this difference in the behaviour of drying and non-drying oils, so far as they are known to science, which is only in part. The first point is that the change is due to oxidation; the drying oils oxidize when exposed to the air, while the non drying oils do not. This can be shown in various ways. For instance, if they are kept at an ordinary tempetature for some days in thin films like this, these drying oils increase in weight, and the others do not. You know that certain oils when exposed on a large surface to the air will combine with the oxygen of the air so vigorously that they catch fire. For this reason it is well known that greasy cotton waste frequently becomes a dangerous element. The reason for that is that the cotton waste is saturated with it and a very large surface exposed to the air, and the oxidization produces heat which ultimately sets fire to the oil. Drying oils are very much more likely to ignite under these conditions than non-drying oils. Experimentalists have found that by taking cotton waste and soaking with non-drying oil, and heating it to a little below boiling water it may be made to take fire in an hour, while drying oil would not take fire under those circumstances until after being very much longer exposed to the heat. It has also been found that this oxidation of oils can be hastened by blowing air through them, and it is by raising the temperature. For instance, if oil is heated to 130° C and a current of air passed through it, it undergoes changes which make it dry much more quickly. In what is called "boiling" oil, oil is heated to 130° C and over, and a certain portion of the oil is decomposed, and the resulting product will dry very much more quickly than raw oil. Then, again, it is known that certain substances when they are mixed with oil, either during the boiling or afterwards, have the property of hastening the drying very much. These substances are called dryers. Some of these substances are black oxide of manganese, red lead, litharge, oxide of lead, these assist very much in drying the oil. Oxide of manganese is well known to be a substance which gives off oxygen very readily, and red lead also gives up oxygen."

Professor Ellis then, using the blackboard, gave a number of chemical formulæ illustrating the action of the various drying substances in connection with oil.

Proceeding, he said, "Now it is a well known fact drying in paints depends not only on the oils, but the different colors exercise considerable effect upon the oil. Of course it is easy to see how red or white led would hasten the drying process, because we have seen how that it is effected with the oil. White lead is known to dry well, and it probably undergoes some similar change, and it probably forms the same kind of oxide that red lead does. I asked Mr. Elliott the other day to give me a list of the colors that dried well. The quick drying ones are yellow ochre, chrome green, zinc white, white lead and sienna. The slow drying colors are lamp black, madder, prussian blue, lakes, carmine, and with these latter Mr. Elliott told me it was necessary to add dryers in order to make them dry. The colors which dry well are almost all mineral oxides, while those that dry slowly are organic compounds. They have a tendency in chemical reaction to take away the oxygen, and therefore it appears that these colors hinder the oxidization in that way, while mineral colors assist them."

The President inquired if color were no object, would oil alone be better?

Prof. Ellis replied that it would not.

The President further inquired whether if a mixture is to be made, red lead was the best thing to use with the oil.

Professor Ellis said that probably some substance mixed with the oil would make a better covering than the oil alone, but he was not prepared to say that red lead was the best substance, because it was desirable that the substance used when once dry should be as unchangeable as possible, and lead was certainly not such a substance. Oxides of iron, such as ochre, were

very unchangeable, a priori he would say they would be very good materials to mix with oil.

Mr. A. F. Paull inquired if Prof. Ellis could recommend anything for the prevention of dry rot better than corrosive sublimate.

Prof. Ellis answered that so far as he knew corrosive sublimate was the best thing to use to destroy the spores. Of course paint did not destroy the spores, but merely assisted in keeping them out, and as soon as it cracked they could enter through the cracks.

Mr. Gregg, following up the question put by the President, asked whether the same objection that had been spoken of as to red led existed when the red lead was used for priming for which it had always been understood to be a good substance and two or three coats of another color applied afterwards.

Prof. Ellis answered that he thought it did not; he had only mentioned the objection to red lead because it was more liable to change, and was not so permanent as other colors.

Mr. Dick said that in the earlier part of his lecture Prof. Ellis had made some very practical remarks in regard to the properties of timber. An illustration in connection with this occurred to his mind, and no doubt others present had met with the same thing in the course of their work in the case of a warehouse, for example, where a row of columns was run through the length of the building and a beam resting from column to column, just resting upon each column. The difficulty to be contended with was, that this beam was a little unsightly if left in its natural condition; while, on the other hand, if painted, it was well known what consequences might be expected. Generally speaking in a not very long time rot would be found somewhere in that beam. He presumed from the warmness of the building and the natural moisture not being dried out of the timber, this mushroom growth spoken of by Dr. Ellis set in. He supposed the spores must have been present in the wood in the first place. He had often himself, and he supposed others had done the same thing, left beams just as they were, unpainted, for a year or two, until they were thoroughly dry, and then had them painted. It had occurred to him that it might be a good thing to leave such a beam unpainted for a year or two, enveloping it in the meantime in cotton batting, until it has become thoroughly well seasoned. The effect of the cotton wool, he thought, would be to filter the air that reached the beam and retain a great many of the spores in the cotton. It would be worth trying as an experiment he thought. Whether the rot was caused by the mushrooms spoken of by Dr. Ellis, or some other organisms, he did not know, but the fact was undoubtedly that in every case where beams were painted the rot sooner or later made its appearance.

Mr. A. F. Paull asked Mr. Dick if he thought that such a beam as would be required to sustain a number of joists in the way suggested, if left in its natural state for two or three years, would then be sufficiently seasoned to admit of its being painted with safety? Professor Barlow, whose works were published, and who had made experiments with regard to the seasoning of timber extending over fifteen or sixteen years, had discovered that at the end of that period the seasoning process was still going on. If Prof. Barlow was right the prevailing opinion was that wood became sufficiently seasoned after two or three years to make it prudent to apply paint was wrong.

Mr. Dick thought practical experience had demonstrated that in most cases two or three years was a sufficiently long period for the beam to get seasoned in, but Mr. Paull was quite right in saying that wood scarcely ever ceased from the process of seasoning. He knew of a case where an old deal table which had been in use for some twenty years in a building insufficiently warmed by the ordinary stoves had been moved into a new building heated by steam, and it had not been there very long before one day it went off like a pistol shot, cracking its entire length.

The President related an instance which occurred in England, in which some old beams taken out of a church were sawn up for another purpose, and they afterwards both warped and cracked, and if anything might be expected to be thoroughly seasoned certainly those beams might have been.

Mr. Belcher remembered a case where an old hardwood floor was taken up, the boards re-dressed, the joints shot, and the floor re-laid, the joints being cramped up perfectly tight, the boards dowelled together and everything left perfectly tight. About two months after it was found that one might almost put a penny piece between the joints of the boards in places. He attributed this to the fact that the old flooring had been left out of doors for a short time during the process of the work, which occupied about two weeks, and had absorbed moisture. The floor he had no doubt was at least two hundred years old.

Mr. Townsend said one of the great difficulties architects had to contend with was that of not being able to get what they specified, particularly in the matter of oil. He understood from what Dr. Ellis had said that the value of paints depended almost entirely on the quality of the oil used, and if Dr. Ellis could give some rapidly applied test, by which, without any deep knowledge of chemistry, an architect could ascertain what was a good sample of oil, he would be conferring a great favor on the members of the Association and the profession at large. Another matter which he had been perplexed about was the presence of turpentine in paint, as to whether it had a deleterious effect.

Prof. Ellis said he could not give the desired assistance in regard to testing oil, but unfortunately the testing of oils was one of the most troublesome things a chemist had to do. Of course anyone accustomed to oil would be able to tell by its physical properties, and could form a very fair idea, but the chemical tests of oils were among the most awkward and troublesome things he had to handle. In regard to turpentine, he did not know of its having any injurious effect except as a diluent. Of course from a practical standpoint he knew less about these matters than his hearers, but what he understood was that the turpentine when it evaporated left the oil behind it in a kind of crystalline residue, leaving the paint in a form similar to the figures of salts left on a piece of glass when a solution is allowed to dry off. The term "crystalline" he did not of course use in its strict sense, and it was misleading, because oil is so very much removed from being anything like crystalline in its structure.

Mr. Langton asked if he was right in understanding that the fungi referred to could do no harm except where in addition to being damp it was also dark.

Prof. Ellis said they grew better in the dark.

Mr. Langton inquired if they would be likely to grow in a room such as that in which the convention was being held?

Prof. Ellis said they would in the centre of the timber.

Mr. Langton said that as the only object in painting wood above the cellar is to keep it from being affected by variations of dampness and dryness which make it warp and crack in an unsightly manner, in places where a few cracks are of no consequence as in the timber of a church roof, the best thing would be to avoid filling, and use water colours merely to disguise the discoloration of age, because otherwise one might be keeping in the dampness which produced the growth of the fungi.

Prof. Ellis said that as a general statement that was no doubt right. Spores would grow where it was damp, they would not grow where it was dry. The application of oil paints constituted a waterproofing, and if there was dampness in the wood before it was painted the painting would have the effect of retaining it there, but if the wood was dry and the coating remained impervious, it would keep dampness out.

Mr. Power said he thought a very good test of oil was to place a sample on a sheet of glass and leave it in a room at a temperature of about 68; if it formed a film, or dried in about twenty four hours it might be regarded as fairly good, and one might judge of its deterioration in quality by the time it took longer than that to dry. Another point was that an oil in which you had to put much turpentine was not a good oil. The older

the oil, the longer it had been allowed to stand, the more turpentine would be required to make it workable. The only object of turpentine was to make the paint flow, and where an excess of it was necessary for that purpose it was deleterious to the paint. He would like to know if Prof. Ellis would recommend ochre and oil as priming, the ochre to take the place of the commonly used red lead.

Mr. Aylsworth said he had gathered from what Prof. Ellis had said that ochre would be better than anything else for priming. In regard to the seasoning of timber his opinion was that kiln drying opened the pores of the wood more than the ordinary seasoning, and that when taken out of a kiln and put in a building it absorbed moisture. He believed this might be obviated if it were possible to lay floors in rooms already finished and warm. He knew of one instance where that had been done, and the floor was tight. Of course that was not practicable in the case of putting in flooring in a new building, where it would absorb moisture. He had heard carpenters say that they had made floors from green lumber cramped up tight, and that they would not open up as much as when made of kiln dried lumber.

Mr. Pearson asked if the pigment in paint did not assist as a preservative? In regard to the use of turpentine in paint, he had always had the impression that it produced blistering.

Prof. Ellis, replying to the questions which had been asked, said that what he had suggested was that there was more chemical union with red lead than with ochre, which caused it to dry faster, but which was the best paint he would not undertake to say. In regard to the blistering of paint, that was probably produced by the evaporation of the turpentine. In regard to the matter which had been discussed about the shrinkage of wood, especially the instance where the timbers had been taken from an old church and sawed up, he would suggest the possibility that wood which had been dry for a number of years was in a condition of strain, and when cut up yielded to it. He thought it probable that the effects referred to were due to some such cause as that rather than from any further change in the drying of the wood.

Mr. Gordon said he was sure all had been greatly interested and instructed by Prof. Ellis's address and the resulting discussion, and moved a vote of thanks to Prof. Ellis.

Mr. Dick had great pleasure in seconding the motion, which was carried.

Professor Wright then gave a talk on the Aspect Compass, illustrated by examples and diagrams, which excited much interest, and for which a vote of thanks was tendered him.

Mr. H. B. Gordon then read the following paper:

MUNICIPAL BUILDING LAWS.

The necessity for wise municipal building laws, efficiently administered, is evident to all who take an intelligent interest in building operations. Unfortunately, the enactment of such laws is generally delayed until gross evils are so multiplied that their efficiency is greatly impaired unless they can be made retroactive. Usually nothing in the way of sanitary supervision is attempted until long after a system of sewerage and water service has been in operation. Meanwhile many property owners ignorantly or unwittingly install in their buildings much that forms an unsanitary menace to the occupants and their neighbours. Generally, not until a severe fire has swept the central portion of some town, does it occur to its ruling authorities that some sort of building restrictions would be a general benefit. Possibly not till after the collapse of some building and the consequent loss of life, is the public conscience so awakened as to enact that the greed of speculators and the ignorance of architectural tyros must be subordinated to the safety of the people.

Very rarely, if ever, does the aesthetic sense of the voting public or their representatives, run the extravagant length of deciding that the nonarchitectural monstrosities proposed for the adornment of their streets, might be the better of a little intelligent revision by a competent public officer.

It therefore rests very largely with the members of this profession to impress upon the public the necessity for such laws; to urge their adoption in all our towns and villages; to seek their improvement where now existing; to loyally respect their requirements; and cordially co-operate in their enforcement.

Architects should remember that their natural desire for a free hand for themselves necessarily implies a free hand also for the speculator and jerry builder. Desirable building restrictions will not in any way hamper the operations of a true architect. The existence of wholesome regulations should be of great help to the profession in dealing with niggardly or unscrupulous clients. And no true man should want to override or set aside a law for the general good.

The scope of municipal building laws may be roughly divided into four branches, viz.:

1st, The safe constructional requirements.
2nd, The necessary sanitary restrictions.
3rd, Provisions against the spread of fire.
4th, Public aesthetic problems.

Some portions of such laws should be universal throughout the province; others must necessarily be determined by local conditions. A law or laws compelling the adoption of some of the general principles of safe construction should be provincial and general. The size and character of foundations to buildings, and the weights with which various soils may safely be loaded, is as applicable to the village as the metropolis. The thickness of walls in relation to their height and the weight of floors to be carried, is as necessary for the safety of life in the mill in the country as in the warehouse in the city. The safe load that may be imposed upon a beam or a joist does not vary with its urban or suburban position. The support to a superincumbent shop front is as important a problem in the village street as it is elsewhere. Indeed the necessity for some clearly defined building laws for small municipalities appears to be even more urgent than for larger places. In the former, the work is generally planned by those who lack theoretical knowledge of the strength of materials and the equilibrium of forces.

Fortunately there is a growing tendency in the smaller places towards the employment of trained men in the designing of their more important structures. But who that has observed the waste of materials on the one hand and the perilous experiments of skimping on the other, can fail to foresee the advantages of some plain general enactments that will guide and control all building.

Such a general law might well include the following, viz.: A statement of the safe sustaining power per sq. ft. of the various kinds of soil; an outline of the correct method of forming footings; a description of what must form the necessary kind of foundation walls, piers or posts under the various classes of buildings; the thickness and character of external and sustaining walls and piers; the strength of floor joists and beams; the sizes, kind and position of posts and beams carrying floors or walls; needful provision against wind pressure on high roofs, and other items of general safe provision; regulations for the repair or removal of dangerous buildings; general tables stating authoritatively the compressive and transverse strength of the commoner building materials; and the factors of safety to be adopted in their use.

There might also be a general classification of buildings according to their purpose and use, with special requirements adapted to each class; for example, churches and places of public amusement should be required to have ample provision for exit, and the stairs and passages proportioned to the audience. The floors of mills, stores and warehouses should be proportioned to carry much heavier loads than other structures. Provision against vibration in factories should be demanded. Regulations for the size and position of stairs in hotels and factories should be provided. Also general conditions to be observed in all buildings of certain classes that exceed a minimum height.

These suggested points, as well as others, might well be embodied in some general law; but pending such, it is clearly the duty of each municipality to protect the public by such reasonable restrictions. In addition to such general requirements each town or city may need special enactments for the public safety, such as regulation of the construction of light areas and their protection; points to be observed in utilizing the vault space under public sidewalks; the disposal of water from roofs; the protection of elevator shafts, and many other points.

Under the head of sanitary restrictions some laws might be made of general application to the entire province; while a more stringent law should be applicable to those municipalities having public sewerage and water supply.

A foul cesspit contiguous to a dwelling and but shortly removed from a well that supplies drinking water is a menace to health in the scattered village as well as in the more thickly peopled town. Unconsciously back venting a cesspool by a badly constructed drain from a country house, is quite as likely to produce diphtheria as an untrapped connection from a town residence to the street sewer. A filthy pan closet in a country hotel is quite as objectionable as its town cousin in a more pretentious hostlery. The abolition of privy pits and the substitution of a more sanitary contrivance is vastly more important in the village street where domestic water is drawn from the adjacent well, than in the more closely built town with its public waterworks.

In municipalities that are inaugurating a public water supply and sewerage system, the necessity is very urgent for the immediate enactment of sanitary building laws. Citizens who in their united capacity spend tens of thousands of dollars to provide such public conveniences should see to it that the benefits thus obtained are not neutralized by unsanitary drains and plumbing, and that their last state is not worse than the first. Nearly every town has its tinsmith plumber who proceeds to nullify the benefits of public sewers and water supply by ventilating the public sewer into the houses of his confiding patrons.

The general requirements of a sanitary building by-law are so well known as scarcely to require notice here: the correct alignment and trapping of all drains and soil pipes; the provisions for ventilating pipes and for preventing syphoning of traps; the material and character of all pipes used and the method of making joints; the class of fixtures allowed; the provisions for the efficient inspection of all parts and for the testing of the whole system. These and other points are well known to the practising architect and the city plumber. But alas, how limited is the knowledge and experience of the tinsmith plumber aforesaid, and his confiding patron; and how great the need for some explicit law to guide the one and protect the other.

Under the heading of "Provisions against the spread of fire," there is also much that might be of general enactment. It is surely as important for the country homestead to have a certain thickness of brickwork around its smoke flues and the chimney tops carried well up above the adjoining gables as it is for the town or city house. Negligence in the one case will likely result in the total destruction of the home, while in the other, a timely visit from the neighbouring fire engine may extinguish the blaze before much damage is done. One can hardly understand how a village or small town that spends thousands of dollars in the equipment and maintenance of a fire brigade, does not make the first effort to prevent the recurrence of serious fire risks by passing a suitable building law. Nor is the action of the authorities of larger places much more intelligent. We have the example of a large city, after very destructive and repeated fires, neglecting the advice of a committee of architects who pointed out at length the the amendments of the law necessary to check a recurrence of the disasters.

The amount of money lost by fires in one year in Ontario, is enormous, and much of that loss is attributable to negligent and unscientific building operations. The unthinking may pass this over by remarking that the insurance companies pay the most of the loss, and that an occasional fire is necessary to keep up the peoples' interest in insuring. They forget that the insuring public have to pay the whole, and that insurance rates bear at least some proportion to the risks run and the loss sustained.

Some look to the insurance companies, to demand better building regulations, and no doubt they might do much in this direction. Their action in making their rates bear some relation to the efficiency of the fire brigade and fire extinguishing apparatus of a town, has quickened the movements of many a Council. Were the same pressure brought to bear in insisting on the enactment of rigid building by-laws, many a town councillor would awake to his duty in this respect. Some who have given this subject much thought, advise that the insurance companies classify buildings more definitely, and rate them more distinguishingly in regard to the material and manner of their construction.

The movement is in this direction and it is helpful to the architect as well as his enterprising client. But the usefulness of such a distinction is much curtailed by the character of surrounding buildings which may have been put up regardless of the fire risks they contain.

A general law for the whole province might cover such matters as: the manner of building chimneys, hearths and fireplaces; the location, protection, and isolation of steam boilers, furnaces, forges, etc.; the insulation of hot pipes, the proper disposition and insulation of electric wires; the isolation of buildings containing extra hazardous contents; special regulations concerning the construction of theatres and other places of public amusement. And it would be well to have the erection of all hotels over a certain height, no matter where built, subject to some clearly defined rules of construction for the prevention or slow spreading of fire. It seems only reasonable, that everywhere, those who wish to build within a certain limit of the boundary of their property, should be under some restrictions, so as to prevent them creating a serious fire risk to endanger their neighbours' property. In towns and villages as well as in cities there should be some limitation as to the class of buildings allowed on the more thickly built streets.

Each city and town will require much more in their by-laws regarding fire protection.

The local conditions will largely determine whether the division of a town into zones in which the restrictions are graded, is desirable or not. The majority of important American cities make no distinction. As a tentative measure it is probably desirable in our young and scattered municipalities.

The central business and crowded part of a town requires more stringent regulation than the outlying districts. All parts however should be under some governing regulations, as it is foolish for any town to have a zone in which people can do as they like in the matter of building.

Some limit should be placed on the external use of wood, and the size and location of wooden sheds and stables should be regulated.

It will be found that even in the residential parts of a town, a fairly stringent building law will work for the ultimate advantage of the locality. "Brick buildings only," is not a severe restriction when their continued preservation is considered.

The kind of roof covering that may be used is an essential matter. The rapid spread of fires is largely attributable to the inflammable nature of the surrounding roofs. Wooden dormers and cornices are another prolific source of danger, and their construction and covering should be restricted or regulated. The size and description of party walls and of parapets above roofs are questions for necessary legislation, as many a serious fire has been checked by efficient walls.

The structure of stairs and their surroundings should be safeguarded with wise restrictions, not only to prevent the rapid extension of fire, but also for the safety of life.

The enclosing walls of elevator shafts are deserving of much more attention than they usually receive in building laws.

Special restrictions are desirable for all buildings over a certain height, so that they may not prove towering fire giants, to spread brands of destruction in every direction. It is regarded by many as only right, that all buildings over a certain height should be built as fireproof as modern conditions will allow.

In defining the special requirements for the different classes of buildings, it is desirable to have a classification with accompanying definition clearly setting forth what is intended by buildings of a certain class.

The following six fold division is suggested:

1st. Public building class, including all places of public assembly, that have audience rooms capable of seating more than a certain limited number.

2nd. Hotel class, including hospitals, asylums, and lodging houses accommodating more than a certain number.

3rd. The Manufactory class.

4th. The Warehouse class.

5th. The Office Building class.

6th. The Dwelling House class.

It will occur to all that structures of the public building class require special regulations for their construction and maintenance, that the audiences may be protected in case of fire and panic.

Buildings of the manufactory class, as well as the hotel class, should have stairways protected from rapid firing, and suitable fire escapes easily accessible.

The restriction of the undivided floor area of warehouses and factories is a wise measure, provided that exception is made in favor of buildings constructed on so called fire proof or slow burning principles.

Building by-laws should contain clauses dealing with the question of repairs or alterations to existing buildings. These should state the percentage of value of allowable repairs to old structures that do not comply with the by-laws; and the basis of valuation from which this percentage is to be determined.

By-laws can only be made definite and explicit by containing a glossary of the terms used throughout their enactments. The importance of this is evident to all who have had to interpret building laws.

How essential it is to have a clear statement of the datum line from which the height of walls or buildings is to be measured, to know just what is intended by first story, and what is a basement and what a cellar; to be sure that your idea of the maximum or minimum height of a story will not conflict with that of the official administering the law; to know what is meant by bearing wall, division wall, party wall and partition wall; to solve the seemingly simple question of what constitutes a mansard roof; to have settled without cavil, what is mortar? what is cement mortar, and what is cement? and even to be informed which ton is meant when such weight is mentioned.

It is when we consider the last or aesthetic side of building laws, that debatable ground is fully entered. Here unartistic democracy puts down its foot and forbids further restriction.

The abstract aesthetic question of having the fronts of all houses in a line at a certain distance from the street, arouses no enthusiasm. But let a concrete case arise where some selfish men obtrude their buildings so far forward as to thrust their neighbours into obscurity, and those who suffer are likely to be interested in a proposed remedy.

The public may not appreciate the beauty of curtailing the height of buildings to some proportion to the width of the street upon which they are built; yet they might apprehend the justice of not allowing some men to completely overshadow the light and air of their neighbours.

If people will tolerate unsightly projections of signs, oriels and cornices, so long as it is merely an aesthetic question, possibly they may protest that space belonging to the public is occupied by private parties.

Ordinarily men do not care to be tied to a building line or allow some of their property to be regarded as a boulevard, but who that has visited Washington and other cities, where such regulations are in force, can help being impressed by the result.

It is only by comparison with what has been done elsewhere, that we can educate the general public to a sense of the needs at home.

What would have been the result if each of the architects of the Chicago World's Fair buildings had been allowed to work his own sweet will without a concerted action or critical oversight, may be left to the imagination. What they did accomplish under wise restrictions as to height of cornice line and general style of design, the Court of Honor bore witness.

Possibly we may never reach the aesthetic status of some continental cities where the street front architecture on important boulevards is subject to the approval of a public official; but the enactment of some effective, if less stringent by-law in this direction, should be the desire of all lovers of architecture.

A building by-law would not be complete without some regulations to be observed during the erection of buildings, such as, the proportion of the public street that may be occupied by building materials; the protection and convenience of the passing public by covers and sidewalks; the height and manner of scaffolds abutting on the streets; the protection of open areas and excavations; the erection of temporary sheds, engines, etc.

Any by-law, however complete, will be a comparative failure without efficient administration. So secure this a really first-class man must be appointed as inspector of buildings. Only such should be appointed to this important position to protect the lives and property of the people and oversee so much that tells for the safety, comfort and enjoyment of the masses. To get the right man in the right place is often a difficult matter when the reach of aldermanic influence is at work. The one who is really competent will not seek the office. The position ought to seek him.

Some one ought to be appointed, who besides a practical experience in the supervision of buildings is competent to make the necessary examinations, calculations and decisions both theoretical and practical in all matters pertaining to the by-laws. He should be a man incorruptibly above reproach, and while courteous to all, firm and just in administering the spirit of the law. Such a man should have discretionary power to modify the provisions of the by-law where there are practical difficulties in the way of carrying out the exact letter of the law, so long as the spirit of the law is observed, the safety of the public secured and substantial justice done. His duties should include the examination of the plans and specifications of all proposed buildings, to determine if the contemplated work is in accordance with the building by-laws; the granting of permits for the execution of such work; the examination as often as practicable of all buildings in course of erection; the examination of all buildings reported as dangerous; and the prosecution of all who infringe the by-laws.

A permit should in all cases precede building operations, and to obtain it a copy of both plans and specifications should be filed.

The specification is necessary to inform the inspector of the character of material and the method of construction. The filing of both plans and specifications is essential for reference as the work proceeds. By the sun print process copies of the plans may easily be supplied. Architects should not grumble at such extra trouble, as they will doubtless find that such requirements tend towards their being more frequently employed.

The foregoing suggested points, together with much that naturally accompanies them, when properly amplified, clearly stated and systematically arranged, should form the basis of municipal building laws.

They may serve to point out the desirability of enacting building laws in small towns and even villages. They may suggest some necessary amendments to existing by-laws in other places, and may convey some ideas favourable to the passing of a provincial act.

If their perusal stimulates the members of this Association to active efforts for the improvement of building

regulations, this short paper will have served a useful purpose.

Prof. Wright at the conclusion of the paper said that while this paper is intended to deal mainly with the fire by-laws, in the early part a reference is made to a factor of safety which should be extended, especially with regard to wood, as there are apparently conflicting ideas before the profession. On the one hand we have a factor of safety of two regarded as sufficient, and so long as the views of the author are observed fully it is perfectly safe, but if this factor is applied to the results of the determinations of the modulus of rupture from other sources it is not safe. This might be explained in this way on the one hand we have a low modulus of rupture with a low factor of safety, giving the same working fibre stress as the higher modulus with the higher factor. This low modulus of rupture above referred to has been obtained by basing conclusions on the results of experiments which are generally rejected.

Again, it is well before using the results of any experimental research to observe fully the method under which such determinations have been conducted. For instance, after an elaborate set of experiments Prof. J. B. Johnson has established a relation between the percentage of moisture in a beam and its strength. So that having given the strength of a beam and its percentage of moisture it is possible to calculate what its strength would be with any other percentage of moisture. You will find these results and others equally valuable published under the direction of B. E. Furnow, by the U. S. Department of Agriculture Division of Forestry. These results, you will find, are very extensive and reliable and are the most advanced determinations of modern scientific research.

I should like to say a few words on that much vexed question of Portland cement. At the outset let me say that most architects and too many engineers draw up elaborate specifications regarding Portland cement and accept the material from the manufacturer without any examination as to its qualities whatever. Now from the very nature of the process of manufacture this material is liable to very great fluctuations, and for that reason alone it requires careful watching to say nothing of the danger proceeding from middlemen who are willing to doctor the cement for a few paltry dollars. I have examined within the last year several large shipments which were absolutely worthless simply so much sand, or worse still, containing a large proportion of lime. These shipments of course were condemned, but you may feel sure they found their way into work where no examinations were made. Now I suppose the reason this neglect of testing is so general is because you have been led to believe a laboratory with a full equipment a necessity. While this may be true as far a thorough knowledge of the material is concerned, yet you may find out a great deal in a very simple manner. If you would mix a small quantity of cement with water and after it is set place it in hot water at a temperature of 110 F. if at the end of 48 hours it remains solid, adheres to the glass and keeps a sharp edge, you may feel fairly sure that it will not go to pieces on the work. With a small pair of scales and a fine sieve you could easily determine the fineness of the grinding. A cement which would not fail on glass in hot water and was fine, leaving only a small residue, might with safety be regarded as a fairly good cement. If in conjunction with this you determined its tensile strength you would be quite safe in your opinion.

The discussion of Mr. Gordon's paper was then proceeded with.

Mr. Gordon suggested that a resolution should be passed something to the effect, "That this Association, being impressed with the desirability of having some general building law applicable to the whole province, and also local and municipal building laws for each town and city, resolves that a standing committee of five members of this Association be appointed by this convention, with instructions to formulate a general enactment of such desirable building laws, and that the committee correspond with architects and others of kindred professions in the various towns and cities to secure such co-operation as is possible for attaining this object." He begged to move that resolution, and thought it very desirable that the project should be attempted.

Mr. Burke seconded the motion.

Mr. Dick pointed out that while there was danger, on the one hand, in allowing too much latitude, leaving people to do as they choose, and incurring thereby danger both constructive and sanitary, yet, on the other hand, there was danger of going too far in the direction of paternal legislation, by making the building laws deal so much with detail that they would almost take the place of a building hand-book, and put it in the power of people to say that where so much was determined by law there was no necessity for skilled architects. Of course all knew that building by-laws, or any other kind of laws, would never make architects in the true sense of the word. If building by-laws were made more strict than was absolutely necessary it had a tendency to deter people from building, because building was done generally as an investment, and if the cost of building was made excessive so that the returns from a building would not pay interest, capital would be chary of going into building operations.

Mr. Power quite agreed with all Mr. Dick had said, especially that the matter of legislation in that line might be overdone.

Mr. Gordon explained that he quite agreed that it was necessary to act with caution and discretion in regard to this matter. But at the same time he thought the Association ought to take the initiative in devising some active means of remedying the evils which existed. There were municipalities in which people were alive to these evils, and were endeavoring to cope with them, and who ought to be assisted in their endeavours. These people did not know just how to proceed, and had not the knowledge to enable them to grapple successfully with this problem, and there ought to be some committee to whom they could apply, and therefore he wished to see this committee appointed. It was the duty of the Association to educate public opinion in these matters, and that could be best done by appointing a good strong committee to exercise their judgment in regard to the matter. He thought such a committee would have enough common sense to avoid the evils which had been mentioned, and to know that the same law which was applicable to Toronto would not be adapted for some little village or town.

Mr. Dick stated that he did not for a moment intend to raise any opposition to the appointment of such a committee, on the contrary he was prepared to vote for the adoption of Mr. Gordon's resolution.

Mr. Power also stated that he did not for a moment question the correctness of what Mr. Gordon had said, and he was in the same position as Mr. Dick.

The President did not think there was any danger of any such legislation as that suggested being carried too far, for the most they could hope for would be that a very small portion of their recommendations might be adopted. How far we should go, he thought, might safely be left to the committee appointed.

The resolution was then carried.

The election of the members of the Council was then proceeded with, and resulted in the election of Messrs. Burke and Lennox, of Toronto, and Mr. Power, of Kingston, as the three new members of the Council.

Mr. Langton then moved that the thanks of the Association be tendered the Hon. the Minister of Education, for permitting the use of the School of Practical Science in which to hold the convention, and to Professors Galbraith, Wright and Ellis, for their very kind assistance in making the convention a success.

Mr. Burke having seconded the motion, the President tendered the thanks of the Association to those of the gentlemen named who were in the room, stating that if half the members of the Association would help as heartily as those gentlemen had done, especially Prof. Wright, the conventions would be even a greater success than they had already been.

The convention then adjourned.

FLYING SHORES AND BUTTRESSES.

[COMMUNICATED.]

THE present condition of the architectural profession may be briefly and prosaically stated thus: It comprises all those men who design and superintend buildings and a large number of others whose business consists in the ordinary transactions with reference to house property and valuations. In fact, the field is so varied and extensive, as though the knowledge necessary to befit an architect was only of secondary importance, and left the holder of this title ample time for study and the practice of other businesses and professions that are in a measure connected with it, that we find many styling themselves architects, valuators, civil engineers, sanitary and ventilating engineers, etc. Architecture is a profession that can hold its own without the support of all these flying shores and buttresses. It has always appeared to us to be a feeble method to adopt to strengthen their position and to ensnare the unwary client with these high sounding and empty titles.

Upon what ground do these men lay claim to these titles? There is no law in the land to prevent a tinker claiming that he is a ventilating engineer as far as that goes, but an architect, if he is an architect, has made a study of it, and is supposed to have some knowledge of these branches of the building trade with which he has to deal. "Ye cannot serve God and mammon." If a man is an architect he is but a poor civil engineer, and vice versa. Surely if a man wants to employ an architect, he will go to an architect if a civil engineer, to a civil engineer not to a weak admixture of both.

Apart from the time and study necessary to obtain any degree of competency in either profession, art in architecture and art in engineering, although they are both ultimately striving for the same goal, have each to make concessions one to the other before the happy combination may be reached; and this result will never be obtained by these half-masters of both and master of none.

There are monopolists in commercial life, and some of these monopolists have proved successful, but we fear these aping professional monopolists will fall to the ground between so many stools.

There is one other buttress that occurs to us, that these professional monopolists have overlooked; Why not Architect and Solicitor? There would be just as much sense in assuming this as in assuming the others, for in the practice of the profession legal difficulties sometimes occur—questions of boundaries, of ancient lights, rights of way, of conditions of contract, and of many other kinds possible present themselves. We make no question but that this buttress would also have been seized upon had it not been that the law is a close profession.

What are the duties of an architect, that these gifted individuals have mastered and found time to study and make themselves expert in other professions? In judgment he is expected to be a better mason than a man who has spent all his life in working stone, a better carpenter than a man who has handled lumber all his days, a better plumber, a better plasterer, a better painter, a better glazier, etc., than anybody who has devoted his life to any one of these particular trades. This is only a small part of what the public looks for and expects from an architect. He might be proficient in all these branches and yet be no architect at all, for his primary business as an architect is not merely to know, but to place, to invent, to adapt, to be incessantly conquering fresh difficulties, not by lavish outlay, but economically, gracefully, and in a refined manner. That these architectural difficulties are conquered in this way is the exception rather than the rule when we take into consideration what an architect is expected to know. To-day he is called upon to build a bank and he must make himself familiar with every detail of the banking business; next week he must make himself perfect in all the knowledge pertaining to tanning, and a month later he must enter heart and soul into the manufacture of bicycles. All this he has to do, not as a barrister has to do it, just far enough and deep enough to talk about it plausibly to convince a judge and jury, but in a way that will stand the test of practice and of fact. His bank must be arranged so that every facility is offered to clerks and public on the most economic principles; his tannery must be capable of turning out real leather, and his bicycle factory arranged with all the latest improvements with no waste of space or labour. Then the man who builds churches or private houses has not only the practical questions of convenience to deal with, but the whole world of architecture as an art besides. When he is familiar with all trades, expert at all sorts of planning and arrangement, he is next expected to add to all this knowledge and all this skill as much artistic faculty as would by itself make the fortune of a painter and sculptor. For this artistic faculty a liberal public never dreams of paying him. It generally offers him the same percentage for building churches as for building cow-sheds, and cannot repress its astonishment when its churches are not built with the perfection it desires. It is also an imperative necessity that the style he adopt for his building should be that which every spectator prefers, since anyone who is not pleased will assuredly lay the fault on the architect's want of ability rather than on his own want of judgment.

The conduct of the works is equally simple, as all that is required of him is that he should be able to answer at once every question that is addressed to him and to decide definitely there and then the best mode of procedure. In his supervision of a building, all that is needed is that he should be omnipresent. Every one who is employed feels that it is the architect's business to watch him, and if he can scamp a bit of work without detection it is on the architect the real shame and disgrace of it all will be. The architect ought to have been here and everywhere at once, and then such things could not have happened. Still the architect's duties are not yet ended. The builder's accounts still remain to be made up. Every item which he did not foresee before the agreement was signed rises up against him as an accusing extra; every detail which he revised and re-revised to make it more perfect does the same; every day which he spent at his own cost improving points of planning and construction, does the same; and now instead of being thanked for his care and thought, he is blamed for having kept the building back and running up a bill of extras. These extras must now be gone into in detail, all the deductions and additions measured up in the manner of measurement peculiar to each trade, and the architect must know to the fraction of a cent the value of each particular item, and these claims must be finally adjusted to the satisfaction of the client and contractor.

Time and space fail us to enlarge on the multifarious duties imposed on the architect, but the foregoing remarks will enable us to form some idea. As was before stated there is sufficient ground to cover in the field of architecture without monopolizing an expert knowledge with other businesses that have an indirect connection with architecture.

What argument could prove a stronger incentive to the profession at large, than this, to put forth every effort to obtain the passing of the Act when the word Architect shall have a recognized standing. Then all these flying shores and buttresses that have been found necessary to bolster up the profession may be dispensed with. The course of study then prescribed will embrace those branches of the building trade in so far as they are necessary to an architect in the exercise of his profession, and it will be then only after several years of hard work and close application and an applied test that one can assume the honorable title of Architect, and there will be no further need of this arrogating of empty titles which every Tom, Dick and Harry can assume.

The annual meeting of the Standard Drain Pipe Co., of St. Johns, Que., was held on the 13th inst. Mayor Trotter was re-elected president and Capt. Coursol, vice-president.

The Prismatic Glass Co., of Toronto, are manufacturing a new and meritorious article for pavement lights, extension sky lights, illuminating ornamental windows, etc.; particulars of which will be found in our advertisement pages. The Company have recently sold 5,000 pieces of double prism sidewalk lights, amounting to five tons of glass, for use in the new Ogilvie Building, Montreal.

FIRE RESISTING STRUCTURES.

THE destruction of the Manhatten Bank building in New York has directed attention to a weakness in the steel skeleton structure, and has shaken faith in the fire resisting qualities of such buildings. A late fire in Chicago, in which two similar buildings were demolished, has further called attention to the matter. It is established that in such buildings, even if the material will not burn, it will warp with the heat to such an extent as to bring them down, and that although the iron work may be covered with a fire resisting material absolute protection is not guaranteed. In the case of the Manhatten bank building it should be stated, however, that the floor beams were not completely covered with the fire-resistant, the lower edge being flush and only protected by the plaster finish. The building was erected some years ago and previous to the passage of the regulations on this point now in force.

As a result largely of their experience at these two fires, Chiefs Bonner and Sweenie, of the New York and Chicago fire departments, have declared these tall sky-scrapers to be huge fire traps, especially when their contents run largely to inflammable materials. They pronounce in favour of buildings of brick and yellow pine. In such the fire burns more slowly, and there is better chance of saving the contents. The opinions of such men should carry much weight. It seems probable that the insurance companies will advance the rate on such buildings, in which event the greater premium will be a serious tax on their income and increase the expense of tenants, making that class of building much less desirable as an investment.

THE LATEST.

The Prismatic Glass Company,

OF TORONTO, Ltd.

Manufacturers under "PENNYCUICK PATENTS" of all kinds of

Prismatic Window Glass

and Double Prism Sidewalk Lights.

Send for Catalogue

N. T. LYON, MANAGER

141-143 Church Street, TORONTO

Isn't it Better?

to get the best at first than to "put up with" or have to tear out a poor and unsatisfactory heating apparatus.

OXFORD

Boilers and Radiators

For Hot Water or Steam . . . .

Always give perfect satisfaction

They are made in enough varieties of size and style to suit the loftiest public buildings, or most modest dwellings, equally well.

Their mechanical excellence represents 52 years of experience and experiment. We are satisfied that these are the best Boilers and Radiators that money can buy.

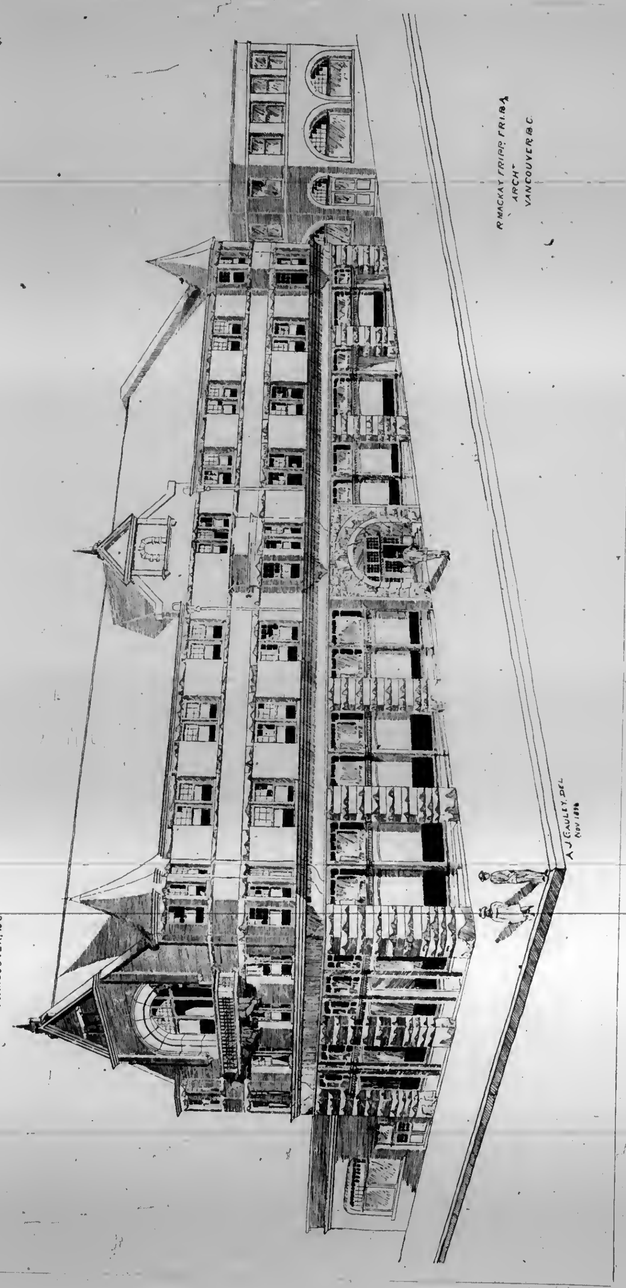
Send for our Catalogue; our prices are right.

The Gurney Foundry Co., Ltd., Toronto

The Gurney-Massey Co., Ltd., Montreal

TORONTO SKETCH CLUB COMPETITION FOR MANTEL.
DESIGN BY T. R. JOHNSTON, AWARDED FIRST POSITION.

TORONTO SKETCH CLUB COMPETITION.
DESIGN BY W. PERCY OVER, AWARDED FIRST POSITION.



R. MACKAY FIIIBR. TRIBA. ARCHT. VANCOUVER B.C.

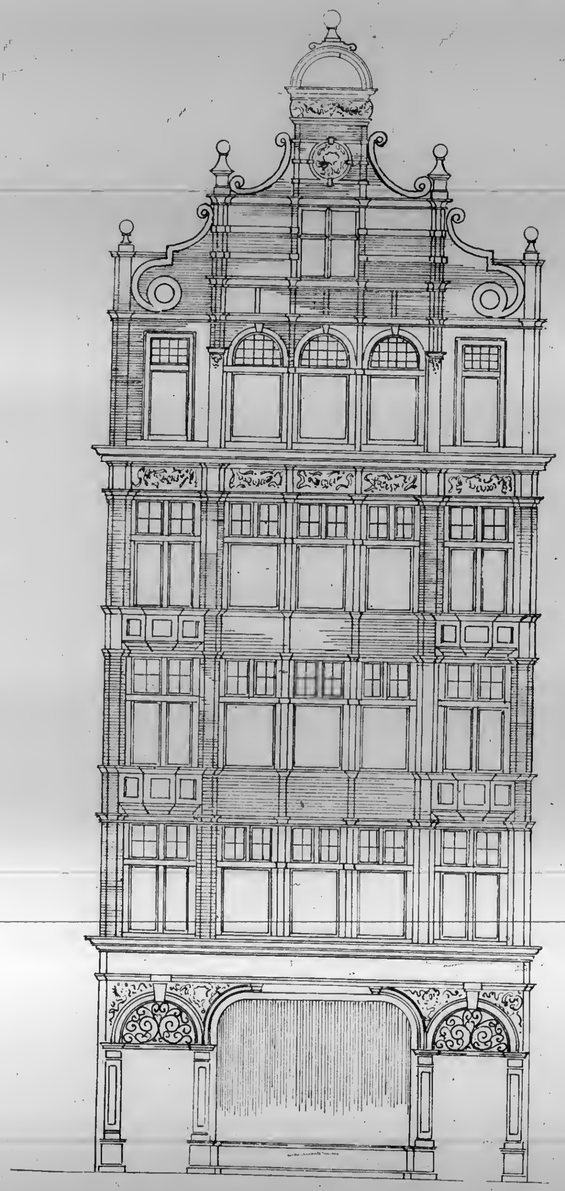
A.J. CAULEY DEL. NOV 1896

BLOCK ERECTED ON THE CORNER OF GRANVILLE AND PENDER STREETS FOR MESSRS. MACKAY AND MATHESON, VANCOUVER B.C. AS HEADQUARTERS FOR THE CANADIAN PACIFIC RAILWAY COMPANY'S STEAMSHIP AGENCY.

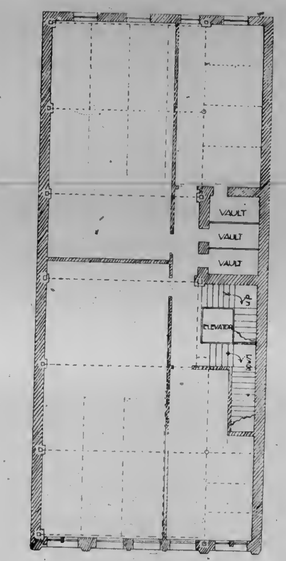
Architects
ay during

an at once
s of avail-

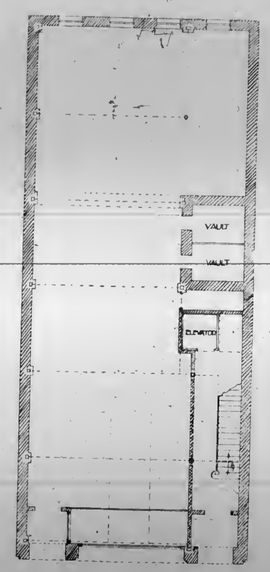
a window
tle past su
rise until
the sunligh



FRONT ELEVATION



FIRST FLOOR PLAN



GROUND FLOOR PLAN

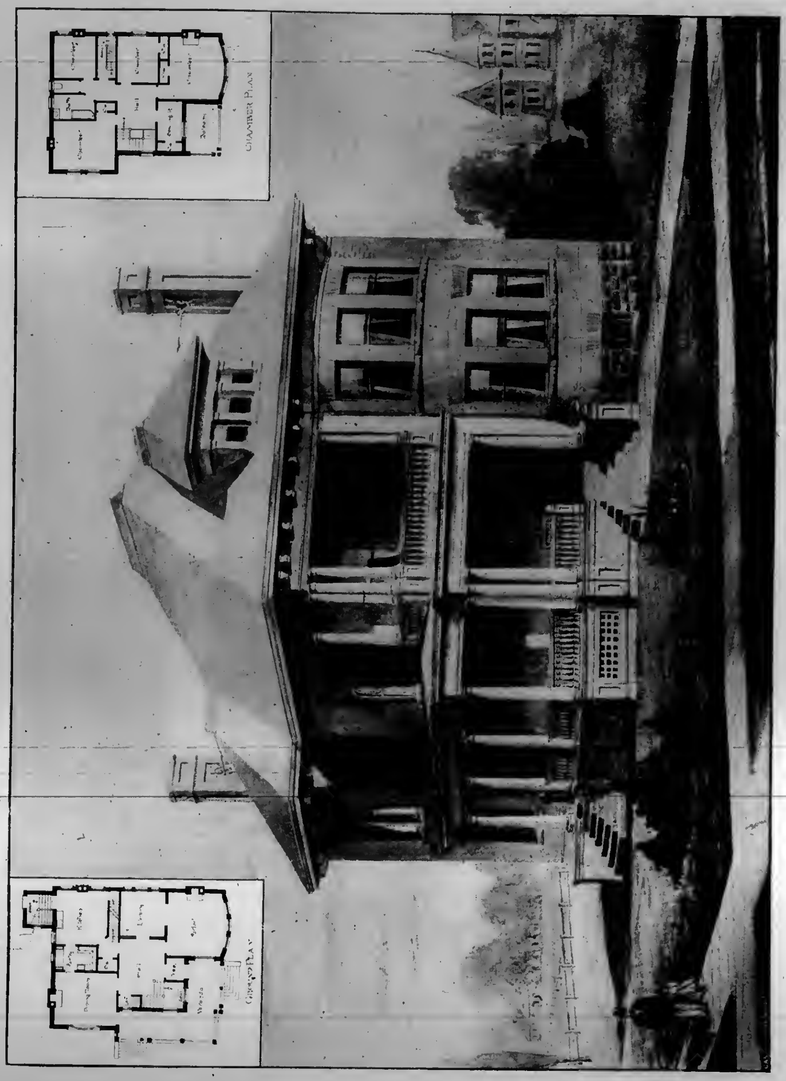
"C. A. & B." COMPETITION FOR A RETAIL JEWELRY STORE.

DESIGN SUBMITTED BY "ARRIUS," (MR. ELMER RUSSELL, TORONTO), AWARDED THIRD POSITION.

Architects
ay during

an at once
s of avail-

a window
tle past six
rise until a
the sunlight



PROPOSED RESIDENCE FOR MR. W. H. P. MOORE, ACTON, ONT.
J. A. ELLIS, ARCHITECT, TORONTO.

Architects
ay during

an at once
s of avail-

a window
tle past six
rise until a
the sunlight

CANADIAN ARCHITECT AND BUILDER.

VOL. IX.—NO. 3. MARCH, 1896 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisemnets should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	H. B. GORDON, Toronto.
1ST VICE-PRESIDENT	J. GEMMELL, Toronto.
2ND VICE-PRESIDENT	JOS. W. POWER, Kingston.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

F. J. ALEXANDER	Ottawa.
THOS. FULLER	Ottawa.
E. J. LENNOX	Toronto.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON — Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. C. HUTCHISON, Montreal.
1ST VICE-PRESIDENT	A. T. TAYLOR, Montreal.
2ND VICE-PRESIDENT	J. P. PEACHY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

CHAS. BAILLAIRGE	Quebec.
ROBT. FINDLAY	Montreal.
J. Z. RESTHER	Montreal.
A. H. LAPIERRE	Montreal.
G. E. TANGUAY	Quebec.
THEO. DAOUST	Montreal.

AUDITORS—A. J. FOWLER and C. CHAUSEE, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

JOHN ALDRIDGE, President.
THOS. CANNON, Jr., 1st Vice-Pres.
JOHN VICK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. BOOTH.
JOHN WICKETT.
FRED. WAKEFIELD.
H. LUCAS.
JAS. ISAAC.
JAS. CRANG.
JOHN M. GANDER.
GEORGE HENRY.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

The O.A.A. Act.

It is pleasing to note that the press, with few exceptions, speak favorably of the proposed Bill to amend the Ontario Architects' Act." Indeed it is not possible to understand how any well-meaning citizen can object to the proposed amendments, as they do not in any way interfere with the rights of any individual or prevent the public from taking advantage of the knowledge or skill, or both, of anyone practising architecture who may not be licensed under the Act. The Toronto World, while favoring the amendments, thinks there is a weakness in the Bill, inasmuch as it does not provide a designation for the unlicensed practitioner. "If he is not to be known as an Architect how can he designate himself?" It can hardly be expected that he will be obliged to solicit business as an "Unregistered Architect," or that he will have to follow Webster and advertise himself as "a person skilled in the art of building." Evidently The World has not read the proposed Bill, or its "funny man" has taken advantage of the staid editor's absence. The unlicensed practitioner, according to the provisions of the Act, may designate himself whatever he chooses, so long as he does not call himself an "Architect." He may be an "Architectural Draughtsman," a "House Designer," or he may advertise himself as "The Greatest Plan Preparer of the Nineteenth Century," if he so wills it. In fact, there is no limit to designation. Here is a sample which may be found in a newspaper published not over a hundred miles from Toronto: "John Roe begs to inform the public that he is prepared to take all kinds of contracts for buildings, repairs, or furnishing materials for same. Plans and specifications for churches, stores and all other kinds of buildings, furnished on the shortest notice. Estimates given while you wait. P.S.—If I get the contracts I make no charge for plans. Sash, doors and blinds always on hand. Live and let live. Give me a call." This, we think, is broad enough a "designation" to cover The World's objection, and the Bill proposed does not pretend to interfere with John Roe or his business. The public will eventually be the gainer if this Bill becomes law, not only because it will have some guarantee that the person intrusted with its work will be in a measure fitted for it, but because of the very fact of a license being required to practice, will prove an incentive to the aspirant for the public favor to better qualify himself for the expected work, knowing as he will know that he will meet in competition men of his own profession, whose knowledge and

experience cannot be gainsaid. It may take a number of years after the passing of the Bill before the architectural profession will feel any direct benefit from it, but much benefit must come sooner or later in many ways. It will have a tendency to create specialists in many branches of the science, just as they have in Europe. One man may become an authority on Gothic, another on Classic, while a third will be known as an oracle on the Renaissance. Ontario is sufficiently advanced in wealth and artistic requirements to give ample scope for specialists in every department of architecture, but in order to attain eminence in any one of them the profession must be protected so far as the public interests will permit.

The City of Toronto v. Neelon.

Mr. Neelon's action against Mr. Lennox, architect of the new city buildings, and the City of Toronto, to recover damages for alleged wrongful dismissal from his position as contractor for the work, has been argued in the Supreme Court. The verdict of the Court confirms the decisions of the inferior Courts, which, as our readers know, were adverse to Mr. Neelon's claims. The case will no doubt be carried to the Privy Council, but there would now seem to be little reason to expect a reversal of the decisions of the several Courts through which it has already passed.

The Late Mr. Atwood.

Mr. Chas. B. Atwood, well known as one of the architects chosen to design some of the more prominent buildings at the World's Fair, died at his home at Buena Park, Chicago, Dec. 19th, after a short and painful illness. Mr. Atwood had a wide reputation in the United States as an architect of more than ordinary ability. He followed, to some extent, the lines laid down by the late Mr. Richardson, to which he added much that was his own, and which evinced originality and scholarly thought. His best works at the World's Fair were the Art Palace and the Peristyle, two buildings that were much admired by members of the profession who had the pleasure of seeing them. Mr. Atwood was born in Boston, Mass., forty-six years ago. He went to Chicago in 1890 and entered into partnership with D. H. Burnham, the eminent western architect, and was a member of the firm when he died. He was unmarried, "for," as he told the writer on one occasion, "if I was a married man my duty to my family would prevent my giving to my profession that attention I wish it to receive at my hands." He loved art, for art's sake.

Dangerous Structures.

The necessity of restricting the practice of architecture to persons properly qualified for the work was exemplified by an accident which took place in Toronto recently. The occupants of a warehouse, while engaged in loading the upper storey of the building with merchandise, observed that one of the doors on the ground floor would not close. They called the attention of the owner of the building to the fact, and he in turn brought the matter to the attention of his architect, and requested him to make an examination of the building and to estimate its strength. The result of the architect's examination showed that, allowing for the usual factor of safety, the building was barely strong enough to support its own weight. Yet, in ignorance of this fact, the occupants had placed a load of 20 tons on one of the upper storeys, and were proceeding to add to this load, when they fortunately made the discovery which resulted in the architect's examination. The building in question is an old one, and was put up in the days when no accurate methods were employed to ascertain the strength of structures. The supports of the upper floors are 7¾ inches in diameter while those of the first storey are but 7 inches. There are, no doubt, a large number of such structures in use throughout the country, and it is too much to expect that sooner or later a disaster will not result.

Roof Construction

An accident occurred on the Thursday night following Christmas that might have resulted seriously. An entertainment was being held in the Mariners' Bethel Church, Philadelphia, when a heavy gale of wind lifted off part of the roof and scattered the fragments on the grounds below. A panic ensued; but, owing to the coolness of a few no one was seriously hurt. Within the last few years many buildings public and private—have been unroofed, a condition that ought not to be possible if proper constructive methods were adopted. A roof should be so secured that its displacement could only take place with the disruption of the walls, or the building itself. Like many prevalent maladies, the unroofing of buildings seems to be altogether a modern scourge. If any buildings were so constructed in ancient or mediæval times that their roofs were blown off or destroyed by a collapse, the events were kept very quiet, for very few accidents of that sort are mentioned by the older writers. In fact, if the old builders constructed their roofs on the same lines as the examples that have come down to us from the early centuries, there was little danger of their blowing away or collapsing. The roof of Westminster Hall, apart from its ornamentation, is a solid example of fine constructive cunning, and its attachment to the walls such that divorce is rendered impossible without causing the total destruction of the latter.

Lien Laws.

Mr. Dowling, Labor Commissioner of New York, has been investigating the lien laws of that State, and in a letter to a Syracuse paper states that the laws as they now stand "are of no benefit to either the working man or the owner of the buildings." Mr. Dowling has made a study of the lien law for ten years, both in his own and other States, and the fact that he has arrived at the opinion that these laws are of no benefit to either workman or owner, is a matter that deserves consideration. When lien laws were first enacted, they were intended solely and altogether to protect the workman, to place in his hands, as it were, some means by which he would be sure to get his wages. All this was right and proper, but subsequent amendments and additions to the law, enabling material men, contractors and sub-contractors to file liens and collect on them, have nullified whatever good there may have been in them at first, and so complicative and irritative have they become that many men decline to build for fear they may get entangled in the meshes of the law. In Ontario the law, as it now stands, is actually a deterrent to progress and should be stripped of all its excrecenses and rendered as simple as possible. No claims should be allowed under a lien, other than actual labor done by day's work. A liberal percentage of the contractor's tender should be held by the owner as now, for labor only, and this amount should be exempt from all other claims until labor is satisfied or the amount exhausted.

Australian Architecture.

Many people have an idea that our brethren of Australia are far in the rear of us in the way of building. This, however, is a mistaken idea, for Melbourne and Sydney contain as fine buildings, public and private, as can be found anywhere on this continent. The Eastern Market Building in the city of Melbourne is said to be without a rival anywhere for beauty of exterior, adaptability and general convenience. For several years the municipal authorities of the rival city of Sydney have been collecting data for use in designing and building a new market for that city that would excel the famous market of Melbourne. The result is that an immense Renaissance structure is to be built, on which a central dome will rise to a height of 150 feet above the sidewalk. The contract to complete the building has been let for the sum of $1,250,000. The designs for this mammoth building were prepared by Geo. McRae, city architect, Sydney, N.S.W.

Building Timber.

The gradual disappearance of good building timber from Ontario, and the substitution of hemlock, soft elm and basswood for white pine and the better class of woods, is the cause of much wrong-doing in the building trades, and the creation of a class of buildings whose lives will be short by comparison. The high price of white or red pine joists is made an excuse by country builders, to substitute hemlock instead, where the use of such uncertain lumber should be carefully eschewed. Fancy hemlock joists in the lower floor of a country farm house, where perhaps only a few inches of space exists between the damp earth and the lower edge of the joists. What is the result? A rotten floor in a few years, and a miasmatic one from the moment it is laid. Where it can be avoided, hemlock should never be employed in a situation subject to alternations of dryness and dampness. It does very well if kept constantly dry, though it has the quality of becoming very brittle if made very dry, and is not by any means a reliable wood if subject to sudden strains. Hemlock may be used with profit in the upper floors of small or medium-sized buildings, that are not likely to be subject to heavy work, and when once in place and properly secured, do satisfactory service. For inside studding, scantlings and light roofing timbers, it will do fairly good service if skilfully arranged and properly secured. It must not be supposed that we decry hemlock as a building material. We do not. Like everything else it has its uses, and it is its improper use we object to. For rough boarding, sheeting and roof covering hemlock has no equal. It is superior to pine in nail-holding qualities, and when dry and properly machined makes a firm and solid base to "side" or shingle over, and each nail may be driven home with a certainty that it will stay where put. When covered, as under shingles, hemlock is not so likely to "swell" or "warp" in a damp atmosphere, as pine would under like circumstances. Hemlock timber, though frequently used in heavy constructions, is rarely satisfactory, owing to the unequal direction of the grain, and the difficulty of working it to correct and proper shape. While it may do passably well for temporary structures, such as bridge centres, platforms, scaffolding, etc., it should never be employed for outside purposes where permanency is an important factor. The scarcity of good lumber, or rather its high price, is working favorably in the interests of permanent buildings. Few country people in the well settled districts of Ontario now ever think of building their houses of wood altogether. The old-fashioned frame house gave way to the lighter and more compact scantling or "balloon" house, and this is fast giving way to the "cased" or "veneered" house, or the solid brick house. It is beginning to be known that a house built of bricks costs but little more than a house built altogether of wood, while the life of the former is three times longer than that of the latter, and the former needs no paint on the walls to preserve it, or to prevent the "poverty stricken" appearance which is sure to attack the latter once every four or five years. The advent of the brick house in the country should be encouraged, and whenever the designing of these is placed in the hands of an architect, he should employ every possible means to give his work a "truly rural" but effective appearance.

An Uniform Size for Brick.

The variation in the sizes of bricks made by different firms often leads to a great deal of inconvenience and useless labor and expense. The introduction of pressed bricks or terra-cotta bricks, among common moulded bricks, is often prevented because of the unequality of sizes the pressed brick generally being much smaller than the moulded ones and this militates against the interests of pressed brick makers, for, if moulded and pressed bricks were of one uniform size throughout the country, the use of pressed bricks for trimming windows, doors and other openings, would soon become a fixed practice in the smaller towns, villages and country, and the practise has much to commend it from more points of view than the artistic one. It seems to us that it would be as much within the scope of parliamentary limits, to legislate on the question of "uniformity of size in bricks," as it is to legislate on "weights and measures," and the rights of the community are nearly as much concerned in one as in the other. If one brick differeth from another one-twentieth of its size—and there are greater differences than this—it means a difference of five brick in each hundred, an item that becomes formidable in buildings requiring five or six hundred thousand bricks. Even in a much smaller building the difference may make or unmake the contractor. True, architects frequently specify certain makes of bricks, but this custom is not to be recommended as it may lead to abuses, therefore it is better for everyone concerned that the contractor have a free hand in purchasing all his material, providing always the standard of quality is maintained. A practice, quite common with our neighbors to the south, is to specify certain "makes," not only of bricks, but of hardware, paints, plumbing fitments, heating apparatus, and other building requirements, in all specifications; in fact, in many of the printed forms of specifications, certain goods are specifically named, and the contractor is not permitted to use any other. It will readily be seen to what this method may lead, and does lead—and how the owner may have to pay for goods of an inferior sort when the quality might have been obtained for less money. It is well enough for an architect to specify certain brands at a given price, and to see that the price is paid; then the owner gets value, and the contractor "knows where he is at."

DOMESTIC ARCHITECTURE.*

By Grant Helliwell.

In venturing to offer a few remarks on this subject, I do so not with the hope of being able to present anything but what has, in substance, often been stated before. The principles on which domestic or any other kind of architecture are based, never change. They are the same to-day as when the first constructions of man worthy of the name of architecture were built. But the applications of those principles are ever changing, and will continue to do so as long as man continues a builder.

This fact renders apology needless; moreover, apart from the deeply absorbing interest with which the subject is invested on its own account, it must ever be a living question with architects, since in the very nature of things, the larger part of the average architect's own living is directly connected with it.

Domestic architecture may very well be considered in two aspects, the first general and the second specific or individual. The former may be likened to the case of a man, who, from some eminence looks out upon a scene of Nature's making. As his eye travels over space, trees, hills, valleys, brooks and ponds, all combine to form a scene of beauty charming alike to vision and to sense. The second aspect is likened to the same man, who, having descended from his vantage ground, concentrates his sight and attention on the foliage of some specific tree or the entrancing beauty of some particular flower. This little analogy, however, is only relatively correct as it must be admitted that the architectural achievements of man seldom if ever bear a favorable comparison with those of Nature's architect.

Taking up then our subject in its general aspect, the impression produced on the mind of an observant person by our residential architecture depends largely, not only on the buildings themselves but on their approaches and surroundings, the disposition of trees and shrubbery and the arrangement of the walks and terraces. That these most important adjuncts to architecture are often overlooked or entirely ignored cannot be disputed and yet their importance can hardly be overestimated. It would perhaps not be too much to say that many dwellings, beautiful in themselves, are so marred and disfigured by their surroundings that their intrinsic architectural worth is almost wholly unknown, while many another house, commonplace and inartistic in design, is so beautified by the accessories of landscape as to attract and delight the eye of all beholders.

Especially in outlying or rural districts has the architect opportunities to obtain pleasing effects impossible in the case of city dwellings. Here not only does the unlimited ground area admit of landscape architecture in perfection, but the natural and topographical characteristics of the site, will, in the hands of a skillful and judicious artist, furnish the key note of the design for the dwelling, and form the basis of a combination, beautiful and satisfying because of the perfect concord of all its parts. If the location is rugged and precipitous and the horizon sharply broken by the peaks of tall pines or rocky crags, every sense of fitness and harmony would be violated by a design in which the prevailing lines were long and level and all features of the building uniform and symmetrical.

We would look rather for an irregular treatment high roofs and pinnacles—a broken angular skyline, and a general air of rough vigor and strength. On the other hand should the site be on the sea shore, low and flat with level sand beach and horizon unbroken either towards land or water, then a long, straight roof line, broad verandahs and a general horizontality of style and restfulness of feeling would seem to be compatible with the surroundings. On the materials with which buildings are constructed and the colors of those materials much also will depend if a pleasing, artistic and harmonious effect would be produced.

In the case of the dwelling with weird and rugged environment rough stone or brick of quiet hues for the walls and a dull dark roof would seem most suitable; while for the house on the sea shore or among green fields and shady gardens, lighter and more cheerful materials might be used, with brighter and more varied coloring.

Nor is the principle here laid down to be applied only to rural work. If we examine any architecture recognized as of superior merit, either in this or older lands, we will find the treatment adopted wholly due to natural surroundings and climatic influence; and this is doubtless the chief secret of architectural success. The methods of building were not based on mere whim or fancy, but were the direct result of the practical principles of utility and common sense controlled by a highly cultivated taste for the beautiful.

Take for example the countries of Holland and Belgium or the northern parts of France. Here a picturesque and strongly marked sky line is a striking characteristic of their buildings, a characteristic which may be clearly traced to the natural forces just alluded to. The admiration generally bestowed on these buildings, not to speak of their reproduction in many other lands, bears testimony to their excellence.

As another notable illustration of the same principle, take the architecture of southern Europe, universally conceded to rank amongst the finest architectural achievements of man. In this case the prevailing atmospheric conditions are clear air and bright sunshine, conditions admirably suited to accentuate the contrasts of light and shade. With a keen appreciation of these facts the builders of Italy, for instance, employed methods well calculated to obtain excellent results. Projecting balconies and deeply recessed wall openings, fine and delicately moulded or carved ornament, the free use of color, and everything executed in harmonious and suitable materials all combine to produce buildings which have for ages been an unending source of pleasure and delight.

Until these fundamental principles govern the architecture of our own country we cannot hope for similar success. In studying these fine examples of old work with a view to improvement, it is not the combination of external features, perfect as that is, nor yet the exquisite refinement of detail, much as he may learn from it, that should engross the student's attention. Unless the principles underlying the surface are not only discovered but actually put into practise, but little good will be accomplished.

Suppose one of the well-known facades of Venice, with its profusion of delicate ornament, its glowing colors, the projecting features shining with light, the recessed doorways darkened in shadow and the whole reflected in the blue waters of the Grand Canal. Suppose such a facade transported to one of the streets of a northern town. Imagine those balconies decorated with huge icicles, the interstices of carving and ornament filled with snow. Instead of bright light and deep shadow a dull flat appearing front backed by a duller sky, and we have about as incongruous a picture as the mind could conjure up.

This may be an exaggerated case, but is not a similar mistake, only in lesser degree, too commonly made, with the result that the whole tone of our architecture is correspondingly lowered.

Among the chief characteristics of any town are the disposition and contour of the streets, the sky line formed by the roofs of the buildings, the chimneys, gables and lines of cornices. The architect who has the knowledge and skill to take advantage of broken or uneven sites, to bring the various features of his design into harmony or pleasing contrast with the adjoining buildings or the landscape is to be congratulated. Were this taste and skill more frequently displayed there would be far less of that painful incongruity and discord with which the usual unpicturesque and prosaic conglomeration of roofs and stacks and gables offends, often unknowingly, the eye.

In this connection it will not be out of place to refer to a very common fault in street architecture, that is the treatment of flankages. How many instances can we recall when the flank wall of some dwelling rears its ungraceful sky line obtrusively above the roofs of adjoining houses. Apparently all the resources of its architect were exhausted on the front, leaving not a single idea to expend upon the flank, which stands, grim and bare, a lasting disfigurement and reproach.

Such treatment as this is an infringement of the unwritten law of decency and good taste. Surely something might have been done to make the plain wall tolerable to the eye, even by merely carrying the lines of cornice or mouldings along the sides by means of stone bands or brick sailing courses, to say nothing of some simple design in panel or arcade, either flush or slightly sunk; and just here the writer would like to express his appreciation of a very simple, inexpensive, and to his mind pleasing and effective example in the case of a prominent store building in our own city, whose immense and towering flank has been thus treated.

Another general impression made on the mind of the observer of our domestic architecture is that of its variety. In some of the finest cities in Europe, notably Paris, fault has been found with the monotonous effect produced by the similarity in design of its buildings. With some few exceptions, that is not a prevailing condition on this side the Atlantic. A close study of nature reveals the marvellous beauties of variety, and in following her example we are not likely to err. While, however, nature gives

*Read before the Architectural Guild of Toronto, on Jan. 7th, 1896.

countless examples of both variety and contrast she never violates the laws of harmony; and this is where our mistakes are most "en evidence."

The eclectic tendency of our designers, added to the whims and caprices of a builder, result in the most striking discords. Buildings of diametrically opposite style are placed side by side. The color in which one house may be decorated completely kills both itself and the unfortunate neighbors. This lamentable result would not be nearly so common were the buildings separated from each other by even a narrow stretch of landscape or shrubbery; but the insane desire to crowd the greatest number of houses on the smallest possible area of ground greatly magnifies the evil.

The distinction between variety and difference is a wide one, and it is quite possible to secure the greatest variety as well as the most marked contrasts, without those harsh and discordant effects so frequently seen, did those who are responsible for the design bring judgment and taste and study to bear on the problem?

Let us now very briefly consider domestic architecture in its individual or specific aspect, that is the study of a dwelling in itself. We will, I think, find this aspect to be fully as interesting as the broader or more general one we have been discussing. Under this heading much indeed might be said. We might with interest and no little profit sketch the various stages through which the habitations of man have progressed from the earliest examples down to our own day. We might discuss the suitability and adaptability of the different styles of architecture for domestic buildings. But the barest outline of these facts or theories would extend a paper, such as this, beyond all reasonable limits. We will confine our observations on this occasion to a brief consideration of how the main uses for which a dwelling is erected may be architecturally expressed. In other words, attempt to analyse the principles on which house building, from an æsthetic point of view, is based.

Among the numerous uses of a dwelling house shelter, rest and comfort probably come first. Family privacy and hospitality are likewise important considerations. In design the ideal dwelling should fully and unmistakeably express these facts and sentiments, not to speak of such others as the specific habits or tastes of its occupants may call for. This great variety of sentiment, in the full expression of which domestic architecture has its highest possibilities, furnishes an opportunity for artistic treatment of almost unlimited scope.

But while the sentiments just alluded to are primarily in the interest of the occupier of the house, the commonest ties of humanity demand that a selfish thought of his own interests should not be the only motives which actuate the house builder. He should be as considerate of his neighbors as he would like them to be of him; and even the general public should by no means be forgotten.

Nor does public spiritedness and friendly consideration for others, even in the matter of house building, go without its due reward. The man who thus thinks of others than himself will have, not only the inward satisfaction that such actions invariably bring; he will set an example that others will follow, to the general improvement and thus ultimate benefit of the whole locality, to say nothing of the greatly improved chances of selling property that has been thus brought favorably to the public notice.

Let us now enquire how the sentiments expressive of home life are to be proclaimed, not in words, but in the more enduring materials of construction. To take the one we have first mentioned, viz.: shelter. How this can be most clearly expressed will depend largely on the climatic conditions obtaining in the specific case. If protection from the burning rays of the sun, or the downpouring of heavy rains is the chief consideration, broad verandahs and roofs with spreading eaves would naturally be appropriate. Is resistance to the violence of the wind and storm most necessary, then projections of less extent and the use of stone or brick and other materials suggestive of strength and durability might be used to advantage.

To continue in order, the next sentiment is Rest. One might well ask, how many of our homes suggest this primal sentiment in their external appearance? Precious few, and yet what architectural expression can be more appropriately given to the dwelling place of man? Why is this? Doubtless because it is most difficult of attainment. One need scarcely say that many of our grandest, most expensive and most elaborately built houses are complete failures in this respect.

Here artistic ability and cultivated taste may well expend their best efforts. It is useless to lay down rules in such a case, but a suggestion or two may be offered which will perhaps form a base on which to work.

Rest or repose in buildings may be obtained in a variety of ways. Simplicity and breadth of treatment are of the first importance. By skilful composition the various parts of even a complex structure may be so arranged and grouped as to produce a complete whole, the general purpose of which is easily and quickly though perhaps unknowingly comprehended by mind and eye. It is impossible to give an air of quiet restfulness to a house whose facades are full of features—bays and turrets and balconies, windows large and small, square and round distract the eye and weary the brain in a hopeless search for something on which to rest.

A certain proportion of plain wall surface is an indispensable condition; without it repose is unattainable. A judicious use of materials bearing in mind their colors, will also be most helpful in imparting the expression of rest to a building; those that convey the impression of stability and equipoise, the more sombre colors below, the lighter and brighter above.

Comfort, the next quality to be considered, should also be clearly expressed. Here, good workmanship is of paramount importance. Nothing could be more destructive to a sense of comfort than flimsy or cheap materials put together in a careless or slovenly manner. Windows should be of proper size, convenient shape and in suitable positions. An air of spaciousness or at all events an avoidance of anything approaching a cramped appearance. Ample bays and verandahs will add much to the air of comfort.

Privacy—this most important point is too often neglected. The house is for the use of the family, not for the public or even the near neighbors. If circumstances will allow it, the building should be kept well back from street line, and in any case the exercise of judgment and thoughtfulness in arranging the levels and positions of windows will do much to secure this most desirable property.

There are many other sentiments which might most appropriately be expressed in the exterior design of a house, but time forbids reference to more than the remaining one of those before mentioned, Hospitality. This quality is also not to be overlooked or a most serious defect will be apparent.

It is quite frequently the case that on approaching a house the entrance is the last feature to catch the eye, a feature which, perhaps more than any other, impresses an important character on the building to which it belongs. It is the entrance which stamps on any house an air either of hospitality or exclusiveness. A cramped insignificant door or one not easily seen from the street as certainly conveys the latter impression, as a wide, inviting and prominent entrance augurs a hospitable reception to the approaching guest. The doorway should not only be plainly visible to the passer-by, but a due regard for comfort and shelter in the shape of a projecting portico or recessed entrance of generous dimensions will not fail to add greatly to the attractiveness of any home.

These phonetic qualities of architecture may be as clearly impressed on the humble cottage as on the lordly manor. Because every man's house is his castle is no reason why every modest home should ape the pretentiousness of a palace. We have too many instances of this. It is, perhaps, one of the most frequent and offensive infractions of the laws of good taste. If instead of striving after conspicuousness, the chief aim of our architects was quiet dignity and simplicity, with a due regard for the environments of the home, doubtless we should soon see a very marked improvement in the general and specific character of our domestic architecture.

Thomas A. Edison, the electrician, has been investigating the Pierce & Norris method of making bricks out of sand, plants for which are in operation at London, Dunnville, Port Huron, Sarnia and elsewhere in Ontario. Mr. Edison proposes establishing a plant at his home in New Jersey.

Mr. W. A. B. Fishleigh, of Indian Head, N.W.T., has invented a new heater, a patent for which is now being applied for. The cold air enters from the bottom, and passes up and down through several tubes in the inside of the stove before it is emitted. It is claimed to effect a large saving in fuel.

The Stonecutters' Union of Ottawa have decided to enter into competition with masons in laying stone. This has been brought about by the refusal of the Stonemasons' and Bricklayers' Unions to assist the stonecutters in shutting out stone dressed in Hull, by declining to work on buildings on which it is used.

CONCRETE AS A FIRE-PROOF MATERIAL.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—I venture to submit the following quotations from a paper read by John J. Webster, M. Inst. C. E., before the Institute of Civil Engineers, London, Eng. (Paper No. 2518, Vol. C V, page 256, et. seq):

"d Concrete. Many of the fireproof floors are now constructed of concrete of various materials, either in the form of arches or with flat ceilings built in situ or in slabs; the details of the various systems will be fully described in section 2. Although a certain material may withstand the action of fire satisfactorily, it is important to know what will be the effect upon it of water when in a heated state, for in a conflagration these two elements have to be contended with; and very often water causes the more disastrous effects. It may be mentioned that at the great fire at Lynn on Nov. 26, 1889, when buildings covering an area of 40 acres were destroyed, the water used would have flooded the whole space to a depth of over 7 feet, and at the great fire at Boston on Nov. 28th, 1889, sufficient water was poured upon the structures to cover the site to a depth of 12 feet 7 inches.

"To enable some idea to be formed of the action of fire and water upon various concretes, the author made a series of experiments on test briquettes of various mixture, as follows:

10	briquettes of neat cement				
10	"	1 part cement	1	part sand	
10	"	1 "	"	3	" "
10	"	1 "	"	5	" "
10	"	1 "	"	4	parts ironworks slag
10	"	1 "	"	4	" broken firebrick
10	"	1 "	"	4	" pumice-stone
10	"	1 "	"	4	" coke-breeze
10	"	1 " (plaster of Paris),		4	parts pumice-stone
10	"	1 "	"	4	" broken fire brick
10	"	1 "	"	2	" " " "
10	"	1 "	"	2	" ironworks slag

"The briquettes were of the form usually adopted for testing cement, and the tests were made in a Bailey cement testing machine in the laboratory of University College, Liverpool, Prof. H. S. Hele Shaw, M. Inst. C. E., having kindly placed the use of the machine at the author's disposal. NOTE.—As the stresses to which the various concretes are submitted in an actual structure are very similar to those met with in ordinary engineering works where cement is used, the author felt justified in only applying such a tensile test as is usually adopted in the case of cement.

"Five briquettes of each set were tested at a normal temperature of about 60° Fahrenheit; the other five were carefully heated on the top of a specially built up fire of coal and coke until they were of a light red heat, the average time of exposure to the heat being about five minutes; they were then removed, and whilst hot were quenched with water. A large number of the briquettes lost all cohesive power after being quenched, and it was with difficulty that they were removed intact. As they could not in this state withstand any tensile strain, they were allowed to dry. After three days' exposure to the atmosphere of a warm room they partly regained cohesion, and were then tested. The details of the tests are given in the appendix table I-XII, and the following is a summary of the results: NOTE.—The briquettes were set in air, and were tested within four or five weeks after being moulded.

"None of the above proportions are those adopted by the maker of any particular flooring, but they are such as to yield a good concrete under ordinary conditions, and are sufficient to enable an opinion to be formed of the strength of certain materials in combination, and of their value in fireproof construction."

The whole paper will well repay careful perusal, but your space will not afford a longer extract. The subject is one of great importance in all cities, and is deserving of careful study. When we build "fire-proof" let us seek to use sure material, and thus not bring discredit on "fire-proofing." It would seem to be high time that, in the larger cities at least, fire-proof buildings be insisted on by the authorities.

Yours very truly,

M. J. BUTLER,
M. Inst. C. E.

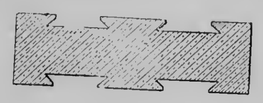
Deseronto, March 9th, 1896.

SUMMARY OF TESTS OF CONCRETE BRIQUETTE.

Number of Table in Appendix	Nature and proportions of materials used in concrete briquettes	Average weight per cubic foot	Breaking weight per square inch at temperature 60° Fahren.	Breaking weight per square inch after being heated and quenched	Average loss per cent of original strength after heating and quenching
		lbs.	lbs.	lbs.	per cent.
I	Neat Portland cement	124.6	554.6	117.2	60.8
II	1 part cement, 1 part sand	120.9	148.9	93.0	80.0
III	1 " " 3 parts "	111.2	109.8	16.7	84.4
IV	1 " " 5 " "	109.7	74.6	15.9	79.8
V	1 part " 4 " iron furnace slag	163.08	108.1	23.06	69.3
VI	1 part cement, 4 parts broken fire brick	95.04	84.4	30.5	50.9
VII	1 part cement, 4 parts Pumice-stone	64.8	94.58	38.3	59.5
III	1 part cement, 4 parts coke breeze	71.65	69.9	39.06	57.1
IX	1 part plaster of Paris, 4 parts broken fire brick	89.6	66.8	16.3	75.0
X	1 part plaster of Paris, 4 parts pumice stone	55.6	57.4	3.4	94.7
XI	1 part of plaster of Paris, 2 parts furnace slag	148.0	223.3	6.9	96.8
XII	1 part plaster of Paris, 2 parts broken fire brick	106.9	167.5	15.7	90.0

RECENT CANADIAN PATENTS.

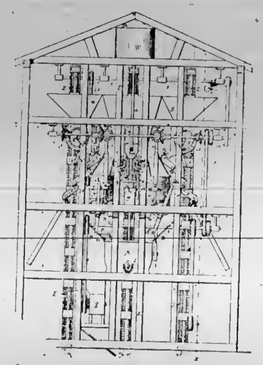
PATENTS have recently been granted in Canada for the following apparatus:—



BRICK.

Patentee: S. I. Adams, Raunhurst, Eng., patented 8th November, 1895; 6 years.

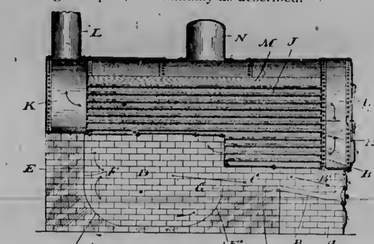
Claim.—A brick, either header, stretcher, quoin, or any kind of brick, provided with dove-tailed shaped recesses either above only or above and below, lengthwise or crosswise, substantially as and for the purposes set forth and as illustrated in the accompanying drawing.



APPARATUS FOR MAKING MORTAR.

Patentee: Thos. D. McClary, Washington, U. S., patented 15th November, 1895; 6 years.

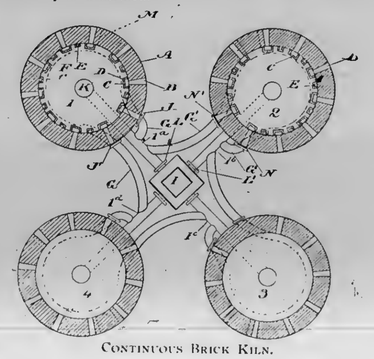
Claim.—In a mortar-making apparatus, the combination of a lime slaker and a rotating lime meter, the latter provided with compartments, each compartment having a false bottom adapted to be adjusted, or removed, the meter arranged above the slaker so as to discharge therein, by gravity. The combination of a lime crusher, a lime meter having compartments provided with false bottoms adapted to be adjusted or removed, as desired, a lime slaker, a water meter having a graduated standard and a float-valve adjustably connected therewith, the said meters arranged to discharge into the slaker, by gravity, the bottom of the slaker provided with ports and screens, a mixing-tank arranged below the slaker, a sand-meter provided with mangle-gear and operating lever and pawl, a feed regulator, and screens arranged between the said meter and mixer, the mixer provided with a discharge port and an interior swinging gate for opening and closing said port, substantially as described.



FURNACE.

Patentee: J. W. F. Sole, Guelph, Ont., patented 11th November, 1895; 6 years.

Claim.—In the combination of a combustion chamber closed at its rear end, against which the heated and liberated gases from the fire chamber may be projected as to be deflected, and a boiler provided with a series of short tubes so located as to be immediately over the fire bridge wall and the fire chamber, and forming outlets through which the inflamed and deflected gases pass to the chamber in the front of the boiler, then through the long tube to the rear chambers and smoke stack. In a device, the combination of the ash chamber A, the grate B, the inlet C, between the fire bridge wall C¹, and the boiler H, the combustion chamber D, having its rear wall E built up to the boiler so as to close the rear end, short tubes H¹ formed in the lower part of the boiler H, front chamber I, long tubes J, rear chamber K, and smoke stack L, substantially as described.



CONTINUOUS BRICK KILN.

Patentee: C. J. Lewis, Grimsby, Ont., patented 22nd November, 1895; 6 years.

Claim.—A brick kiln consisting of an outer wall, a series of vertical fire chambers on the inner side of the outer wall, the upper end of each of the vertical fire chambers opening into the body of the kiln, a series of vertical hot air flues arranged around the inner sides of the outer wall and extending through the floor of the kiln, a flue connecting together the lower ends of each of the hot air flues, a main flue to the chimney into which the connecting flue discharges, a draft well formed centrally through the floor of the kiln into the main flue, and dampers for the main flue and connecting flue, substantially as specified.

Composition for artificial stone, Frederick Brown and John King, both of Fort William, Ont.

Radiator for steam heating, F. E. Backus, Williamsport, U. S.

Pipe trap, H. F. Pool, Lynn, Mass.

Josiah Fairbank, Helena, Ohio, machine for erecting frame structures.

Oliver Schlemmer, Cincinnati, Ohio; hot water heating apparatus.

J. J. Baskerville, Duluth, Minn., school desk and seat.

John S. Burton, Danville, Ill., gable ornament for buildings.

Robert W. King, Toronto, Ont., ventilating apparatus.

J. R. Bate, Cincinnati, Ohio, process of preserving wood fibre.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

IT is a well-known fact in Montreal that a certain class of architects undertake to carry out work much below the customary percentage of 5% on the cost of the building. The practice generally indulged in is to undertake the preparation of plans and specifications, taking in tenders and superintendence at a cost of 2½% to the proprietor, who is left under the impression that he is saving 2½%, and congratulates himself at not having fallen in with some of those high priced architects with their exhorbitant charges of 5%. The bogus architect, as we may be allowed to call him, takes the responsibility of taking out quantities when tenders are about to be called for, and charges a certain fee to each contractor tendering on the job, for a copy of his bill of quantities. Moreover the successful tenderer, under the pretext of renumerating the architect for the work and responsibility incurred by the taking out of these quantities, is forced to pay him an additional fee of 2½% on the acceptance of his tender on the full amount of same. Thus it will be seen the proprietor pays indirectly to the architect more than the customary commission of 5%, as it is evident the contractor reimburses himself for the 2½% commission he has paid, and, moreover, the architect loses his independence towards the contractor, and is entirely at his mercy. As a result, very often, the latter is the sole judge of the interpretation of the plans and specifications, and if he finds he has not made a sufficient allowance for profit or contingencies in his original tender, he invariably tries to save every penny he can on the material and workmanship employed in the building. Honest contractors should unite together and refrain in a body from tendering in the office of an architect who will indulge in these practices, as not only will they have the disadvantage of invariably meeting with the recriminations of the proprietor but also risk their business reputation and lower their class of work below the standard, with the result of being refused the patronage and encouragement of honest architects.

Another well-known method of "boodling" is in the inducement of manufacturers to architects to specify their goods. Manufacturers, anxious to introduce a new heating furnace or other goods or materials used in buildings, pay a certain percentage to architects on the amount of goods specified, for their influence in helping them to introduce the same. All these dishonest practices should be brought to light and strongly condemned, so that persons intending to build may guard themselves against persons carrying on business in a suspicious manner, and encourage the honest, straightforward and deserving class of architects and contractors, with mutual advantages to all concerned.

AUGE BILL.

The Auge Bill has undergone considerable modifications at the last session of the Legislature (21st December, 1895). It has been first modified so that the workingmen's privilege will apply to the plus value only created by their work, and not on the original value, and the starting point of the delay of 30 days allowed for the registration of privileges has been fixed at when the building is ready for occupancy. Architects have not been given a privilege which they did not enjoy before. Their privilege comes next to that of the workman and before that of the contractor. The order of privileges is as follows: 1st, the laborer; 2nd, the workmen; 3rd, the architect; 4th, the contractor. The obscure clause about the sub-contractor, which I explained and condemned in my correspondence on the Auge Bill in the August number of the CANADIAN ARCHITECT AND BUILDER has been cancelled. The privilege given the finisher of materials takes rank only after the privileges previously registered; and when the proprietor has paid the contractor and received notice from the furnisher of materials of money due him by the contractor, the proprietor cannot be held responsible for the same. This amendment is a very desirable one. When a proprietor builds himself, without the intermediary aid of a contractor, the notices from the privileged parties should be addressed to the persons who furnish the funds for the erection of the building. "Le Prix Courant" in an editorial expresses the opinion that as a whole the Auge law is more reasonable and practicable than previously, but that it would have been more simple and preferable to abolish the same altogether.

CONTRACTORS' DRIVE.

After a lapse of seven years the contractors of this city have revived their popular drives, the first of which was held on Saturday, the 29th of February. Messrs. Peter Wand and W. A. Stephenson assumed the management, and upwards of sixty well-known contractors enjoyed the outing. Their destination was Peloquin's hotel, Sault au Recollet, where an excellent dinner was served, the chair being occupied by Mr. Wand, and the vice-chair by Mr. Peter Lyall. After numerous toasts and speeches, the company returned about ten o'clock and congratulated themselves upon the re-union.

CORRECTION.

IN the reference in our New Year Number to the new Wesley College building, Winnipeg, should have been stated that Messrs. George Browne and S. Frank Peters were associate architects of the building.

T. M. Hennessy, architectural draughtsman of the Department of Public Works, has compiled a most accurate and useful table, setting forth the comparative sizes, absorbing properties, specific gravity, etc., of the different pressed brick manufactured in the Province of Ontario.

BUILDING STONES OF EASTERN ONTARIO.*

By Andrew Bell.

NOTES ON THE BUILDING STONES FOUND IN EASTERN ONTARIO AND LOWER OTTAWA VALLEY, EMBRACING THAT PART OF THE PROVINCE AND OTTAWA VALLEY EAST OF A LINE FROM THE HEAD OF THE BAY OF QUINTE TO MATTAWA ON THE OTTAWA.

The following notes are compiled from personal observations, extending over the past 40 years, during which time I was in active practice in that region, both in engineering and architectural building, but principally the former.

The region contains a great variety of valuable, useful and ornamental building stones, in unlimited quantities, for almost any purpose in building, except for highly ornamental cutting such as can be done with the Ohio and similar free stones—of that there may be said to be none or next to none. When I mention a stone that will cut well, I mean the good ordinary cutting for general building, as distinguished from a stone that can be easily cut for ornamental purposes, as before mentioned.

The subject, to do it justice, would require a large volume instead of a short paper; the following notes, on that account, may appear to be rather fragmentary.

I do not speak of the different building stones from a scientific, but from a practical point of view, as I saw them.

Geology divides the rocks in this territory into two general groups—the primitive or igneous formations, and the sedimentary rocks, comprising the Lower Silurian groups. The first covers perhaps two-thirds of the district, and, for our purpose, may be divided into "Granite Proper" and the "Laurentian." The other comprises the "Potsdam Sandstone," the "Trenton and Black River" groups of limestone, (which I will for the sake of brevity call the "Trenton group") and the "Utica Slate," which latter, however, does not furnish any good building stone worth mentioning.

I will take them in the above order.

GRANITE PROPER.

This is not found exposed in many places, or covering a large area. The best I know of, and the most accessible, is in the vicinity and north of Gananoque, especially at Charleston Lake. There it can be obtained, free from flaws, in any desired size. It is, of course, as all granites are, hard to quarry and hard to cut, but breaks out well with the plug and feather, and, although hard, cuts well and takes a fine polish. It varies in color from light grey to a beautiful mottled red, closely resembling and fully equal to the celebrated Peterhead granite. It looks its best when polished, as in pillars, &c., but would also be admirable for basements.

Granite is found also at several places in the counties of Lanark, Renfrew, Addington, and on the Ottawa, but I do not remember any of them in those localities that are at present easily accessible. Some granite has been quarried near Gananoque, but to such a limited extent, and not at all in the best localities in which it is found, that it may be considered as yet unknown to the general public.

LAURENTIAN.

Wherever this prevails it generally furnishes fairly good stone for rough rubble work. In many places gneiss is found in courses from 6 to 10 inches thick, with good natural beds, not requiring much dressing, varying from nearly white to dark grey, but can hardly be considered a desirable stone to take to any distance, although useful in its immediate locality.

But the strong point in the Laurentian is its crystalline limestones, marbles, serpentines and dolomite. They are found all over where the Laurentian prevails in great variety—generally coarsely crystallized, although often fine grained. In color generally pure white, light and dark grey, white and grey mixed, or beautifully streaked and mottled with grey and white, or light and dark grey. It is sometimes nearly black, often green, mottled green and white, and sometimes pink, salmon-colored and yellow, and various other colors and mixtures. Generally the crystalline limestones are more in masses than in beds, although sometimes found in well-defined courses from 6 to 24 inches thick, with good natural beds. Stones of almost any desired size can be taken out. They are fairly easily quarried—much easier than granite—break well with plug and feather, cut well, almost always take a fine polish, even when very coarsely crystallized, and are generally very durable. At Portage du Fort and many other places along the Ottawa they are found pure white, or nearly so. In the townships of Dalhousie, Lanark, Pakenham, but especially at and near Arnprior, where is obtained the well-known "Arnprior marble," they are light grey, grey and white, or light and dark grey mixed, with the markings often very beautiful. These, although giving splendid dimension stone and ashlar, are rather too sombre in hue to be ever much in demand for ornamental purposes. They would be good in basements, or sawn into pavements, &c.

In the mountain, only a few hundred yards from the Calumet station on the C. P. Railway, there is a large mass of green mottled serpentine, which could be taken out in pieces of any required size. It is not very coarse-grained, can be comparatively easily quarried, cut or sawn, and shows a beautiful green mottled surface when polished. Some 50 years ago a quarry of this was opened and a small mill built on the Calumet River close to the quarry to saw it, but I do not know if any was ever sawn and put on the market. Since then it seems to have been forgotten. It should make good pavement for halls, green-houses, &c., and might be used to advantage for many other ornamental purposes.

At Massonog Lake, in the township of Barrie, some 15 or 20 miles north of Kaladar Station, on the Toronto branch of the C. P. R., there is a mountain of marble, mostly white, rising almost perpendicularly out of the lake to a height of 300 feet. It is fine in grain, resembling in appearance the well-known Italian and Vermont marbles, but all the specimens I have examined contained small particles of quartz, which is a serious drawback to its cutting or polishing. It is situated in a wild, almost uninhabited part of the country, and it is therefore probable that it has not yet been carefully examined, nor any regular quarries opened. If that were done intelligently, no doubt some valuable beds of marble would be found in it. As before mentioned, it is mostly white, but some parts or beds are a beautiful light pink, and some spotted and mottled with black, grey, red and other colors.

Near Renfrew a rather fine-grained kind is found, which is white, prettily spotted with light gray or blue, and sometimes with red. Near Bridgewater it is found black and white, or what might be called "pepper and salt."

The white coarsely crystallized marbles when polished, and they take a very fine polish, are often very beautiful on account of the irridescent effect of the large crystals. In Huntley, Darling and several other places there are found small masses of these marbles—light pink, salmon-colored and yellow. They are generally as yet unexplored.

All the crystalline limestones would give good paving for halls of public buildings, &c., and could be used for the thousand and one other purposes which will suggest themselves to the architect. The quantity is unlimited and the variety endless.

POTSDAM SANDSTONE.

This produces generally a hard and often coarse-grained sandstone—sometimes pure white, but oftener yellowish white, or yellow—often red, or streaked with red and yellowish white, or two or three shades of red, and sometimes white or yellowish white beautifully mottled and streaked with dark purple. It often contains a good deal of iron, which, when exposed, oxidizes and gives an appearance of age to the building, not at all unpleasing to the eye.

Some beds in many places, such as near Pembroke, in Ramsay, near Pembroke; in Ramsay, near Almonte; at Lombardy, near Smith's Falls; in North Elmsley, near Perth, and several places along the Rideau Canal, it gives really good dimension stone of the various colors mentioned, and can be got in courses from 12 to 24 inches thick, with good natural beds, requiring little dressing to lay close joints. The thicker beds often cut fairly well, and sometimes would almost merit the term of free stone.

At Dog Lake, on the Rideau Canal, I have seen it in thick courses of a pleasing light red color. This would make good dimension stone, or good rubble, as it splits parallel with the natural beds. It is coarse in grain but cuts well.

In Ramsay at Lombardy and at Pembroke some beds are white or yellowish white, a good example of which may be seen in the Court House at Pembroke, and several buildings at Smith's Falls.

The Potsdam produces splendid rubble stone in a great variety of colors, almost always pleasing—quarries easily, generally with good, natural beds, and, although hard, can be easily shaped for use with the hammer or point.

At or near Hudson, on the Ottawa, it is found of a reddish color, a good example of which is the new Catholic church at Oka, opposite Hudson. At Pembroke, besides white, it is found red, or striped red and white, or with two or three shades of red, a good example of which is the new Government buildings at Pembroke. In Beckwith, some six miles from Carleton Place, and 2½ miles from the railway, and also in the township of Montague, it is in beds from 4 to 10 inches thick, nearly white, can be quarried easily, has true natural beds, and can be laid up as easily as brick, without any further preparation than breaking to sizes required. In other places, such as Huntley, Ramsay, &c., I have seen it with a white or bluish glassy appearance, often translucent but very hard.

In North Elmsley, near Perth and near the Rideau Canal, there are large quantities white, yellowish white or bright yellow, and the same colors, beautifully striped and mottled with dark purple. It is easily quarried and requires little dressing for use as coursed or broken coursed rubble. Good examples of it can be seen in the railway station at Perth and in the new Government buildings at Almonte, Carleton Place and Smith's Falls. These Government buildings are trimmed with Nova Scotia red sandstone, which matches the rubble very well. It looks well also trimmed with Credit Valley stone and with Ohio free stone. Near Ottawa it is abundant in good form for rubble, as may be seen in the Parliament buildings at Ottawa, which, as trimmed with Ohio free stone, show to great advantage the beauty of this class of rubble stone.

THE TRENTON GROUP—LIMESTONE.

This covers a large area and produces our best stone for heavy work, such as canal locks, railway bridges, &c. It is generally a nearly pure carbonate of lime, sometimes mixed with carbonate of magnesia, and often carries a large proportion of sand. I, in common with many of the engineers in Eastern Ontario and Montreal, divide it into two classes, called for want of better names, "Grey" and "Blue," although the color designation is somewhat misleading.

For dimension stone, the "Grey" is found in even beds from one to three feet thick. It is easily quarried, breaks out well with plug and feather, cuts easily and well and is very durable. The grey has a coarse or open grain, and shows a torn or ragged fracture when broken. It produces excellent dimension stone for building. It is abundant and good at Terrebonne, back of Montreal, at Caughnawaga, at East Hawesbury, at Cumberland, at Gloucester, at Hull and at many other places. Examples of its adaptation to the better class of building may be seen in the Court House, the Quebec Bank and other buildings at Ottawa, and in several buildings at Hull. It also gives good rubble, easily dressed into what is locally known as "shoddy."

The "Blue" is fine and close in grain, breaks with a sharp clear cut and often conceidal fracture, presenting a glassy surface. It does not cut nearly so well as the grey, often eating out before the tool, leaving concave hollows. It is not so durable as the grey, nor does it give as good results for dimension stone. It produces abundance of rubble; in fact it is the most commonly used stone all over the country where it can be got, as it is comparatively soft, easily quarried, and requires little preparation for use. The "Blue" is generally bright in appearance when first quarried, but unfortunately fades in a few years and becomes a "sickly" white, as may be seen at Kingston and other places. It makes a poor contrast trimmed with Ohio free stone, but looks much better with the yellow sandstone of the Potsdam formation.

Near Cornwall, near Pakenham and some other places there are thick beds, fine-grained, which take a fine polish, and are first black, with a few white spots when polished. These can be easily sawn, polished and used for paving, and also for any other purpose where it is desirable to use a black marble. They are locally called "Black Marble."

In the township of Beckwith, close to Carleton Place and the C. P. Railway, there is a large quantity, which, as far as I know, is unique. It is of the grey variety, as far as texture is concerned, and is in masses, not having very clearly defined beds, but is easily quarried to any desired size, tools and bush hammers very well, and is really a valuable building stone, although unfortunately the color—a dark grey brown, gloomy in appearance—is much against it. However, it does well in basements, making a ground work from which to start a brighter superstructure. It is now being quarried extensively, and is used in all the towns and villages for a considerable distance in every direction, for sills, lintels, corners, plinths, &c., for which it seems to be well adapted. It is known as "Beckwith Stone" and is a nearly pure carbonate of lime and magnesia, carrying only 3% of silica or other impurities indissolvable in hydrochloric acid. Strange to say, it is often erroneously called free stone or sand stone. A somewhat similar stone is found in Maitland, but it is not so dark in color, and is not nearly so good.

All the region I have spoken of is rich in valuable building stones, of very varied colors and qualities much more so than the western part of the province, and could be drawn on to advantage for buildings in the rapidly growing city of Toronto—the only objection being that they are generally somewhat harder than the Toronto builders have been accustomed to.

I have spoken only of what I have seen myself. As a large portion of the district is as yet comparatively unexplored, or little known, no doubt what I have enumerated does not nearly cover the whole field.

In concluding I will take the liberty of recapitulating the building stones heretofore spoken of, which could be advantageously brought to and used in Toronto:

Granite—Especially that from Charleston Lake and in rear of Gananoque and Kingston.

The various Crystalline Limestones or Marbles of the Laurentian formation.

Dimension Stone and Rubble, especially the latter from the Potsdam sandstone. The rubble could be used, either coursed, broken coursed or random, in churches, detached private residences, &c., either trimmed with Potsdam, or with Credit Valley, or Ohio stone.

From the Trenton group, black limestone or "black marble," and the "Beckwith stone."

All of the above can now be obtained close to railways or navigation, although in many cases the quarries are not being worked at present, but soon would be if there was any demand for the stone.

I will be glad at any time to furnish any further information I can as to where and how any of these building stones can be obtained if wanted.

*Paper read before the Ontario Association of Architects.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

The following is the Code of Engineering Ethics recently adopted by the Canadian Society of Civil Engineers:—

DUTY OF THE ENGINEER TO HIS CLIENT.

1.—Every member of the Society should perform the work he undertakes to do to the best of his ability and in the true spirit of his engagement, feeling it to be his duty to present all ascertained facts in their true light.

THE CLIENT'S OBLIGATION TO THE ADVISER.

2. The Civil Engineer has a right to expect from his client the same consideration and deference to his opinion as is by their clients accorded to the members of other professions—Law and Medicine for example—and without which the adviser should decline to advise. The surest way for the Engineer to obtain such necessary consideration and deference from the public will be found in his manner of carrying himself.

MUTUAL RELATIONS OF CHIEF AND ASSISTANT.

3.—The Assistant Engineer must loyally obey and support his Chief, to whom it will be his duty to report directly on all matters relating to the work or which they may be jointly engaged. His report should be full and explicit on all important points and exact to the best of the Assistant's knowledge and belief, eschewing nothing, even though going to show that previous reports have been inaccurate or not duly weighed in some particulars affecting the well being of the business in hand.

4.—The Assistant Engineer is entitled to look to his Chief for, and to receive from him, advice for his guidance in the proper performance of his duties and, where right, to expect his support in matters in dispute between him (the Assistant) and his subordinates or between him and the contractors working under him. He is also entitled to the aid of the Chief Engineer's professional experience or counsel where unlooked for or extraordinary difficulties present themselves or changes of original plan may be called for in the work on which they are associated, so that responsibility may be fairly apportioned between them.

5. It is the duty of both Chief and Assistant, each in his department, to study proper economy in the doing of the work, the management of which they have undertaken, and in every way consistent with the maintaining of the good character of the work to make the client's interest the guiding object.

6.—The Engineer may legitimately suggest experiments with a view to improvement whether in methods of doing the work which he oversees or for raising its character, but such experiments should only be undertaken with the full consent and cooperation of the party, whether client or contractor, on whom the expense may fall, and on the understanding that to them will accrue all pecuniary benefit from the success of the experiment.

7.—It shall be considered unprofessional for any member of this Society to seek the position of an expert to report on any work that is in charge of a recognized Engineer.

8.—It shall be the duty of any Engineer before examining any work with a view to report thereon to give the Engineer due notice before going on with the investigation, in order that he may have every facility to explain and sustain his methods of carrying on the work in question.

PROFESSIONAL SERVICES OF ENGINEERS TO EACH OTHER.

9.—Interchange of professional assistance between members, as tending to promote fraternal intercourse and mutual good-will is not to be discouraged, but neither is it to be considered obligatory on a member to respond to the request of a fellow-member for professional counsel or assistance. Service so rendered must be entirely voluntary on the part of the member whose aid is sought.

PECUNIARY MATTERS, ADVERTISING, ETC.

10—The Civil Engineer may consistently with professional status take out patents for new inventions or for improvements on old ones, and may sell or otherwise dispose of the patents for his own advantage. He may undertake surveys and the engineering of works by contract, or he may take contracts for the construction of works on a percentage of their cost. Advertising with a view to attracting business should, where resorted to, be as far as possible free from egotistic or self-laudatory references and expressed in language not derogatory to the dignity of the profession.

DUTIES OF THE ENGINEER TO THE PUBLIC.

11.—The Civil Engineer whose advice is sought in respect to the usefulness, practicability and cost of a work should before expressing his opinion obtain reliable information on all points involved in the matter submitted to his judgment, including the probable paying capacity of the contemplated undertaking. He must be cautious how he recommends large preliminary outlay; should avoid connecting himself with schemes or projects of merely speculative character, always bearing in mind that his professional reputation will be to a great extent judged by the inherent merits and commercial value of the undertakings with which his name may come to be associated.

At the ordinary meeting of the Society held at 112 Mansfield St., Montreal, on the 13th February, the President, Mr. Herbert Wallis, presided. The evening was occupied in the discussion of Mr. W. Bell Dawson's paper on "Retaining Walls," in which Messrs. H. Irwin and J. G. Kerry took a prominent part.

At the meeting on Thursday, February 27th, at which Mr. Wallis, the President, also presided, a paper on the Penn Yan (N.Y.) Waterworks by Mr. Angus Smith, student of the Society, was read by the Secretary. There was also a debate on the following resolution: "That engineering works should be constructed by day's work under the immediate direction of an engineer instead of being done through a contractor." The debate was opened by Mr. W. J. Sproule, and was taken part in by Messrs. Wallis, Irwin, Smith, Kerry, and others.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

BUILDING RIGHTS AND MEASUREMENTS.

MONTREAL, Jan. 25, 1896.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR, As there are differences of opinion, would you kindly give the law of the Province of Quebec which governs the following questions concerning walls:

1st. If the foundation of a building requires to be planked or concreted say 6 feet wide, do the respective proprietors pay 3 feet each? If the footings are 4 feet wide when there is no plank or concrete, do they pay 2 feet each, presuming in both cases there is a 2 foot stone wall built on it? And do each pay 3 feet or 2 feet of excavation respectively, or just the thickness of the 2 feet wall?

2nd. How many feet English measure are there in a toise of masonry.

3rd. How many bricks are there in a cubic foot of brick work, and does the different thicknesses of a brick wall make any difference in the number? By answering the above in your next edition you will greatly oblige.

A SUBSCRIBER.

[ANSWER.—According to Act 512 and 513 of the Civil Code of Lower Canada, all those that have right to community of wall are obliged to contribute to repairs and reconstruction to half the amount of value of the whole portion of said wall they use, unless they abandon their claims to community. 2nd. The practice in Montreal is to count 80 cubic feet in English measure per toise; measurements vary, however, according to locality. 3rd. A square foot of brick veneering is assumed to contain 7 bricks, an 8 inch wall 14 bricks, and although at this rate a cubic foot of brickwork should contain 21 bricks, it is generally reckoned as 20, there being a little less than 21 bricks in a cubic foot.—EDITOR C. A. & B.]

FIRE RESISTING STRUCTURES.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR, Regarding the article which appeared under the above heading in your February issue, I beg to submit a resume of the report of F. D. Moore, President of the Continental Insurance Co., and a member of the Board of Examiners of the Building Department of the City of New York. This gentleman says he has visited and examined the Manhattan building in his official capacity, and clearly states that the cause of the accident was due to the box girder supporting the floors not being protected; it sagged and carried the upper floors along with it. Mr. Moore also calls attention to one part of the building, composed entirely of wood and glass, which burned fiercely.

This gentleman's report is, in my humble opinion, of far more importance than the opinion of chief Bonner, who, as a fireman, sees a building only when it is on fire. For a man like Chief Bonner to pass an opinion on fireproof buildings, of which he knows nothing, is simply ridiculous. Chief Bonner should learn first that iron which is not properly protected, is not considered fireproof by any one who knows what constitutes a fireproof building.

What does chief Bonner now think of his wooden buildings in the light of the Troy and Utica fires? The buildings, destroyed in those fires were, according to your statement, the kind he recommends. I would say further, that New York City should never be taken as an example as regards fireproof construction. I dare say there are thousands of buildings in New York that are called fireproof, but judging from what I have personally seen, I am sure that not one-half of them are actually fireproof. There is no law to prevent anyone from calling a cow shed fireproof if he chooses be may advertise it, post up notices all over that the building is fireproof, and no one may be the wiser until it takes fire; then men like Chief Bonner will say fireproof buildings are a failure.

I see only one remedy for this condition of affairs, and that is for the government to appoint an expert, and make it a criminal offence for anyone to advertise a building as fireproof without a certificate to that effect from the government expert. If that were done you would be surprised to see how few really fireproof buildings there are, and how easily they could be made fireproof, and those who intend to put up a really fireproof building would be protected against unscrupulous competitors with their cheap imitations as well as against fraud and ignorance.

Yours truly,

N. T. GAGNON.

TESTS OF CANADIAN BRICKS.

By the courtesy of Mr. Kivas Tully, chief architect of the Public Works Department of Ontario, we are enabled to publish the accompanying table showing the result of tests of Canadian pressed brick made during the past three years for the Public Works Department under Mr. Tully's direction. The tests were made in the laboratory of the School of Practical Science, Toronto. The table of results is as follows:

FORM IA SHEWING SIZES, TESTS FOR ABSORPTION, ETC., OF PRESSED BRICK MANUFACTURED IN ONTARIO, MADE BY MESSRS. TULLY AND WRIGHT AT SCHOOL OF PRACTICAL SCIENCE, TORONTO.

No.	Label.	Dimensions of Brick—Length, Breadth, Thickness.	Cubic Contents	Weight in ozs. after 4 hours drying.	Weight in ozs. after 4 hrs. in water.	Absorbed ozs.	Weight per cub. inch in ozs.	Specific gravity.
1.	T. Nightingale.....	8.42" x 4.12" x 2.46"	85.38"	88.40 oz	100.28 oz	11.52 oz	1.04	1.76
2.	Boyd.....	8.36" x 4.11" x 2.36"	80.81"	82.25 oz	94.57 oz	12.32 oz	1.02	1.82
3.	R. P. B. Co.....	8.38" x 4.11" x 2.48"	85.02"	90.44 oz	102.42 oz	11.62 oz	1.06	1.87
4.	T. P. B. Co.....	8.39" x 4.11" x 2.40"	82.73"	84.21 oz	97.17 oz	12.37 oz	1.02	1.76
5.	Don.....	8.38" x 3.99" x 2.35"	78.575"	92.33 oz	99.41 oz	7.8 oz	1.08	2.03
6.	Ontario.....	8.45" x 4.18" x 2.42"	85.670"	95.63 oz	106.40 oz	10.4 oz	1.12	1.94
a7.	Description.....	8.04" x 3.85" x 2.34"	72.432"	79.40 oz	90.24 oz	10.48 oz	1.10	1.90
b8.	Garson P. & Co.	8.75" x 4.25" x 2.5"	92.968"	93.32 oz	110.48 oz	17.16 oz	1.09	1.74
c9.	Garson P. & Co.	8.37" x 4.1875" x 2.5025"	86.868"	87	104	17	.98	1.67

NOTE:—As respects the durability and finish of the first six specimens, there is practically no difference; all are good with a slight difference in color.

"Don" (5) and "Ontario" (6) specimens were tested for crushing by Professor Wright 175,000, about 5,100 lbs. per cubic inch.

"Don" (5) shows least absorption; G. P. & Co. (b 8) and (c 9) show greatest absorption.

KIVAS TULLY, Architect.
Department of Public Works, Ontario, January 30th, 1896.

The South Kensington Work on "Building Construction," referring to the absorption test, says, "The amount of water a good brick will absorb is a very good indication of its quality. Insufficiently burnt bricks absorb a larger proportion, and are sure to decay in a short time. It is generally stated in books that a good brick should not absorb more than one-fifteenth of its weight of water. The absorption of average bricks is, however, generally about one-sixth of their weight, and it is only very highly vitrified bricks that absorb so little as one-thirteenth or one-fifteenth."

It is said by those who have made a study of the subject, that a brick may absorb a large percentage of water and yet not disintegrate easily. Disintegration is largely caused by water and frost. The water absorbed by the brick becomes frozen, causing the expansion and decay of the brick. Another cause of disintegration is lime, which under the action of water, burns out, and causes the brick to go to pieces.

It has been noticed that bricks which absorb less than 10 per cent. and upwards of 15 per cent. of water are better able to withstand the action of the water than those which absorb from 10 to 15 per cent. The water absorbed by the former is not enough to cause sufficient expansion to destroy the structure of the material, while the latter are so porous that the water absorbed quickly drains out again without allowing time for the destructive influence of frost to operate upon the brick. It is estimated that a brick which absorbs 20 per cent. of water will drain out the greater part of this water again in from 20 minutes to half an hour, so that unless frost sets in immediately after rain there is little danger of the brick being injured. A brick which absorbs say 12 per cent. of moisture is considered much more dangerous than one which absorbs 20 per cent.

As very little appears to be known with regard to the character and quality of Canadian manufactured bricks, we would be pleased to be furnished with any further information on the subject, and invite our readers who may be able to do so, to contribute data on this line.

ONTARIO ARCHITECTS' ACT.

WE are pleased to observe that the Ontario Architects' Act, embodying the amendments desired by the Ontario Association of Architects, has passed its second reading in the Legislature. The Association have taken pains to explain very clearly the meaning and effect of the proposed amendments, and the legislators with scarcely an exception have had the good sense to see that the measure is one which will operate in the public interest. As it is an unwritten law of legislative bodies that a measure which passes its second reading without serious opposition is entitled to a third reading, we look for the adoption of the measure at an early day.

ILLUSTRATIONS.

TORONTO, HAMILTON AND BUFFALO RAILWAY STATION, HAMILTON, ONT. WM. STEWART & SON, ARCHITECTS.

PROPOSED EAST END DEPOT FOR THE C.P.R. AT MONTREAL. GEO. B. POST, ARCHITECT, NEW YORK.

RESIDENCE FOR MR. F. T. FROST, SMITHS FALLS, ONT. J. A. ELLIS, ARCHITECT, TORONTO.

DESIGN FOR A TOWN HALL. EDWARD SWALES, ARCHITECT.

COMPLIMENTARY OF THE "ARCHITECT AND BUILDER."

WE have recently received a number of kindly worded letters from some of our subscribers, from which we take the liberty to print the following extracts:

"Many thanks for the copy of your New Year's number of the CANADIAN ARCHITECT AND BUILDER. It is a truly admirable production, and a credit to the arts and crafts of the country in every respect." Hamilton McCarthy, R.C.A., Toronto.

"I wish to say how much pleasure it gives me to receive the ARCHITECT AND BUILDER monthly, and how much it must please every subscriber to see its rapid progress. The present number is a piece of art for which the publisher deserves the highest credit."—James Mather, Architect, Ottawa.

"I desire to congratulate you upon the greatly improved appearance of your journal, as evidenced in the recent number, both as regards the illustrations, letter press and advertisements; the latter having sketch illustrations, are made more attractive, and consequently receive more attention at the hands of the profession." Geo. W. Gouinlock, Architect, Toronto.

STUDENTS' DEPARTMENT.

MAXIMS FOR DRAFTSMEN.

THE power of shading rightly depends mainly on lightness of hand and keenness of sight; but there are other qualities required in drawing dependent not only on lightness, but steadiness of hand; and the eye to be perfect in its power, must be made accurate as well as keen, and not only see shrewdly, but measure justly.

Nearly all expression of form, in drawing, depends on your power of graduating delicately; and the graduation is always most skillful which passes from one tint to another very little paler.

In darkness of ground there is the light of the little pebbles or dust; in darkness or foliage, the glitter of the leaves; in the darkness of flesh, transparency; in that of stone, granulation; in every case there is some mingling of light.

An entire master of the pencil or brush ought indeed, to be able to draw any form at once as Giotto his circle; but such skill as this is only to be expected of the consummate master, having pencil in hand all his life, and all day long, hence, the force of Giotto's proof of his skill. Ruskin.

THE STAIRCASE.

STAIRCASES, says the author of the Architectural Association prize essay on "The History and Development of The Staircase," have been conveniently classed under the following six descriptions: (1), the spiral or newel staircase; (2), the straight staircase; (3) that which goes round two, three or four sides of a rectilinear figure; (4), a central ascent with two branches; (5), the circular, semi-circular, or oval-open well staircase; (6), compound, composed of straight flight in conjunction with curves. The first two and the third of these we have already noticed as being the usual forms during the Mediæval and Transitional periods respectively, and we shall frequently find examples of the remaining three among the staircases of the Renaissance. The circular or oval well staircase was really the mediæval spiral staircase in an improved form. The fact of the mediæval newel being solid practically placed a limit on its diameter, but the open newel could be made of any size, and consequently the number of steps in each circuit increased, thus allowing the ascent to be made with a less number of revolutions, and greatly diminishing the inconvenience resulting from the varying width of each tread. Geometrical staircases were not introduced till the latter part of the reign of Charles II., and Sir Christopher Wren is said to have constructed the first in the south-west Tower of St. Paul's Cathedral. Winding staircases were very often used during the Renaissance, especially in its earlier stage.

TORONTO SKETCH CLUB.

A meeting of the Toronto Sketch Club was held at the office of Messrs. Strickland & Symons on Tuesday, Jan. 21st, when Mr. Wickson acted as critic. The subject for competition was the Corner of a Court Yard shewing a Tower, Gable and Entrance—view taken from inside. This was a study in composition and grouping more than detail. The designs were not so numerous as on previous occasions as the subject was rather difficult for the junior members. Mr. E. R. Rolph took first place for the draughtsmen with a design in French Gothic, and Mr. Melville P. White first place for the students.

A meeting was held on Tuesday, Feb. 4th, at Messrs. Curry & Baker's office. Plans were submitted for a farm house for a farm of 100 acres, the owner of the house to work on farm. Mr. Baker criticised the various drawings and considered them all too elaborate for a house of the requirements. The kitchen should be the most important room in the house, whereas the drawing-room in nearly all cases was given the most study. They were more suitable for a gentleman farmer that would have a smaller house attached for farm hands. Mr. C. P. Meredith took first place for the students. The next meeting will be held in Mr. Langton's office on Tuesday, Feb. 18th.

THE SUBURBAN HOUSE.*

By R. J. Edwards.

When I was asked by our esteemed Secretary to contribute a paper for this occasion, I may say it was on the spur of the moment I consented; and I have since found it was more easily promised than accomplished in the short time at my disposal. You will, therefore, I beg, expect but a sketchy treatment of the subject I have chosen. I am not sure but that that is the proper treatment anyway, for a too-ambitious is not, perhaps, the best spirit in which to approach the subject in actual practice.

The kind of house I have in my mind is one that will be within the reach of the comparatively poor man. Though living in the city he has not lost, we will suppose, his love of the ideal sun and air of the country. In building his house he can obtain these for all the living rooms only by having it surrounded by sufficient open ground. Happily, the electric railway makes it possible to build where land is cheap without too great a sacrifice of time in journeying to and from business, and in this city he need not go outside the limits to obtain the advantages of the country, together with those necessities of modern life—water, sewers, gas, and I hope soon we shall be able to add, Sunday cars. The cost of the building may be anywhere from $2,000 up, according to the accommodation required.

I venture to say that architectural taste would gain immensely in this place if all fire limit restrictions were withdrawn, except in the more central districts, provided the houses were kept a reasonable distance apart. Nothing, in my opinion, has had so much influence in making the dwellings of Toronto commonplace as the absurd by-laws the people have imposed on themselves. The effect has been to build whole streets of attached brick or brick-fronted houses. Scores of streets have been architecturally ruined in this way, that might have been attractive had they been built up with detached frame or brick cottages on comparatively wide lots. I think you will all agree with me when I say that our most admired streets owe their beauty more to the well-kept grounds filled with fine shrubs and stately trees than to the houses, good as some of them undoubtedly are. Sherbourne would still be a beautiful street if the best houses were replaced by well-designed cottages costing even less than $2,000 each, while such streets as Brunswick avenue (it is mostly always avenue) would remain dreary looking if the closely-packed houses had been doubled in cost.

As architects, therefore, we have nothing to gain and much to lose by despising the low-cost dwelling as unworthy of serious attention. Though there is certainly "no money in it" for the architect, there is every other consideration to engage the best efforts of the best men. If we could imagine this a city of houses of good architectural treatment, each house standing free and, if you will, costing less than $3,000, how vastly would it be improved? If this is true of the whole, I may claim it is even more true of a part, for the part would have the advantage of contrast; and, therefore, every house of the kind that is built and turns out to be a success, is an example worthy of being followed, though not copied, and is a distinct gain to the taste of the town, out of all proportion to the importance of the building itself.

I shall not attempt to indicate what may be good or bad in the arrangement or plan of the house, as much will depend upon the habits and tastes of the occupants. I will say, however, that there should be a conservatory, no matter how small. The common idea is that this is an expensive affair both to build and to maintain. If small, the cost will be slight, and if the heating of the house is by hot water the conservatory will add little if any to the coal bill, and if by furnace, a simple coil can be arranged and operated without additional firing.

The purpose of this paper is to combat the tendency of the time to overdo the exterior of dwellings. People call them "residences" in the spirit which prompts them to name the streets and roads "avenues." As architects we cannot escape responsibility on the ground that our clients demand huge Romanesque arches and a profusion of meaningless carvings. Nevertheless we know to our cost, or even more, to our disgust, that we are not free agents, and that is why it is so much more difficult to practice than to preach. Still, there is nothing like knowing what we should do, even if we cannot often do as we ought, and I shall here briefly attempt to say what I think should be the characteristics of the building in question.

Whatever the materials of construction they should be rationally and truthfully used. There must be no imitations. The treatment should be temperate, having the true domestic feeling, with broad surfaces and deep shadows. The surfaces may be relieved by telling though not overworked detail in windows, recessed balconies, roomy porches, or a combination of verandah and porch. The entrance should be hospitable-looking, and no feature lends itself more happily to this end than the open porch with its roof a continuation of the main roof lines of the house. The great aim should be to get a good roof sheltering the whole, its bold lines and sparingly broken surfaces giving character to the design. It may be truly said that a really clever roof effect will make a success where without it all is lost.

In this country care must be taken to see that the snow will not lodge in long or shaded valleys, or slide directly upon the steps or walks or on the conservatory roof. No convenience or wholesomeness of the plan should be sacrificed to exterior effect. It is perhaps superfluous to say so, for decidedly the best design is that in which the outside effect grows out of and emphasizes the qualities within, like the face of a man who is devoted to good works. The treatment should suggest coolness in summer and comfort in winter—the former by its deeply shaded porch, balcony and eaves, the latter by its aspect in relation to the hours of sunshine by its spacious chimneys rising from the ground and locating the cheerful open fires in rooms where sunlight and a pleasant outlook are not unprovided for. Both these effects are enhanced by not having too large or too many windows.

There is nothing so good for our climate as the weighted sash window—and I say so after having earnestly tried to work out casements to open either inward or outward. It does not interfere with inside or outside shutters or storm sashes, and admits of moderate ventilation with the minimum danger from drafts. Unfortunately the two-light sash window is not an ideal feature, but it is wonderful how improved is the effect if divided into comparatively small, though not too small, lights. And I have found that if plate glass is used the outlook from within is in no way impaired, if, indeed, it is not actually improved, from the fact, I suppose, that one is conscious that the glass is between oneself and the outer air, which, after all, is the truth. The outside effect of the smaller glass is certainly pleasing, is more homelike and, therefore, more architectural in relation to the subject of this paper. Let me insist, however, on the use of plate glass, except in the less important windows.

Broadly speaking, you should bend your efforts to keeping as close to Nature as you can. Make your house appear to belong to the ground and the woods, and in this connection I cannot help saying I know of nothing in art nearer to the grey of the woods than a shingled wall, softly stained! If you stay as "near the grass" as possible you will favor low ceilings and will not be frightened by the uneducated critic, whose one word is "squatty."

Though I have not said anything original, I shall be satisfied if I have left with you the feeling that I have emphasized some truths.

*Paper read before the Toronto Architectural Guild.

PERSONAL.

Mr. Benjamin Dillon, architect, of Kingston, Ont., has opened an office in Renfrew.

Mr. K. Simpson, a railway contractor, died on the 10th of February, at Halifax, from pneumonia.

Mr. E. J. Walsh, C. E., who has been engaged for some time as colonial engineer in the Leeward Islands, has returned to Ottawa.

Mr. P. A. Peterson, of Montreal, chief engineer of the C. P. R., has been selected as vice-president of the American Society of Civil Engineers.

Mr. Charles Kessell, who was the architectural superintendent of the Administration and other buildings at the World's Fair, died in Chicago on the 6th of March.

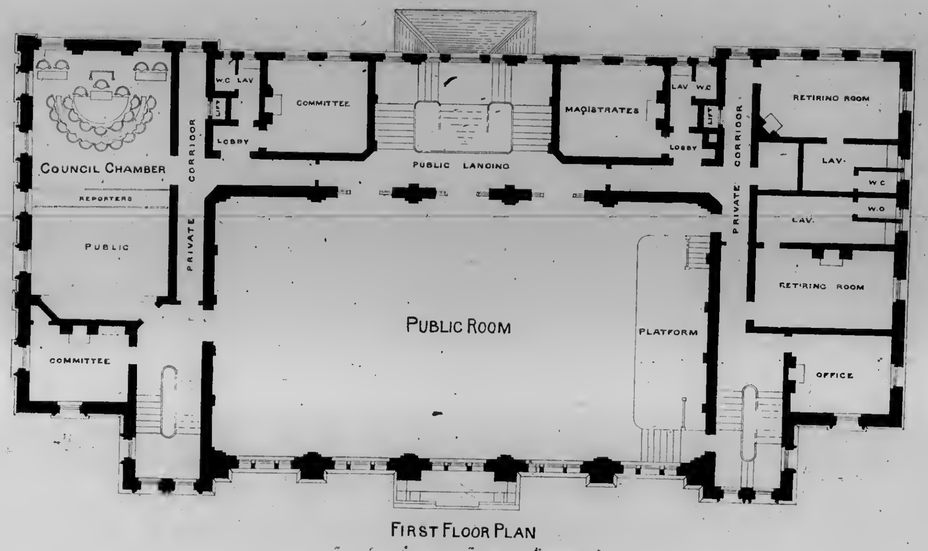
Mr. R. M. Hannaford, son of Mr. E. P. Hannaford, late Chief Engineer of the Grand Trunk Railway, has been appointed bridge engineer of the G.T.R., with headquarters at Montreal.

Mr. T. R. Johnstone, a leading spirit in the Toronto Sketch Club, and admittedly one of the cleverest young architects of the city, has removed to New York, where he hopes to find a wider field for his abilities.

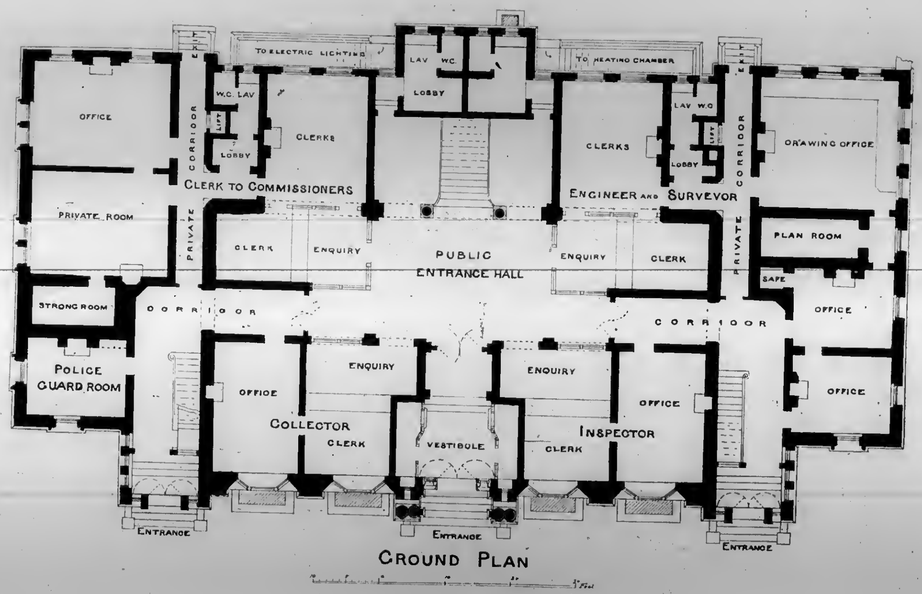
At the thirteenth annual meeting of the Master Plumbers' Association of Toronto, the following officers were elected for 1896: W. J. Burroughes, president; Jas. B. Fitzsimons, 1st vice-president; Jas. Worthington, 2nd vice-president; F. W. Armstrong, recording secretary: Thos. Cook, corresponding secretary; Al Fiddes, treasurer; J. E. Knott, sergeant-at-arms.

DESIGN FOR A TOWN HALL.

EDWARD SWALES ARCHITECT.



FIRST FLOOR PLAN



GROUND PLAN

DESIGN FOR TOWN HALL.

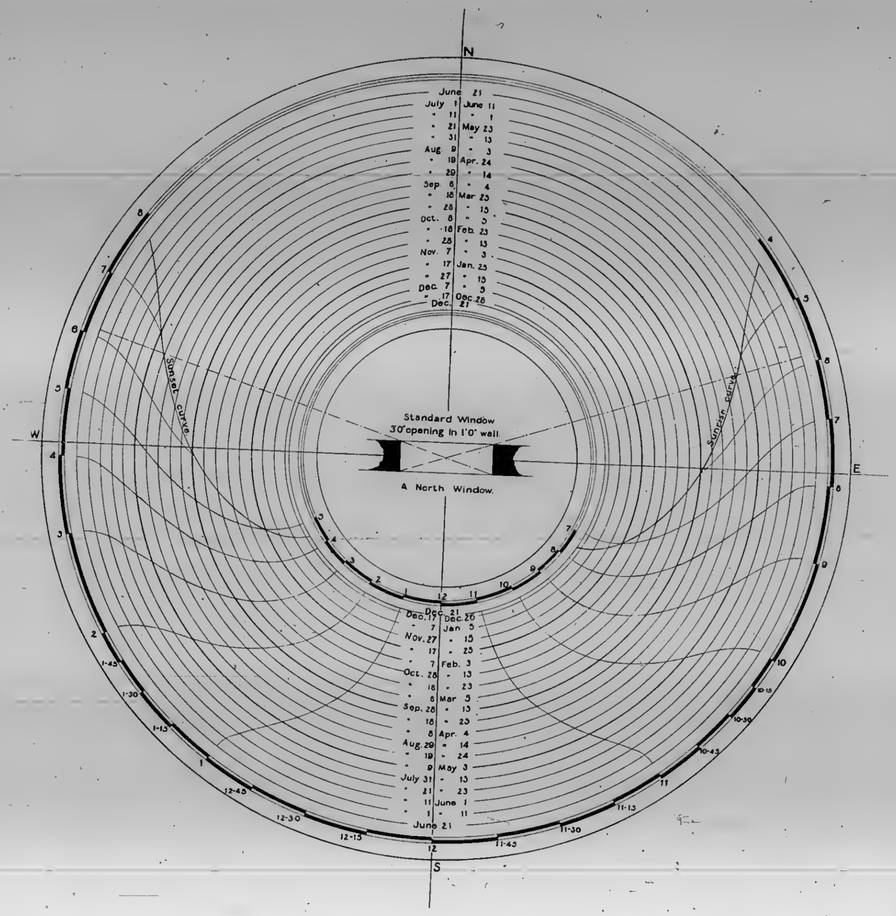
EDWARD SWALES, ARCHITECT.

PROPOSED EAST END STATION OF THE C. P. R., MONTREAL.

GEO. B. POST, ARCHITECT, NEW YORK.

TORONTO, HAMILTON & BUFFALO RAILWAY DEPOT, HAMILTON, ONT.

WM. STEWART & SON, ARCHITECTS.



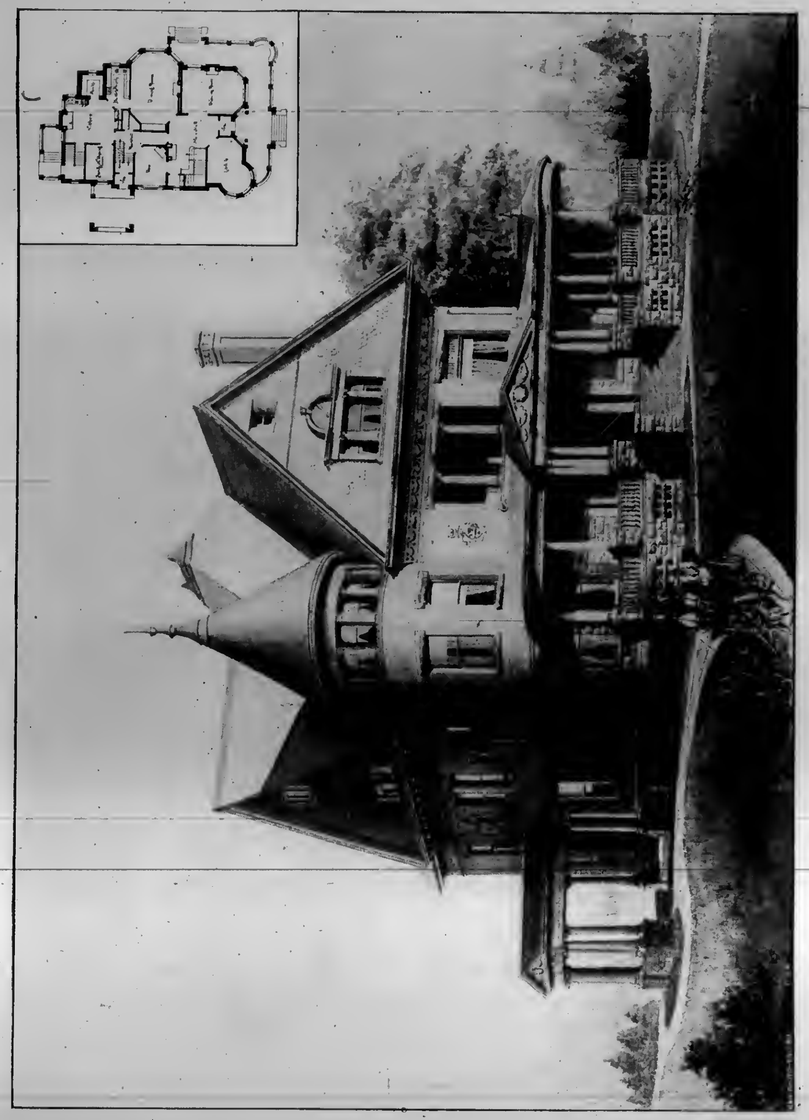
ASPECT COMPASS.

ARRANGED FOR THE LATITUDE OF TORONTO—USING APPARENT TIME.

The above compass is the one exhibited at the annual meeting of the Ontario Association of Architects by Mr. C. H. C. Wright, and gives the azimuth (direction) of the sun from sunrise to sunset for any day during the year.

Any architect, by applying a tracing of the plan of any dwelling or building to the compass, can at once determine the amount of sunlight entering through the different windows, and also the exact hours of available sunlight.

A north window is suggested in the diagram, and shows that the sun will shine through such a window on June 21st, from sunrise until nearly six o'clock in the morning, and in the evening from a little past six until sunset. Again on May 3rd or August 9th the opening will admit direct sunlight from sunrise until a quarter past five, and from a quarter to seven until sunset. After August 18th and until April 25th the sunlight will not enter the window.



RESIDENCE OF MR. F. T. FROST, SMITHS FALLS, ONT.
J. A. ELLIS, ARCHITECT, TORONTO.

CANADIAN ARCHITECT AND BUILDER.

VOL. IX.—NO. 4. APRIL, 1896 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisemnets should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	H. B. GORDON, Toronto.
1ST VICE-PRESIDENT	J. GEMMELL, Toronto.
2ND VICE-PRESIDENT	JOS. W. POWER, Kingston.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

F. J. ALEXANDER	Ottawa.
THOS. FULLER	Ottawa.
E. J. LENNOX	Toronto.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON — Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. C. HUTCHISON, Montreal.
1ST VICE-PRESIDENT	A. T. TAYLOR, Montreal.
2ND VICE-PRESIDENT	J. F. PEACHY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

CHAS. BAILLAIRGE	Quebec.
ROBT. FINDLAY	Montreal.
J. Z. RESTHER	Montreal.
A. H. LAPIERRE	Montreal.
G. E. TANGUAY	Quebec.
THEO. DAOUST	Montreal.

AUDITORS—A. J. FOWLER and C. CHAUSEE, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

JOHN ALDRIDGE, President.
THOS. CANNON, Jr., 1st Vice-Pres.
JOHN VICK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. BOOTH.
JOHN WICKETT.
JOHN RUSSELL.
H. LUCAS.
JOHN VOKES.
JAS. CRANG.
JOHN M. GANDER.
GEORGE HENRY.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

The Lien Laws.

AT the last session of the Legislatures of Ontario and Quebec important amendments to the lien laws of those provinces were adopted. At the request of some of our subscribers, and to give every reader an opportunity of becoming familiar with the present existing laws, we devote considerable space in this number to the publication in full of the Ontario Lien Act of 1896, and amendments to the Auge Bill in the Province of Quebec.

The Late Lord Leighton.

By the death of Lord Leighton, England has lost one of her greatest artists and art critics. Lord Frederick was perhaps the greatest authority on the law of Harmony while alive, and his sudden taking off will be a severe loss to the whole art world. Since Ruskin has ceased to be an active factor, no man's opinion on art or its productions have been read with such deference as those given out by Leighton. He was an authority on everything he deigned to discuss.

Color in Brickwork.

THE introduction of brick of different shades, and terra-cotta, in domestic architecture, is an innovation that is to be commended if not carried beyond the limits of good taste. Fine soft effects may be obtained by a proper interweaving of different shades of bricks from the same yard, if care is taken in choosing the pattern and selecting the bricks. This sort of work, however, should only be undertaken by persons thoroughly conversant with the law of color harmony, as in unskillful hands the commingling of color would be as likely to prove disappointing as otherwise. The practice of mixing red bricks with cream-colored ones, or vice versa, is one that should be discouraged, unless the work has been designed by an architect whose good taste is beyond reproach. Many buildings in towns, villages and country in Ontario are discords in red and cream—and sometimes, in red, cream and black, with facades like immense checker boards, or covered with sheets of the Cameron tartan. We have in our mind's eye a block of stores in a northern town, well adapted for the purpose for which they were built, faultless in construction and arrangement, and modern in all their fitments, but lamentably ugly on the front exterior, partly from faulty design, but chiefly because of the use of multi-colored bricks being employed for decorative purposes over the windows and in the cornices, over-profusely, and apparently without regard to law and order.

Value of Professional Journals.

PROFESSOR Roger T. Smith, F.R.I.B.A., concluded a lecture at University College, on Architects' Libraries, by saying: "Lastly, let me recommend the back volumes of the professional journals. In the course of years all sorts of architectural topics come up in the public press and before the professional societies, and if you hunt through the indices of these publications when you are seeking for information which eludes you in books, you will often be rewarded."

The Combination of Stone with Brick.

THE introduction of stone in brick buildings always has a satisfying effect, if not overdone, inasmuch as its mission is at once recognized by the eye and accepted as being legitimate and in good taste. A fair sprinkling of greystone in plinths, beltings, quoins, lintels and sills, is not inappropriate when judiciously distributed in the walls of a red brick building. In fact, the greystone tends to soften the monotony of a continuous red surface, and gives the eye rest, while it does no violence to refined taste. Where expense does not obstruct the way, it is much better to make use of stone as an interval, than of colored bricks.

Defective Construction.

THE sudden collapse of the skeleton skating rink at Orillia recently should prove an object lesson to corporations or others owning like structures. A curling match had just been finished, and all parties, including spectators, had just left the building, when the whole affair tumbled in on the ice that had just been occupied. A little earlier, and from 75 to 100 lives would have been jeopardised; indeed, parties who were concerned in the curling game assert that had the place been occupied, nothing but a miracle could have saved a life, as tons and tons of ice fell in with the debris. Buildings of this sort, intended for public gatherings, should be under some kind of municipal or government control.

An Interesting Point of Law.

THE Courts have been called upon to give decision in a very unusual case, and one in which builders might be expected to feel an interest. Several ministers of the religious sect known as Seventh Day Adventists, who, like the Jews, observe Saturday as the Sabbath, were brought before the Courts for violating the statute relating to Sabbath observance by engaging in the work of erecting a new church in the neighborhood of Chatham, Ont., upon a Sunday. The lower courts recorded a conviction against them, and the Divisional Court at Toronto, in view of the fact that it may be desirable in the public interest to have such a question settled, refused a motion to quash the conviction. At the original hearing the defendants' counsel contended that they were not within the prohibition of the enactment, not being mechanics, or laborers, or workmen pursuing their ordinary calling.

A Chair of Architecture at McGill University.

IN connection with the recent magnificent donation of half a million dollars by Mr. W. C. McDonald to McGill University, Montreal, provision is made for the establishment of a chair and course of instruction in Architecture. We learn that there is some probability that arrangements can be made for the inauguration of this course at the next session, the necessary accommodation being provided in one of the existing buildings. This is a consummation towards which the hopes of the architects of the Province of Quebec have long been turned, and its realization has given rise to a feeling of the deepest satisfaction. As a result of the course of instruction to be established at McGill, we may expect to see the work of the architects of the future characterized by a higher standard of ability and efficiency, and from this in turn will come a truer conception and appreciation on the part of the public of the essentials of beauty.

Troubles of A German Architect.

THE London Builder tells of an architect in Berlin who lately ran foul of grief because of his endeavor to punish the city councillors for not appropriating seventy-five thousand dollars towards the building of a church in memory of the late Emperor of Germany. Because of this refusal, the architect had an inscription cut upon a bas-relief in a conspicuous place which informed the beholder that the councillors of the city of Berlin were "camels" and "too mean" to contribute anything towards the building of the church. As the legend attracted a great deal of attention the city authorities soon heard of it, and determined to retaliate. It appears that the architect stood over the artist who made the inscription during the time he was carving it; and the officials of the city, as an act of poetic justice, forced the architect to stand by while another artist cut away the obnoxious inscription. This punishment seems to have been all the authorities felt like inflicting, but the act is likely to cause some trouble, as the Berlin Institute of Architects seem to think the dignity of the profession has been insulted, and something must be done to satisfy the wounded honor.

Aesthetic Teaching in The Public Schools.

IT is gratifying to see the Honorable Minister of Education recommending the teachers in our public schools to pay more attention to the cultivation of good taste in the school room. The Minister recognizes a truism in Keats' beautiful axiom, "A thing of beauty is a joy forever," that stretches far beyond the precints of the school. Beauty, no matter in what form presented, leaves a beneficient impression on the youthful mind. The object of beauty may be a bunch of artistically arranged flowers, a picture, a painted glass window, a well-proportioned carved desk for the teacher, or a tastefully designed stove or one or more of the thousand and one things that go to make up a school's outfit. It matters not what it may be, so it is handsome in form, decoration or color; it will attract attention, and educate the eye and mind of the pupil. The school itself should be made attractive in appearance, and should be built on recognized lines of good taste, even though it be but an humble affair. By all means let us introduce into our schools all the aestheticism consistent with economy and efficient teaching. As the result of it boys will become better men, and it will add grace and dignity to the growing woman, and make life more pleasant to all concerned.

Modern Tall Building Construction.

THE modern tendency to run up buildings into the clouds is taxing the engineering abilities of our architects to their utmost. Structures ten, twelve, or twenty storeys high, require much different treatment in their foundations than do buildings with less aspirations. By this

we do not mean that a greater depth or wider footings are required than are proportionate to the weight of walls, but that other methods of procedure are necessary. A building now being erected on the corner of Broadway and Ann streets, New York, is to be twenty-six storeys above the sidewalk. A skeleton steel frame, built in with a wall four feet thick for several storeys, then three feet, then two feet, until the top is reached. These heavy walls call for a special foundation, so constructed as to meet every possible condition of settlement. This is accomplished by building under the main columns a double shoe with its two parts just alike. These shoes rest on iron rails ten or twelve feet long, bedded in concrete. There are two or three layers of these rails, according to the character of the soil, and they are laid, first, side by side, until an exact square is formed, then the next layer is placed at right angles to the first, the whole being filled in with properly tempered concrete. The space between the two legs of this double shoe is utilized for holding a powerful hydraulic jack, which is placed directly under the centre of the pier and rests in the middle of the concrete and iron foundation. The object of having the jacks placed in these openings is to be prepared to raise the building to its proper level if any displacement should ensue during construction. While the manner of using a double shoe under piers is novel, the scheme of building in hydraulic lifts is not, for if we remember rightly, a number of jacks were built in the foundations of the Marquette Building, Chicago, Ill., for the same purpose.

SOME OBJECTIONS ANSWERED.

THE Canadian Manufacturer has recently devoted considerable space to a criticism of the action of the Ontario Association of Architects in seeking legislation to restrict the use of the title "Architect" to properly qualified persons. It admits the necessity of providing some means whereby incompetent persons would be prevented from planning and supervising the construction of important buildings. It, however, finds fault with the architects for proposing, in the event of legislation being obtained, to admit into the ranks of the profession all persons who have hitherto been engaged in the practice of architecture and known by the title of architect.

In effect, the Manufacturer says to the architects, "You place emphasis on the fact that it is important that the design and construction of buildings should only be entrusted to qualified men, and that you are desirous of raising the standard of architectural practice, but at the same time you propose to allow every man now practicing as an architect, no matter how incompetent he may be, to continue to call himself an architect and to design and erect buildings as he has been accustomed to do heretofore."

Will the Manufacturer give us a better method of raising the standard of architectural practice than the one proposed by the promoters of this Bill? The architects are simply doing the best they can under the circumstances. If they were to ask for the exclusion from the profession of every person now practicing as an architect who should not be able to pass a certain qualifying examination, we are quite safe in saying that the Legislature would not consider for a moment their application. It would at once see the injustice which would result to men who have spent years in the practice of architecture, if they were compelled, perhaps beyond the period of middle life, to abandon their calling or at least to pursue it under a different name. Seeing that it would not be possible to obtain legislation by which the standard of the profession might immediately be raised to the desired level, the architects have wisely adopted the more moderate course of asking for legislation by means of which the standard could gradually be raised. If the desired legislation were obtained, the number of incompetent architects would for a time remain as at present, but the door would be closed to additions to their ranks, and the coming generation of architects would be compelled to undergo a proper course of study and pass the necessary examinations to qualify them for the proper discharge of their duties.

The situation may briefly be stated thus: If the standard of architectural practice is ever to be raised, a start must be made in that direction, and if means cannot be found to immediately raise the standard to the required level, the architects are surely not deserving of censure for adopting a course whereby that object may be gradually attained.

ONTARIO ARCHITECTS' ACT.

WE regret to state that the Ontario Architects' Bill in the Ontario Legislature has again been withdrawn. The majority of the members of the Committee expressed themselves as having no personal objection to the measure, and the Bill was reported by the Committee to the House. The mover of the Bill deemed it wise, however, to withdraw it for the present, believing that the feeling of the House was not sufficiently favorable to insure the passage of the measure, and that the longer it is kept before the House the better its objects will be understood and the more probable will be its final adoption.

One of the strongest opponents of the Bill was the speaker of the House, who announced himself as being opposed on general principles to all such legislation, while unable to give any specific and satisfactory reasons for his opposition. He even went so far as to lobby against the Bill, a most unusual and undignified proceeding.

The great obstacle in the way of the measure appeared to be the inability of the legislators to understand the object which the architects had in view in seeking to obtain this legislation. They seemed to take it for granted that there must be on the part of the architects a personal object to be gained, and because they could not discover such an object they regarded the Bill with suspicion. In view of the suspicion in which the efforts of the architects are held and their methods questioned, it were much better that the legislation sought should be promoted by persons entirely outside of the profession. There are a large number of persons who thoroughly understand the necessity for such legislation as will elevate the standard of architectural practice in this province, and we believe it would be possible to obtain an influentially signed petition asking the Government to legislate on the question. The Government appears to be thoroughly in accord with the objects of the Bill, and we would be pleased if they could see their way introduce a Government measure dealing with the question.

A great many architects and builders now ride wheels, as they are found to be cheaper and more convenient than the regulation horse and buggy. The Vokes Hardware Co., Toronto, announce that they are sole Canadian agents for the Ben-Hur wheel, which has won for itself an excellent record. A catalogue giving full particulars may be had on request to the company.

SANITATION AND HEALTH

TORONTO MASTER PLUMBERS AND STEAM FITTERS.

The Master Plumbers' and Steam Fitters' Association, of Toronto, was organized in the year 1885, and although including only a portion of the employers in those trades, was a fairly successful organization. During the prolonged strike of the journeymen plumbers in 1888 the Association became quite active, and embraced nearly every employing plumber in the city. Since that time, largely owing to the depression in building operations, interest in the Association has to some extent declined. An effort has therefore been made during the past winter by some of the members to infuse new life into it, which effort has been successful.

To promote good fellowship and bring the members into closer touch with one another, the idea of an annual banquet was conceived. The event took place on Thursday evening, the 26th of March, and the success which attended it augurs well for the future of the Association. Shortly after eight o'clock the members and their friends, with business cast aside and wearing smiling countenances, put in an appearance at Webb's restaurant. Upwards of one hundred occupied seats at the table, among whom were many prominent plumbers of the city, representatives of the wholesale supply houses, civic representatives, and visitors from London.

As the jovial company took their seats around the festive board, there was no evidence to be seen of the hard times through which those connected with the building trades in Toronto have passed.

The members of the Association, nearly all of whom were present, are as follows :

W. J. Burroughes.	A. G. McCauley.
J. B. Fitzsimons.	W. H. Hewlett.
Thos. Worthington.	K. J. Allison.
F. W. Armstrong.	Geo. Wallace.
Thos. Cook.	P. J. LeCour.
A. Fiddes.	J. R. Seager.
J. E. Knott.	A. B. Webster.
Jas. Wilson.	Jas. Sherlock.
Jos. Wright.	Geo. Guest.
John Wright.	A. Cruickshank.
John Sim.	J. Aggett.
H. Hogarth.	W. Mansell.
Fred Armstrong.	A. Purdy.
W. J. McGuire.	W. Mashinter.
W. J. Guy.	D. Clark.
C. H. Beavis.	J. H. Parkes.
T. Gordon.	J. Harkley.
Wm. Erwood.	J. Monahon.
S. Meadows.	John Ross.
W. M. Watson.	Thos. Slean.
H. Richards.	R. Ross.
J. W. Oram.	Geo. McGuire.
J. H. Cairns.	

In addition to the members of the Association present, the following were noticed : W. F. McLean, M.P.; Ald. Hallam ; Ald. Bell ; Ald. McMurrich ; P. McMichael and Mr. Miller, of the Jas. Robertson Co. ; W. H. Carrick and T. B. Alcock, of the Gurney Foundry Co. ; Assistant City Engineer Rust ; Fred. Somerville, of the Ontario Lead and Barb Wire Co. ; A. D. MacArthur, of Craig, MacArthur & Co. ; H. W. Anthes, Toronto Foundry Co. ; W. J. Skelley, London; Mr. Smith, of Smith Bros., London ; W. J. Hazlett, London ; Mr. Stevens, London ; John Ritchie, Toronto; A. Fiddes ; W. B. Malcolm ; Robt. Fair ; James Morrison, of the James Morrison Co. ; W. C. Bullock, of John Perkins & Co. ; James Malcolm, of the Ontario Lead and Barb Wire Co. ; Andrew Taylor, of the Toronto Radiator Co. ; John Wayne, of the Polson Co., John Aldrich, president of the Builders' Exchange.

The President's chair was occupied by Mr. W. J Burroughes and the vice-chair by Mr. J. B. Fitzsimons.

After justice had been done to the menu, the President extended a few words of welcome to the members and their friends, and while feeling grateful for the large number present, expressed the hope that next year might witness an even larger gathering.

He then read letters of regret from the following : Mayor Fleming, City Engineer Keating, Medical Health Officer Sheard, Ald. Boustead, Lamb, Burns ; John M. Taylor, of the Toronto Radiator Co. ; Mr. Lamarche, president of the Montreal Master Plumbers' Association; J. W. Hughes, secretary Montreal Plumbers' Association ; Fairly & Stewart, Hamilton ; Adam Clark, Hamilton ; Everson & Hawkins, Oshawa ; John Boston, president Halifax Association ; Adam Hall, Peterboro ; Stevens Manufacturing Co., London ; Mr. McAvity, St. John ; Bennington & Bain, Windsor, Ont. ; John

MR. W. J. BURROUGHES,
President Toronto Master Plumbers' and Steam Fitters' Association.

McKinley, president of the Ottawa Association ; McKelvey & Birch, Kingston ; H. Dakin, Galt ; Steel Clad Bath Co.

Attention was next directed to the toast list. "The Queen and Royal Family," was responded to by the company singing the national anthem.

The toast of the "Lieutenant-Governor and Parliament of Canada," brought Mr. W. F. McLean, M. P., to his feet. He apologized for so much time being taken up by Parliament in discussing a question affecting race and creed, and thought the development of the resources of our country should receive more consideration. "Last week," he remarked, "we were in session night and day, and I am sorry we had not a master plumber among us to charge double price for over-time. Your Association is formed to regulate prices and make a living profit, and I believe every Association thus formed should be supported. I therefore congratulate this Association, and wish it prosperity."

"The Maple Leaf Forever," was sung in honor of the toast "Canada Our Home."

With the toast "The Mayor and Corporation of Toronto," the President coupled the names of Ald. McMurrich, Bell and Hallam.

Ald. McMurrich declared that plumbers came next to doctors in his estimation. The public, as a rule, did not give sufficient attention to plumbing. The alderman referred to the movement to transfer the plumbing department to the control of the Medical Health Officer,

and expressed the hope that the change would prove beneficial.

Ald. Hallam followed, and took occasion to make a hit at the plumber's bill. "If you get as good returns from your banquet as you do from your bills," he said, "you will have enough to keep you feasting until the end of the world." Regarding legislation he promised his support to any movement which is in the interest of the public, and he had confidence that the plumbers will only ask for what is right.

Ald. Bell said he had always coincided with the views of the plumbers, and declared that the amendments to the Plumbers' By-law, which were secured at the solicitation of the plumbers, had resulted beneficially to the public.

The toast of the "Manufacturers and Wholesale Supply Men," was proposed by the Vice-President, and the manner in which it was received showed that little friction existed between the plumbers and manufacturing firms.

Mr. Carrick, of the Gurney Foundry Co., was the first to respond. He regretted the unavoidable absence of their president, but assured the members of the Association that his firm would do all in their power to meet the demands of the trade.

Mr. James Morrison congratulated the Association upon the success of their banquet, and expressed himself as willing to assist in improving the plumbing trade.

Mr. P. McMichael, of the James Robertson Co., was satisfied that the Association had the sympathy of the manufacturers, who, he believed, would do everything in their power to place the trade on a solid financial basis.

The next response came from Mr. W. B. Malcolm, who said : "Within the past few years conditions in the plumbing trade have greatly changed. Some time ago it was necessary to keep a number of men to make up baths, soil pipe, etc., but now this has passed into the hands of the manufacturers, and the plumber has very little for his men to do. This has brought about keen competition, and prices are therefore cut very fine. It is necessary that the manufacturers should join with the plumbers to maintain prices. In this way the manufacturers would be benefitted, as there would be fewer failures."

Mr. Somerville, of the Ontario Lead and Barb Wire Co., also promised the Association the sympathy and co-operation of his firm.

Mr. MacArthur, of Craig, MacArthur & Co., said : The progress and growth of the plumbing trade is one of the wonders of civilization. No man works harder and receives less remuneration for his services than the plumber, except, perhaps, the supply man. Instead of plumbers receiving more than a just amount for their work, it is quite the reverse. Show me a retired plumber. They are not to be found, but in nearly every other trade or profession it is possible to retire after fifteen or twenty years of active business.

Mr. Andrew Taylor, of the Toronto Radiator Company ; Mr. Stephens, of London ; Mr. Wayne, of the Polson Co. ; Mr. Anthes, of the Toronto Foundry Co. ; and Mr. Bullock, of the Perkins Boiler Works, each spoke briefly, complimenting the Association and promising their hearty support.

With the toast of "Our Guests" were coupled the names of three representatives from London, Messrs. Hazlett, Skelly and Smith.

Mr. Hazlett said that they had tried three or four times to form an Association in London, but without success, and now they were going to make another attempt. They had come down to the banquet to get some ideas, and he hoped next year he would be able to return the courtesy of an invitation.

Mr. Smith and Mr. Skelley also made some brief remarks, referring to the difficulty experienced in forming an Association in London.

The President then invited all the members of the Master Plumbers' and Steam Fitters' Association to meet the London delegates at the Builders' Exchange at 10 o'clock the following morning, for the purpose of discussing the formation of an Association in London.

Mr. John Aldrige, President of the Toronto Builders' Exchange, responded to the toast of "Sister Associations" in a few brief but pointed remarks. He hoped the plumbers would shortly form a provincial Association.

Messrs. Kirk and Meadows replied to the toast of the "Plumbing Inspectors of Our City," and Messrs. Alcock and Meadows to that of "The Ladies." "The Press" was acknowledged by representatives of Hardware and Metal and the Canadian Architect and Builder.

Although the hour was late, the opportunity of drinking the health of the Association was not allowed to pass. The toast was proposed by Mr. MacArthur, in response to which the President, Mr. Burroughes, expressed regret that there were so many illegitimate plumbers in the city of Toronto. He believed that membership in the Association should be sufficient qualification for a plumbing license, and no man should be given a license who could not pass a qualifying examination. He intended to use his efforts to improve the trade. (Cheers.)

The Vice-President and Secretary-Treasurer were also called, and expressed their belief in the possibility of bringing about an improved condition of the trade.

The entertainment feature of the evening's programme was as follows : Songs by Messrs. Bullock, Alexander, Ernest Williams, John Ritchie, R. J. Hazlett, Beavis and Ald. McMurrich ; comic speech by Mr. Palmer ; humorous reading by Mr. James Malcolm ; ventriloquism, Mr. Simpson.

The committee of management, composed of W. J. Burroughes, Jas. H. Wilson, Thos. Cook and G. H. Beavis, have every reason to feel gratified at the success which attended their efforts.

TRANSFER OF PLUMBING DEPARTMENT.

In the recent reconstruction of the various civic departments of Toronto, the Plumbing Department was transferred from the supervision of the City Engineer to that of the Medical Health Officer. The plumbing trade regard the new arrangement with favor, as likely to result beneficially to the city, the plumber, and the general public. In this connection we might state that it is the intention of the master plumbers to seek certain amendments to the existing city plumbing by-law. The main object of these amendments is to secure for the license inspectors more freedom in the exercise of their judgment. It is held that the present by-law is so framed that the inspectors are bound down to cast-iron rules, without regard to the governing conditions in any particular case. With competent inspectors it seems reasonable to expect that they should be allowed the free exercise of their knowledge, and this the plumbers hope to secure under the new order of things.

The Halifax Master Plumbers' Association have adopted resolutions for the protection of the trade, and have forwarded a copy of same to every manufacturer of plumbing supplies in Canada.

The members of the Toronto Master Plumbers' Association held a conference at the Builders' Exchange, Toronto, on the 28th of March, with representative master plumbers of London, Ont., to discuss the organization of an Association in the latter city. The London delegates were Messrs. W. J. Skelly, W. J. Hazlett and W. Smith, who were furnished with copies of the constitution and full information regarding the working of the Toronto Association. It is believed that at an early date the formation of an Association in London will be accomplished.

STUDENTS' DEPARTMENT.

"CANADIAN ARCHITECT AND BUILDER" STUDENTS' AND DRAUGHTSMEN'S COMPETITION.

THE publisher invites from architectural students and draughtsmen, other than practising architects, designs for front cover page for the New Year (1897) Number of the CANADIAN ARCHITECT AND BUILDER.

Designs must be rendered either with pen and perfectly black ink or with brush in sepia on a sheet of white drawing paper or card-board, drawn to the size or 22 × 14 inches, and capable of being reduced to 7 × 11 inches. The wording to appear on the design is as follows:

"CANADIAN ARCHITECT AND BUILDER.
NEW YEAR NUMBER. 1897. TORONTO, CANADA."

Drawings must be marked only with the motto of the author, and accompanied by the motto, full name and address of the author, in sealed envelope, must be sent, charges paid, addressed to the publisher of the CANADIAN ARCHITECT AND BUILDER, Toronto, so as to reach this office on or before 5 o'clock p. m. on Monday, the 6th of June next.

This competition will be decided by a majority vote of a committee of architects to be appointed for that purpose by the Council of the Province of Quebec Association of Architects and of the Ontario Association of Architects. The decision of this committee will be final.

If two or more suitable designs are submitted a prize of $10.00 will be given to the author of the one awarded first position and $5.00 to the one awarded second place. The right is reserved to withhold the prizes if two or more suitable designs are not submitted. The right is also reserved to publish any of the designs submitted.

NOTE.—This competition is announced with the object of testing somewhat outside of the lines of their every day work the artistic skill of Canadian students and draughtsmen. It is hoped that the response will be generous and earnest, and the result satisfactory.

SKETCHING COMPETITIONS IN THE SECOND CLASS OF THE SCHOOL OF FINE ARTS, PARIS.

By I. O. MARCHAND.

"Au quel entrain et quelle 'emulation!" If these competitions have provoked this sincere expression, fallen from the lips of the celebrated "patron" of H. H. Richardson, I feel assured that I am dealing with a subject that has interested to the utmost, scores of young artists.

These competitions, which last twelve hours and are made "en loge," that is in one of the spacious class rooms of the school, divided into compartments to accommodate but one pupil, take place every two months, and have for object to develop the artistic sense of the pupils and to train them in grasping in as short a time as possible the spirit of a program and of a "plan parti" (standard plan.)

At 9.30 a. m. the pupils are closeted in the loges and at 10 o'clock the program which has been prepared by the professor of theory, Monsieur Guadet, who replaces Monsieur Guillaume, is distributed; immediately every pupil's attention is concentrated on the program before him, and each endeavours to find a plan or the standard plan if not the solution of the program. If the programme calls for an interesting facade such as that required for a museum or an atheneum, the plan is worked on the breadth; if, on the contrary, the plan requires several dispositions on the axis, such as is required in an insane asylum or a thermal establishment, the plan is worked on the length.

With this as a starting point we commence by grouping the plan, studying it in detail and scaling the sizes of the different rooms required, and then a clear tracing of it is made, bringing out the most important motives of construction, till the last study presents a satisfactory arrangement and an harmonious whole, after which we pass on to the facade which sometimes is of minor importance in the programs of Monsieur Guadet.

Formerly under the direction of Monsieur Guillaume the "esquisses esquisses" as they are called at the school, possessed a more artistic sense in themselves, in that less importance was attached to the plan, and their merit consisted mainly in the beauty and rendering of the studies of the facade; but all this had the inconvenience of rendering the sketches devoid of cleverness, and of offering nothing interesting judged from the research point of view; a rendering had but to be well done and effective and one could count upon a mention. This came to an end with the Guadet regime—all the spirit of the program resting on the study of the plan and of its arrangements—and for my part I think the last mentioned is more logical, in that they form a sort of introductory exercise to pass into the first class where the real drill in design and the serious study of planning begins.

Once the studies are completed, the final rendering is taken up, and here commences the amusing part of the competition. From all sides is heard the cries of "charrette charrette!" which indicates that the time for closing is drawing near. Those who take part in the competition for the first time get discouraged and abandon it, while the most presevering work steadily at it in their loge. The most clever get through before the appointed time, but every one feels nervous, and soon the guardian shouts "on ferme! on ferme!"—(closing! closing!)—and all competitors run in the direction of the guardian-in-chief to deliver to him his "projet," whether completed or not.

The sketches are then exhibited in the Melpomene Hall, where every pupil goes for a week to compare his "projet" with that of other competitors. Sometimes it loses in interest considerably, by its smallness of scale and its arrangement as a whole, and also by the "parti" adopted, by indication, and by the rendering.

These exhibitions do a good deal towards the advancement of the pupils and teach them many lessons. For my part I have been many a time disappointed by the showing of my "projet" when placed side by side with those of other competitors; while it seemed satisfactory enough when in the loge, it lost in value either by its smallness and meanness or by its lack of air when exhibited.

The competitions are judged by the heads of "ateliers." Of two hundred pupils who commence the "projet," only about one hundred render, while seven or eight only succeed in obtaining a mention, which mention counts as a value for admission into the first class.

I hereunder give one of the recent programs proposed by Monsieur Guadet, for "A Parishional Church" accompanied on separate sheet by the sketch submitted by myself, which will convey an idea to the readers of the "CANADIAN ARCHITECT AND BUILDER of the nature of these "esquisses esquisses" as practised in the school. The sketches are generally rendered in pencil and color or washed, but a rough tracing in black and white had in this instance to be made in order to publish it in this journal.

EMULATION COMPETITION OF THE 4TH DECEMBER, 1895.—"A PARISHIONAL CHURCH."

This church erected in a fashionable quarter of a large city, would comprise a nave, aisles and chancel, with or without transept; numerous chapels for particular services, and one principal chapel of the Holy Virgin; two vestries, one for the clergy and marriages, and the other for attendants of the church: organ tribune. The accommodation for the catechism class, the members of the choir, etc, would be in the basement. The church can be preceded by a porch forming carriage way, and will also have side entrances, and one or two spires. The ceiling will be vaulted and the roof will be entirely built above the vaulting.

The ground available for this church which is isolated on all sides, has for largest dimension (length) 120 metres (365 feet). The plan, transverse section (parallel to facade) and facade will be made to the scale of 0.00015 to the metre.

J. GUADET,
Professor of Theory.

Paris, 4th December, 1895.

Mr. John Shanklin, a well-known contractor, who had resided in Toronto for sixty-three years, died at his home a fortnight ago. Deceased was born in Ireland in 1827, and came to Toronto when six years of age.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

CANADIAN SOCIETY OF CIVIL ENGINEERS.

An ordinary meeting of this Society was held on March 12th, the President, Mr. Herbert Wallis, in the chair.

The following were elected into the Society:—Associate members—Walter Jos. Francis, Deer Park, Ont.; John W. Harris, Winnipeg, Man. Students—William J. Bishop, Montreal; Hamilton Lindsay, Kingston, Ont. The following were transferred from the class of student to the class of associate member:—John Edward Schwitzer and Alex. W. Spence, Ottawa; Alfred J. Stevens, Moncton, N. B.

At this meeting the discussion on Mr. W. Bell Dawson's paper on "A New Method for the Design of Retaining Walls" was continued, and a paper on "The Effects of Engineering Works on Water Currents," by Cyrus Carroll, M. Can. Soc. C. E., was read.

At the ordinary meeting of the Society held on the 26th of March, the President, Mr. Herbert Wallis, occupied the chair. The evening was taken up in the discussion of the resolution: "That engineering works shall be constructed by day's work under the immediate direction of a civil engineer, instead of being done through a contractor."

THE AUGE BILL.

By request of a number of subscribers to the ARCHITECT AND BUILDER, I forward herewith for publication a copy of the amendments to the Auge Bill passed at the last session of the Quebec Legislature, as follows:—

1. Paragraph 7 of article 2,009 of the Civil Code, as replaced 57 Victoria, chapter 46, section 1, is replaced by the following:

"7. The claim of the laborer, workman, architect and builder, subject to the provisions of article 2,013.

2. Articles 2013, 2013a, 2001 3b, 2013c, 2013d, and 2013e of the said Code, as enacted by section 2 of the said act, is replaced by the following:

"2013. The laborer, workman, architect and builder have a right of preference over the vendor and other creditors, on the immoveable, but only upon the additional value given to the immoveable by the work done.

In case the proceeds are insufficient to pay the labor, workman, architect and builder, or in cases of contestation, the additional value given by the work is established by a relative valuation effected in the manner prescribed in the Code of Civil Procedure."

The aforesaid privileged claim is paid only upon the amount established as being the additional value given to the immoveable by the work done.

"2 013a. The privilege of the laborer, workman, architect and builder ranks as follows:

1. The laborer;
2. The workman;
3. The architect;
4. The builder.

"2013b. The right of preference or privilege upon the immoveable exists as follows:

1. Without registration of the claims in favor of the debt due the laborer, workman and the builder, during the whole time they are occupied at the work or while such work lasts, as the case may be; and with registration, provided it be registered within the thirty days following the date upon which the building has become ready for the purpose for which it is intended.

2. But such right of preference or privilege shall exist only for one year from the date of the registration, unless a suit be taken in the interval, or unless a longer delay for payment has been stipulated in the contract.

"2013c. The preservation of the privilege is subject to the following conditions:

1. The laborer or workman must give notice in writing or verbally, before a witness, to the proprietor of the immoveable that they have not been paid for their work at and for each term of payment.

Such notice may be given by one of the employers in the name of all the other laborers and workmen who are not paid, but in such case the notice must be in writing.

2. The architect and builder shall likewise inform the proprietor of the immoveable or his agents in writing of the contracts which they have made with the chief contractor, within eight days from the signing of the same.

"2013d. In order to meet the privileged claims of the laborer and workman, the proprietor of the immoveable may retain an amount equal to that which he has paid or will be called upon to pay, according to the notices he has received, so long as such claims remain unpaid.

"2013e. In the event of a difference of opinion between the creditor and the debtor, with respect to the amount due, the creditor shall, without delay, inform the proprietor of the immoveable, by means of written notice which shall also mention the name of the creditor, the name of the debtor, the amount claimed, and the nature of the claim.

The proprietor then retains the amount in dispute until notified of an amicable settlement or a judicial decision."

"2013f. The sale to a third party by the proprietor of the immoveable or his agents, or the payment of the whole or a portion of the contract price cannot in any way affect the claims of persons who have a privilege under article 2013, and who have complied with the requirements of articles 2013a, 2013b, 2013c, and 2103."

"2,013g. The supplier of materials shall, before delivery of the materials, give notice in writing to the proprietor of the immoveable, of the contracts made by him for the delivery of materials, and mention the cost thereof and the immoveable for which they are intended.

"2013h. In order to meet the privileged claims of the suppliers of materials, the proprietor of the immoveable retains, on the contract price, an amount equal to that mentioned in the notices he has received.

"2013i. The notices mentioned in article 2,013g have the effect of an attachment by garnishment on the contract price.

Within the three months following the notice given in accordance with article 2,013a, the interested parties must adopt legal steps, by proceeding against the proprietor of the immoveable, to have the debtor condemned and the seizure declared valid, otherwise the latter lapses.

"2013j. In the event of the proprietor of the immoveable erecting the building himself without the intermediary of any contractor, the notices mentioned in article 2013g may be given to the person or persons who lend or may lend money to the person building, and thereupon the latter shall, mutatis mutandis, be subject to the provisions of the preceding articles.

"2013k. No transfer of any portion of the contract price or of the amount borrowed, as the case may be, either before or during the execution of the work, can be set up against the said suppliers of materials; nor can any payment, exceeding the costs of the work done according to a certificate of the architect or superintendent of the works, affect their rights.

"2013l. On notice given to the proprietor in virtue of article 2013g, and registered according to article 2103, the suppliers of materials shall have a hypothecary privilege which shall rank after the hypothecs previously registered and the privileges created by this act."

3. Articles 2103 and 2103a of the said Code, as enacted by section 3 of the said act, are replaced by the following article:

"2103. The privileges of the persons mentioned in article 2013 dates, in the cases mentioned in the first clause of article 2013b, only from the registration, within the proper delay, at the registry office of the division in which is situated the immoveable affected by the inscription, of a notice or memorial, drawn up according to form A, with a deposition of the creditor, sworn to before a justice of the peace or a commissioner of the Superior Court, setting forth the nature and the amount of the claim, and describing the immoveable so affected.

(Concluded on Page 56)

THE ONTARIO LIEN LAW OF 1896.

AN Act was passed by the Ontario Legislature at the recent session making certain amendments and additions to the lien law respecting mechanics, wage earners, and others. Below will be found the Act in full as revised :

1. This Act may be cited as THE MECHANICS' AND WAGE-EARNERS' LIEN ACT, 1896. R.S.O. 1887, c. 126, s. 1.

2. Where the following words occur in this Act, or in the schedules hereto, they shall be construed in the manner hereinafter mentioned, unless a contrary intention appears :

(1) "Contractor" shall mean a person contracting with or employed directly by the owner or his agent for the doing of work or placing or furnishing materials for any of the purposes mentioned in this Act.

(2) "Sub-contractor" shall mean a person not contracting with or employed directly by the owner or his agent for the purposes aforesaid, but contracting with or employed by a contractor, or under him by another sub-contractor.

(3) "Owner" shall extend to and include any person, firm, association, body corporate or politic, including a municipal corporation and railway company having any estate or interest in the lands upon or in respect of which the work or service is done, or materials are placed or furnished, at whose request and upon whose credit or on whose behalf or with whose privity or consent or for whose direct benefit any such work or service is performed or materials are placed or furnished, and all persons claiming under him or them whose rights are acquired after the work or service in respect of which the lien is claimed is commenced or the materials furnished have been commenced to be furnished. R.S.O. 1887, c. 126, s. 2.

(4) "Person" shall extend to and include a body corporate or politic, a firm, partnership or association.

(5) "Material" shall include every kind of moveable property.

(6) "Registry Office" shall include Land Titles Office.

3. Where work or service is done or materials are furnished upon or in respect of the lands of any married woman with the privity and consent of her husband, he shall be conclusively presumed to be acting as well for himself and so as to bind the interest, and also as the agent of such married woman for the purposes of this Act, unless the person doing such work or service or furnishing such materials shall have had actual notice to the contrary before doing such work or furnishing such materials.

4. No agreement shall be held to deprive anyone otherwise entitled to a lien under this Act, and not a party to the agreement, of the benefit of the lien, but the lien shall attach, notwithstanding such agreement. R.S.O. c. 126, s. 3.

5. Unless he signs an express agreement to the contrary, any person who performs any work or service upon or in respect of, or places or furnishes any materials to be used in making, constructing, erecting, fitting, altering, improving or repairing any erection, building, railway, land, wharf, pier, bulkhead, bridge, trestlework, vault, mine, well, excavation, fence, sidewalk, paving, fountain, fishpond, drain, sewer, aqueduct, roadbed, way, fruit and ornamental trees, or the appurtenances to any of them, for any owner, contractor or sub-contractor, shall by virtue thereof have a lien for the price of such work, service or materials upon the erection, building, railway, land, wharf, pier, bulkhead, bridge, trestlework, vault, mine, well, excavation, fence, sidewalk, paving, fountain, fishpond, drain, sewer, aqueduct, roadbed, way, fruit and ornamental trees, or appurtenances thereto, and the lands occupied thereby or enjoyed therewith, or upon which the said work or service is performed, or upon which such materials are placed, or furnished to be used, and limited in amount to the sum justly due to the person entitled to the lien and to the sum justly owing (excepting as herein provided) by the owner.

6. The lien shall attach upon the estate or interest of the owner as defined by this Act in the erection, building, railway, land, wharf, pier, bulkhead, bridge, trestlework, vault, mine, well, excavation, fence, sidewalk, paving, fountain, fishpond, drain, sewer, aqueduct, roadbed, way, fruit and ornamental trees and the appurtenances thereto, upon or in respect of which the work or service is performed, or the materials placed or furnished to be used, and the lands occupied thereby or enjoyed therewith. See R.S.O., c. 126, s 5.

(2) In c ses where the estate or interest charged by the lien is leasehold the fee simple may also, with the consent of the owner thereof, be subject to said lien, provided such consent is testified by the signature of such owner upon the claim of lien at the time of the registering thereof, and duly verified. R.S.O. 1877, c. 126, s. 5, s.s. 2.

(3) In case the land upon or in respect of which any work or service is performed, or upon or in respect of which materials are placed or furnished to be used, is encumbered by a prior mortgage or other charge, and the selling value of the land is increased by the work or service, or by the furnishing or placing of the materials, the lien under this Act shall be entitled to rank upon such increased value in priority to the mortgage or other charge. R.S.O. 1877, c. 126, s. 5, s.s. 3.

(4) The provisions of this or any other section of this Act affecting railways under the control of the Dominion of Canada are only intended to apply so far as the Legislative Assembly of this Province has authority or jurisdiction in regard thereto.

7. Where any of the property upon which a lien is given by this Act is wholly or partly destroyed by fire, any money received by reason of any insurance thereon by an owner or prior mortgagee or chargee shall take the place of the property so destroyed, and shall be subject to the claims of all persons for liens to the same extent as if such moneys were realized by a sale of such property in an action to enforce a lien.

8. Save as herein provided the lien shall not attach so as to make the owner liable for a greater sum than the sum payable by the owner to the contractor. R.S.O. c. 126, s. 10.

9. Save as herein provided where the lien is claimed by any other person than the contractor, the amount which may be claimed in respect thereof shall be limited to the amount owing to the contractor or sub-contractor or other person in for whom the work or service has been done or the materials have been placed or furnished. R.S.O. 126, s. 8.

10.—(1) In all cases an owner shall, as any contract progresses, deduct from any payments to be made, and retain for a period of thirty days after the completion or abandonment of the contract twenty per cent. of the value of the work, service and materials actually done, placed or furnished as defined by section 5 of this Act, and such values shall be calculated on the basis of the price to be paid for the whole contract; provided that where a contract exceeds $15,000 the amount to be retained shall be fifteen per cent. instead of twenty per cent., and the liens created by this Act shall be a charge upon the amounts directed to be retained by this section.

(2) All payments up to eighty per cent. (or eighty-five per cent. where the contract price exceeds $15,000 of such value made in good faith by an owner to a contractor, or by a contractor to a sub-contractor, or by one sub-contractor to another sub-contractor, before notice in writing of such lien given by the person claiming the lien to the owner, contractor or the sub-contractor, as the case may be, shall operate as a discharge pro tanto of the lien created by this Act.

11. In case an owner or contractor chooses to make payments to any persons referred to in the fifth section of this Act for or on account of any debts justly due to them for work or service done or for materials placed or furnished to be used as therein mentioned, and shall within three days afterwards give, by letter or otherwise, written notice of such payment to the contractor or his agent, or to the sub-contractor or his agent, as the case may be, such payments shall, as between the owner and the contractor or as between the contractor and the sub-contractor, as the case may be, be deemed to be payments to the contractor or sub-contractor, as the case may be, on his contract generally, but not so as to affect the percentage to be retained by the owner, as provided by section 10 of this Act.

12.—(1) The lien created by this Act shall have priority over all judgments, executions, assignments, attachments, garnishments and receiving orders recovered, issued or made after such lien arises, and over all payments or advances made on account of any conveyance or mortgage after notice in writing of such lien to the person making such payments or after registration of such lien as hereinafter provided. (See 56 Vic., c. 24, s. 4 and R.S.O. c. 126, s. 31.)

(2) In case of an agreement for the purchase of land, and the purchase money or part thereof is unpaid, and no conveyance made to the purchaser, the purchaser shall, for the purposes of this Act and within the meaning thereof, be deemed a mortgagor and the seller a mortgagee.

(3) Excepting where it is otherwise declared by this Act, no person entitled to a lien on any property or to a charge on any moneys under this Act shall be entitled to any priority or preference over another person of the same class entitled to a lien or charge on such property or moneys under this Act, and each class of lien holders, except where it is otherwise declared by this Act, shall rank pari passu for their several amounts, and the proceeds of any sale shall, subject as aforesaid, be distributed among them pro rata according to their several classes and rights.

13.—(1) Every mechanic or laborer whose lien is for work done for wages shall, to the extent of thirty days' wages, have priority over all other liens derived through the same contractor or sub-contractor to the extent of and on the twenty per cent. or fifteen per cent., as the case may be, of the contract price directed to be retained by section 10 of this Act, to which the contractor or sub-contractor through whom such lien is derived and entitled, and all such mechanics and laborers shall rank pari passu on said twenty per cent. (See R.S.O.c. 126, s. 9, ss. 3.)

(2) Every wage earner shall be entitled to enforce a lien in respect of the contract not completely fulfilled. (See 56 Vict. c. 24, s. 5, ss. 2.)

(3) In case of the contract not having been completely fulfilled when the lien is claimed by wage earners, the percentage aforesaid shall be calculated on the work done or materials furnished by the contractor or sub-contractor by whom such wage-earners are employed. 56 Vict. c. 24, s. 5, ss. 1.

(4) Where the contractor or sub-contractor makes default in completing his contract the percentage aforesaid shall not, as against a wage earner claiming a lien under this Act, be applied to the completion of the contract or for any other purpose by the owner or contractor, nor to the payment of damages for the non-completion of the contract by the contractor or sub-contractor, nor in payment or satisfaction of any claim of any kind against the contractor or sub-contractor. (See 56 Vict. c. 24, s. 5, ss. 3.)

(5) Every device by any owner, contractor or sub-contractor, adopted to defeat the priority given to wage earners for their wages by this Act shall, as respects such wage earners, be null and void. 56 Vict. cap. 24, sec. 1.

(6) "Wages" shall mean money earned by a mechanic or laborer for work done, whether by the day or as piece work.

14. Nothing in this Act contained shall apply to make legal any payment made for the purpose of defeating or impairing a claim for a lien arising or existing under this Act and all such payments shall be taken to be null and void. (See R. S. O. c. 126, s. 9.)

15.—(1) During the continuance of a lien no portion of the materials affected thereby shall be removed to the prejudice of the lien, and any attempt at such removal may be restrained on application to the High Court, or to a judge or officer having power to try an action to realize a lien under this Act. R. S. O. c. 126, s. 15.

(2) The court, judge or officer to whom any such application is made, may make such order as to the costs of and incidental to the application and order as he deems just.

(3) When any material is actually brought upon any land to be used in connection with such land for any of the purposes enumerated in section 5 of this Act, the same shall not be subject to execution or other process to enforce any debt (other than for the purchase thereof) due by the person furnishing the same. (See R. S. O. c. 126, s. 31.)

16. A claim for lien applicable to the case may be registered in the registry office of the registry division or in the Land Titles office in which the land is situated, and shall state :

(a) The name and residence of the (person claiming the lien) and of the owner of the property to be charged ; or of the person whom the person claiming the lien, or his agent, believes to be the owner of the property to be charged) of the person for or whom and upon whose credit the work (or service) is done, or materials furnished or placed, and the time or period within which the same was, or was to be, done or furnished or placed.

(b) A short description of the work (or service) done or materials furnished or placed or to be furnished or placed.

(c) The sum claimed as due or to become due.

(d) The description of the land to be charged sufficient for the purpose of registration

(e) The date of expiry of the period of credit (if any) agreed by the lienholder for payment for his work (or service) or materials where credit has been given.

(2) The claim may be in one of the forms given in the schedule to this Act and shall be verified by the affidavit of the person claiming the lien or of his agent or assignee having a personal knowledge of the matters required to be verified, and the affidavit of the agent or assignee shall state that he has such knowledge. R. S. O. c. 126, s. 16.

(3) Where a lien is registered against the lands of a railway company it shall be sufficient description of the said lands to refer to the same as the lands of such railway company in the county where the claim arose as described and shown on the plan of the said railway registered under The Railway Act.

17. A claim for lien may include claims against any number of properties, and any number of persons claiming liens upon the same property, may unite therein, but where more than one lien is included in one claim each lien shall be verified by affidavit as provided in section 16 of this Act. (R. S. O. c. 126, s. 19.)

18.—(1) A substantial compliance with sections 16 and 17 of this Act shall only be required, and no lien shall be invalidated by reason of failure to comply with any of the requisites of sections 16 and 17 of this Act unless in the opinion of the court or judge or officer who has power to try an action under this Act, the owner, contractor or sub-contractor, mortgagee or other person, as the case may be, is prejudiced thereby, and then only to the extent to which he is thereby prejudiced.

(2) Nothing in this section contained shall be construed as dispensing with registration of the lien required by this Act.

19.—The registrar, upon payment of his fee, shall register the claim, so that the same may appear as an incumbrance against the land therein described. R. S. O. 1887, c. 126, s. 18, s.s. 1.

(2) The fee for registration shall be twenty-five cents. If several persons join in one claim, the registrar shall have a further fee of (ten) cents for every person after the first. 45 Vic. c. 15, s. 11.

3. The registrar shall not be bound to copy in any registry book any claim or affidavit, but he shall number each claim, and shall insert in the alphabetical and abstract indexes the like particulars as in other cases ; he may describe the nature of the instrument as "Mechanics' Lien" 45 Vic. c. 15, s. 11.

20. Whenever a claim is so registered, the person entitled to the lien shall be deemed a purchaser pro tanto, and within the provisions of The Registry Act, 1893, but except as herein otherwise provided, The Registry Act, 1893, shall not apply to any lien arising under this Act. R. S. O. 1887, c. 126, s. 19.

21.—(1) A claim for lien by a contractor or sub-contractor may be registered before or during the performance of the contract or within thirty days after the completion thereof.

(2) A claim for lien for materials may be registered before or during the furnishing or placing thereof or within thirty days after the furnishing or placing of the last material so furnished or placed.

(3) A claim for lien for services may be registered at any time during the performance of the service or within thirty days after the completion of the service.

(4) A claim for lien for work may be registered at any time during the work or within thirty days after the last day's work for which the lien is claimed. R. S. O. 126, s. 20 and sec. 31 in part.

22. Every lien which is not duly registered under the provisions of this Act shall absolutely cease to exist on the expiration of the time hereinbefore limited for the registration thereof unless in the mean time an action is commenced to realize the claim, or in which the claim may be realized under the provisions of this Act, and a certificate thereof issued in the manner required by section 52 of The Registry Act, 1893, is duly registered in the Registry Office of the Registry Division or the lands in respect of which the lien is claimed are situate. R. S. O. 1887, c. 126, s. 22.

23.—(1) Every lien which has been duly registered under the provisions of this Act shall absolutely cease to exist after the expiration of ninety days after the work or service has been completed or materials have been furnished or placed, or the expiry of the period of credit, where such period is mentioned, in the claim of lien registered, unless in the mean time an action is commenced to realize the claim under the provisions of this Act or an action is commenced in which the claim may be realized under the provisions of this Act, and a certificate thereof issued in the manner required by section 52 of The Registry Act, 1893, is duly registered in the Registry Office of the Registry Division or in the land titles office wherein the lands in respect of which the lien is claimed are situate. R. S. O. 1887, c. 126, s. 23.

(2) The registration of a lien shall cease to have any effect at the expiration of six months from the registration thereof, unless the lien shall be again registered within the said period, except, in the meantime, proceedings have been instituted to realize the claim and a certificate thereof has been duly registered in the proper registry or land titles office. 56 Vic., c. 24, s. 19.

24. If there is no period of credit, or if the date of the expiry of the period of

credit is not stated in the claim so registered, the lien shall cease to exist upon the expiration of ninety days after the work or service has been completed or materials furnished or placed unless in the meantime an action shall have been commenced and a certificate registered as required by section 23 of this Act, (R. S. O., c. 126, s. 24.)

25 In the event of the death of a lien-holder his right of lien shall pass to his personal representatives and the right of a lien-holder may be assigned by any instrument in writing. R. S. O., 1887, c. 126, s. 25.

26.—(1) A lien may be discharged by a receipt signed by the claimant, or his agent duly authorized in writing, acknowledging payment, and verified by affidavit and registered ; such receipt shall be numbered and entered by the Registrar like other instruments but need not be copied in any book, but the Registrar shall enter against the entry of the lien to which the discharge relates the word "discharged," and state the registration number of such discharge ; the fees shall be the same as for registering a claim of lien. R. S. O. c. 126, s. .6.

(2) Upon application the court or judge or other officer having power to try an action to realize a lien, may receive security or payment into court in lieu of the amount of the claim and may thereupon vacate the registration of the lien. R. S. O. c. 126, s. 30, ss. (7).

(3) The court or such judge or other officer may vacate the said registration upon any other ground. R. S. O., 1887, c. 126, s. 30, ss. 7 and 8.

(4) Where the certificate required by section 22 or section 23 of this Act has not been registered within the time limited, and an application is made to vacate the registration of a lien after the time for registration of the certificate required by section 22 or 23 of this Act, the applicant shall not be required to give notice of the application to the person claiming the lien, and the order vacating the lien may be made ex parte upon production of the certificate of the proper Registrar's certifying the facts entitling the applicant to such order.

(5) The taking of any security for, or the acceptance of any promissory note for, or the taking of any other acknowledgement of the claim, or the giving of time for the payment of the claim, or the taking of any proceedings for the recovery of the claim or the recovery of any personal judgment for the claim, shall not merge, waive, pay, satisfy, prejudice or destroy any lien created by this Act, unless the lien-holder agrees in writing that it shall have that effect ; provided, however, that a person who has extended the time for payment of any claim for which he has a lien under this Act to obtain the benefit of this sub-section shall commence an action to enforce such lien within the time limited by this Act, and register a certificate as required by sections 22 or 23 of this Act, but no further proceedings shall be taken in the action until the expiration of such extended time ; provided further that notwithstanding such extension of time, such person may, when an action is commenced by any other person to enforce a lien against the same property, prove and obtain payment of his claim in such action, as if no such extension had been given.

27. Any lien-holder may at any time demand of the owner, or his agent, the terms of the contract or agreement with the contractor for and in respect of which the work, services or materials is or are performed or furnished or placed, and if such owner or his said agent shall at the time of such demand neglect or refuse to inform the person making such demand, of the terms of such contract or agreement, and the amount due and unpaid upon such contract or agreement, or shall intentionally or knowingly, falsely state the terms of said contract or agreement, or the amount due or unpaid thereon, and if the person claiming the lien shall sustain loss by reason of such refusal or neglect or false statement, said owner shall be liable to him in an action therefor to the amount of such loss.

28. The court or judge, or other officer having power to try an action to realize a lien, may on a summary application at any time before or after any action is commenced for the enforcement of such lien, make an order for the owner or his agent to produce and allow any lien holder to inspect any such contract, and may make such an order as to the costs of such application and order as may be just.

29.—(1) The liens created by this act may be realized by actions in the High Court according to the ordinary procedure of that court, excepting where the same is varied by this Act.

(2) Without issuing a writ of summons, an action under this Act shall be commenced by filing in the proper office a statement of claim, verified by affidavit.

(3) The statement of claim shall be served within one month after it is filed, but a judge or other officer having power to try the action may extend the time for service thereof, and the time for delivering a statement of defence shall be the same as for entering an appearance in an action in the High Court.

(4) It shall not be necessary to make any lien holders parties defendant to the action, but all lien holders served with the notice of trial shall for all purposes be treated as if they were parties to the action.

30. Any number of lien-holders, claiming liens on the same property, may join in an action, and any action brought by a lien-holder shall be taken to be brought on behalf of all other lien-holders on the property in question. See R.S.O., c. 126, s. 30; 53 Vic. c. 37, s. 39.

31. An action to enforce a lien may be tried by the Master in Ordinary, a local master of the High Court, an official referee or a judge of the County Court, in any country or judicial district in which the lands are situate ; or by a judge of the High Court of Justice at any sittings of that court for the trial of actions.

32. The Master in Ordinary, the local masters, official referees, and the County Judges, shall have in addition to their ordinary powers, all the jurisdiction, powers and authority, of a Judge of the High Court of the Master in Ordinary, to try, and otherwise completely dispose of, an action to realize a lien, and all questions arising in such action, including the giving or refusing of the costs hereinafter provided.

33. (1) After the delivery of the statement of defence where the plaintiff's claim is disputed, or after the time for delivery of defence in all other cases where it is desired to try the action other than at the ordinary sittings of the High Court, either party may apply to a judge or other officer who has the power to try the action, to fix a day for the trial thereof, and the said judge, or other officer, shall give an appointment fixing the day and place of trial, and on the day fixed, or at such other day to which the trial may be adjourned, shall proceed to try the action, and all questions which arise therein, or which are necessary to be tried, to completely dispose of the action and to adjust the rights and liabilities of the persons appearing before him or upon whom the notice of trial has been served and, at the trial, shall take all accounts, make all inquiries and give all directions, and do all things necessary to try, and otherwise finally dispose of the action and of all matters, questions and accounts arising in the action or at the trial, and to adjust the rights and liabilities of and give all necessary relief to all parties to the action or who have been served with the notice of trial, and shall embody all the results in the judgment.

(2) The judge or officer who tries the action may order that the estate or interest charged with the lien may be sold, and when, by the judgment, a sale is directed of the estate or interest charged with the lien, the judge or officer who tries the action may direct the sale to take place at any time after judgment, allowing, however, a reasonable time for advertising such sale.

(3) The judge or officer who tries the action may also direct the sale of any materials and authorize the removal thereof. See R.S.O. 126, s. 30, s. s. 3 and 4.

(4) Any lien-holder, who has not proved his claim at the trial of any action to enforce a lien, on application to the judge, or officer who tried the action on such terms as to costs and otherwise as may be just, may be let in to prove his claim at any time before the amount realized in the action for the satisfaction of liens has been distributed, and when any such claim is proved and allowed the judge or officer shall amend the judgment so as to include such claim therein.

(5) When a sale is had, the Judge or officer with whose approbation the lands are sold shall make a report on sale and therein direct to whom the moneys in court shall be paid, and may add to the claim of the person conducting the sale his actual disbursements incurred in connection therewith, and where sufficient to satisfy the judgment and costs is not realized from the sale, he shall certify the amount of the deficiency and the names of the persons, with their amounts, who are entitled to recover the same, and the persons by the judgment adjudged to pay the same, and such persons shall be entitled to enforce the same by execution or otherwise as a judgment of the court.

(6) Any lien-holder for an amount not exceeding $100, or any lien-holder not a party to the action, may attend in person at the trial of an action to enforce a lien, and on any proceedings in such action, or may be represented thereat or thereon by a solicitor or by an agent who is not a solicitor.

34. The party obtaining an appointment fixing the day and place of trial shall, at least eight clear days before the day fixed for the trial, serve a notice of trial which may be in the form in the schedule to this Act, upon the solicitors for the defendants who appear by solicitors, and on all lien-holders known to him, who have registered their liens as required by this Act, and on all other persons having any charge or incumbrance, or claim on the said lands, who are not parties, or, who, being parties, appear personally in the said action, and such service shall be personal unless otherwise directed by the Judge or officer who is to try the case, who may, in lieu of personal service, direct in what manner the notice of trial may be served.

35. Where more than one action is brought to realize liens in respect of the same property, a judge or other officer having power to try such actions, may, on the application of any party to any one of such actions, or on the application of any other person interested, consolidate all such actions into one action, and may give the conduct of the consolidated action to any plaintiff to whom in his discretion he sees fit. (See 56 Vic. c. 24, s. 12.)

36. Any lien-holder entitled to the benefit of the action may apply for the carriage of the proceedings, and the judge or any other officer having power to try the action, may thereupon make such an order, giving such lien-holder the carriage of the proceedings, and such lien-holder shall for all purposes thereafter be the plaintiff in the action. See R.S.O. c. 126, s. 30, ss. 2, and 53 Vic. c. 37, s. 26.)

37. No fees in stamps or money shall be payable to any judge or other officer in any action brought to realize a lien under this act, nor on any filing, order, record or judgment, or other proceeding in such action, excepting that every person other than a wage earner shall, on filing his statement of claim where he is a plaintiff, or in proving his claim where he is not a party plaintiff, pay in stamps one dollar on every one hundred dollars, or fraction of one hundred dollars, of the amount of his claim up to one thousand dollars. (See 56 Vict., c. 24, s. 18.)

38. In all actions where the amount recovered by the judgment is $100 or less, the said judgment shall be final, binding, and without appeal, except that upon application within fourteen days after judgment is pronounced, to the judge or officer who tried the same, he may grant a new trial.

39. In all actions where the amount recovered by the judgment is more than $100 but not more than $200, any party affected thereby may appeal therefrom to a Divisional Court, whose judgment shall be final, binding, and no appeal shall lie therefrom.

40. In all other cases the same right to appeal shall exist as is given in actions tried without a jury in the High Court.

41. The costs of the action awarded in any action under this Act, by the judge or officer trying the action, to the plaintiffs and successful lien-holders shall not exceed in the aggregate an amount equal to twenty-five per cent. of the amount of the judgment besides actual disbursements, and shall be in addition to the amount of the judgment, and shall be apportioned and borne in such proportion as the judge or officer who tries the action may direct.

42. Where the costs are awarded against the plaintiff or other persons claiming the lien, such costs shall not exceed an amount in the aggregate equal to twenty-five per cent. of the claim of the plaintiff and other claimants, besides actual disbursements, and shall be apportioned and borne as the judge or said other officer may direct.

43. In case the least expensive course is not taken by a plaintiff under this Act the costs allowed to the solicitor shall in no case exceed what would have been incurred if the least expensive course had been taken. 56 Vic., c. 24, s. s. 15.

44. Where a lien is discharged or vacated under section 26 of this Act or when in an action judgment is given in favor of a lien in addition to the costs of action, the judge or said other officer may allow a reasonable amount for costs of drawing and registering a lien or for vacating the registration of the lien. R. S. O., 126, s. 30, s.s. 5 and 9.

45. Excepting in actions tried by a judge of the High Court the judge or other officer who tries the action shall where money has been paid into court and the time for payment out arrives, forward a requisition for cheques with a certified copy of his judgment, or when one is made of the report on sale, to the accountant of the Supreme Court of Judicature, who shall upon receiving said requisition and copy of the judgment or report make out and return to the said judge or officer cheques for the amounts payable to the persons specified in the requisition, and the said judge or officer on receipt of said cheques shall distribute them to the persons entitled.

46. No fees or stamps shall be payable on any cheques or proceedings to pay money into court or obtain money out of court, in respect of a claim of lien, but sufficient postage stamps to prepay a return letter shall be enclosed with every requisition for cheques.

47. All judgments in favor of lien-holders shall adjudge that the person or persons personally liable for the amount of the judgment, shall pay any deficiency which may remain after sale of the property adjudged to be sold, and whenever on a sale of any prope ty to realize a lien under this act sufficient to satisfy the judgment and costs is not realized therefrom, the deficiency may be recovered by execution against the property of such person or persons.

48. Whenever in an action brought under the provisions of this Act any claimant shall fail for any reason to establish a valid lien he may nevertheless recover therein a personal judgment against the party or parties to the action for such sum or sums as may appear to be due to him from him or them and which he might recover in an action in contract against such party or parties.

49. The forms in the schedule hereto, or forms similar thereto or to the like effect, may be adopted in all proceedings under this Act.

50. This act shall not apply to liens arising before the coming into force of this Act excepting that where no action has been commenced or proceeding instituted to realize a lien arising before the coming into force of this Act the procedure herein directed shall be adopted to realize the same.

51.—(1) Every mechanic or other person who has bestowed money or skill and materials upon any chattel or thing in the alteration and improvement in its properties or for the purpose of imparting an additional value to it so as thereby to be entitled to a lien upon such chattel or thing for the amount of value of the money or skill and materials bestowed, shall, while such lien exists, but not afterwards, in case the amount to which he is entitled remains unpaid for three months after the same ought to have been paid, have the right in addition to all other remedies provided by law, to sell by auction the chattel or thing in respect of which the lien exists, on giving one week's notice by advertisement in a newspaper published in the municipality in which the work was done, or in case there is no newspaper published in such municipality, then in a newspaper published nearest thereto, stating the name of the person indebted the amount of the debt, a description of the chattel or thing to be sold, the time and place of sale, and the name of the auctioneer, and leaving a like notice in writing at the last known place of residence (if any) of the owner, if he be a resident of such municipality.

(2) Such mechanic or other person shall apply the proceeds of the sale in payment of the amount due to him and the costs of advertising and sale, and shall upon application pay over any surplus to the person entitled thereto. 51 Vic., c. 27, s. 1.

52. Excepting in so far as is necessary to preserve the liens and rights, causes of action and defences thereto arising or existing thereunder before the coming into force of this Act, the following Acts and parts of Acts shall not apply after the coming into force of this Act, and are hereby repealed :—

Chapter 126 of the Revised Statues of Ontario, 1887, and all amendments thereto.

The Act passed in the 53rd year of Her Majesty's reign, chaptered 36 and all amendments thereto

The Act passed in the 56th year of Her Majesty's reign, chaptered 24 and all amendments thereto.

The Toronto School of Practical Science Engineering Society has elected the following officers for the ensuing year : President, C. F. King ; Vice-President, H. S. Carpenter ; Treasurer, A. G. Piper ; Corresponding Secretary, H. L. Vercoe ; Recording Secretary, H. R. Stovel ; Librarian, W. A. B. Hicks ; Fourth Year Representative, J. A. De Cew ; Third Year Representative, M. B. Weeks ; Second Year Representative, J. Shaw. C. MacBeth, J. A. Bow and T. J. Little were elected to "Varsity" Editorial Board.

The reconstruction of the new building for the Montreal Street Railway Company has been completed. The question of strength has been made paramount to all other considerations. The entire building is carried on steel columns, which rest in concrete and brick foundations laid in gravel, and this load represents 13-4 tons per square foot. Each floor, as well as the roof, is formed of steel girders and fifteen-inch hollow tile floor arches, covered with Portland cement, the whole being supported by steel columns, which in turn are protected by hollow terra cotta tile.

2. In registering such memorial, it is sufficient to mention, opposite the official number of the cadastre which describes the immoveable, if the cadastre be deposited, or opposite the title of the registered deed, if the cadastre be not yet deposited, the name of the claimant and the amount due at the time the memorial is filed.

3. The memorial shall be made out in duplicate, one copy of which shall remain in the archives of the registry office and the other be delivered to the creditor with the registrar's certificate thereon.

4. The creditor shall, within three days from the registration of the memorial, give a written notice to the proprietor of the immoveable, or to his agents, if he cannot be found."

4. The act 57 Victoria, chapter 46, and all other provisions of the Civil Code inconsistent with this act, are repealed.

MONTREAL SKETCH CLUB.

After much exertion and not a few discouragements, new efefforts were recently made to organize in this city a Sketch Club. A general meeting was called on Friday, March 20th, to discuss the advisibility of organizing, at which a large number of students were present. The evening was devoted to considering the requisites of a club of this character, and the work of organization completed. The architects very kindly tendered the use of their rooms to the Club, which offer was gratefully accepted. The Club has been very active since its organization, and it is certain that in a short time it will prove its utility. One Saturday afternoon an enjoyable visit was paid to the Chateau de Ramezay, now converted into an historical museum. The Club is formed for mutual help in matters of design, lectures and discussions. Several other methods of effecting this object are to be employed. One night a week (Friday) is set apart as Club night. Monthly competitions are to be held, the work submitted at these competitions to be criticised by a jury of architects. The jury is formed of three officers, and forms the Executive Committee.

During the summer months the Club will make sketching tours in the surrounding country.

The Club has my best wishes for a long and prosperous career.

P. Q. A. A. STUDENTS' EXAMINATIONS.

The semi-annual examinations of the Province of Quebec Association of Architects were held in the office of Mr. F. X. Berlinquet, St. John street, Quebec, on the 20th, 30th, and 31st of January last. Four candidates presented themselves and have passed with success the final examination, viz., Messrs. J. E. Payette, J. Forget Despatie, and P. A. R. Labelle. The only candidate for matriculation examinations was Mr. P. Levesque, of Quebec. The examiners were Messrs. Charles Baillarge, F. X. Berlinquet, and F. X. Peachy.

ROYAL ACADEMY EXHIBITION.

Those who had the advantage of visiting the exhibition of the Royal Canadian Academy held in the Art Association building, Philips Square, must have remarked the progress achieved by the painters. Every year the outlook seems more promising, and shows a marked advance in the works exhibited. There are to be seen some very fine landscapes, pleasing and altogether successful water color sketches, particularly of Rocky Mountain scenery. The lady artists have done very good work. Some very fine pieces of decorative work can also be seen. The architectural section is represented by drawings by Mr. A. T. Taylor, R. C. A. The principal exhibitors are: Robert Harris, A. R. C. A.; Mrs. Peterson; Homer Watson, R. C. A.; William Brymer, R. C. A.; James L. Graham, A. R. C. A.; J. Forthard, R. C. A.; Miss Sarah Holden, Miss Ford, and others.

The architectural firm of Edwards & Webster, Toronto, has been dissolved. Mr. H. J. Webster has opened an office in the west wing of the Confederation Life Building.

The death is announced of Mr. C. J. King, a prominent contractor of Victoria, B. C., in his 55th year.

Mr. Thomas Askwith, of the firm of Askwith & Neville, contractors, Ottawa, was seriously injured recently by an explosion of gas from the furnace.

Black Enamel for Wood.—The following recipe will prove of value to cabinet makers: Prime the wood with linseed oil, turpentine and white lead; then give it two or three coats of black, mixed with copal varnish and turpentine; rub it down dry with pumice stone and water; finally, varnish with copal. Again rub down, and polish with oil and rotten-stone to obtain perfect smoothness.

NOTES OF AN ARCHITECTURAL TOUR IN ENGLAND AND FRANCE.*

By W. A. Langton.

I propose to speak only of the new work that I saw. I was brought first into contact with churches. I did not see many, but thought from what I saw that the English architect does not trouble himself too much with the problem of providing for the congregation a clear floor space and an unobstructed view of the chancel and pulpit. The objection to columns has been exaggerated and they have, on the other hand, great value as a means of marking proportion and obtaining effects of space; but there is no retreat from the modern conditions which make that the perfect plan which gives the greatest proportional space to seats and gives each seat an unobstructed view of at least the pulpit. With this in view it is impossible to give more than a qualified admiration to many beautiful modern churches which derive the best part of their beauty from an arcaded plan which is not made necessary by the extent of their area. But I was glad to find churches which show that the arcade has still a use. The best example of this that I met was the late J. D. Sedding's Holy Trinity church, at Sloane Square, London. Here there is a wide nave and narrow aisles. The congregation sit between the nave piers, all in full view of the chancel, and the aisles are only used for passages. The entire width from aisle wall to aisle wall is 64 feet; the distance between the nave piers is only 38 feet. If there had been no arcade the cost of a roof to span 64 feet and of a wall to carry it would have been much greater than that of either the roofs or walling which are sufficient for the present arrangement—a nave 38 feet wide with 8 foot aisles—for after a certain span of roof is exceeded, the cost involved in its making, raising and support must increase in a rapid proportion for each additional foot.

This plan of Sedding's is satisfactory in its effect not only because of the division into the nave and aisles, but because of the manner in which they are divided. The nave is important, the aisles only passages. The character of each part is well marked and the church gains in dignity and in picturesqueness too. It is incidentally interesting to reflect that this is true traditionalism, and might have been attained at once if the gothic revivalists had studied the purpose of the ancient builders as well as their results; for the aisles are understood to have been intended by the early builders not for the congregation but for the passage of processions and if the revivalists had recognized the poetry of plan they would not have felt bound by the ancient proportion between nave and aisles but would have adapted them, as has been done in this church, to our manner of worship which makes the placing of the congregation all important, and the only procession in the aisles is their procession to their seats.

My principal object in going to London was to see the new work which, as represented in the English journals, appears to be so beautiful. Viewed in situ it was, on the whole, disappointing. The work is of the highest quality, refined, scholarly and exact, but the result on the street is small. The general characteristic is a small scale with a great deal of ornament. The scale reminds one of a Dutch or Flemish town; and there it would be seen to advantage, but it cannot hold its own against London. As for the ornament no detail which is intended to give pleasure in itself is in place in London. An angel with his mouth full of soot can give no pleasure or ever seem in place. The only kind of carved ornament which is none the worse for black is the meaningless renaissance forms such as swags. No one thinks of the flowers of which they are made up; the line is everything and this is emphasized by the black and white marking of London. In fact the proper street effect in London seems to be exemplified in the buildings of Wren and his followers, which are generally built of grey stone and broadly handled. The London smoke can do them no harm but rather enhances their effect. Indeed black and white is the proper London effect. It is the effect of Wren's churches both inside and outside and to the stranger in London is charming. The Londoner, no doubt, looks upon it as commonplace and barren and wants to import effects of colour.

I cannot see why we should love the renaissance. It is hostile to most of the objects for which we build. Yet it does seem to lend itself especially to the breadth which is so important for street building. The Banqueting Hall of Whitehall for all its elegance would hold its own amongst any neighbours, and commands our constant admiration although it is impossible to consider its principal feature—the detached column with both cornice

*Abstract of a Paper read before the Ontario Association of Architects.

and balustrade breaking round it—anything but a foolish invention.

The greatest success among the recent buildings in the city—Mr. Belcher's Institute of Chartered Accountants—is good English renaissance. Its beauty is in its scale even in the carving, and though now beautiful in its whiteness it should be still beautiful when blackened.

The blackening of a cut stone building is not by any means uniform but is subject to accidents from the varying exposure of the surfaces to wet and currents of air. The result is, in the upper parts of the buildings, an arrangement of scoured white on exposed surfaces and black deposit in quirks and quiet corners that could not be bettered if done intentionally. The effect of columns is peculiarly favored by this process, and all bold work is favoured, but the mean is only made meaner. St. Paul's seems to have gained rather than lost beauty from a couple of centuries of soot. There is a capriciousness about the lines of scouring and marking that suggest eddies caused by external influence and suggest a danger in the tall buildings that are growing up round the church yard. An alteration in the course of the prevailing eddies so as to deposit black on what is now white would spoil perhaps permanently the beauty of the present arrangement.

After coming to the conclusion I have stated about the renaissance I went to Paris and was pleased to believe I had found there a street architecture which had extracted from the renaissance simple and reasonable elements which produced its good qualities without its follies. In this respect the ordinary street architecture is a better example than higher flights of individual ambition. There is little in it but good proportion and the detail is applied so as to help this rather than be a source of interest in itself. Each opening is surrounded by an architrave and there are string courses and a cornice. All of these are built as blocks and planed afterwards, for they have at Paris the supreme advantage of an easily worked and yet durable stone. As a consequence there is also much carving, but used generally in a temperate manner, as finish rather than adornment. The stone is white and remains white, for though there is too much smoke hanging over Paris to allow of its being seen well from adjacent heights, the smoke does not seem to obscure the sunshine in the city or blacken the buildings.

The wall surfaces of buildings of an inferior class, if not those of the better class, are usually I fancy rough brick plastered and the stone is used only to trim openings, but there is no noticeable difference in the appearance and the total effect of these continuous white buildings is very beautiful. When summer comes and the trees on the boulevards are green, the streets must be many degrees more beautiful than when I saw them.

There was a tendency in the newer quarters of Paris, and in the suburbs, to abandon the simplicity of this old fashioned building and seek more bizarre effects but though the individual perhaps appears here, there is no departure from the accepted type. The fact is that France has a living style of architecture. The manner of building is traditional and the results conform to type.

I made a note of the construction of a commonplace house which I saw in the process of erection in a small country town and which I considered to be a typical example. The house was of two storeys below the roof. The external walls were of rough stonework for plastering. The openings were trimmed with stone in the front of the building and with brick at the back, set out so as to project beyond the plaster line. The space between the front and rear walls was 32 feet. It was sub-divided by a partition wall of brick which was 16 inches in the cellar, but for the two storeys above only 4 inches. It carried the ends of 5½" iron beams running from the front and rear walls which carried a floor of hollow bricks. The roof was not yet on this building, but would probably be of tiles fastened to wooden laths.

Though the style is traditional the materials are modern. Indeed it seemed to me that one of the evidences of the living character of French architecture is the straightforward way in which they use iron. It is commonly used to span wide openings, sometimes with an arch over it, sometimes it acts as support for a stone lintel. But I was most impressed with the excellent spirit of the French, by the way they expose iron in roofs and ceilings where it must look well. Sometimes they come out of this well, sometimes the result is crude, but it at any rate appeals to one as a spirited effort.

Whatever view may be taken of either the form of the French houses or the method of building them, (and for my own part I have always admired the plastered wall with stone trimmings) there can be no question I think that the country which has a traditional and recognized practice is fortunate; for not only are building operations simplified, and the expense of them, I should think, both less and more easily calculated, but the effect of the national art is greater.

In respect of the question of style I do not feel much more determined than before this tour, but one strong impression I have received, which is that a town is most interesting when its buildings are similar in character, whatever the style may be, and that any building which differs unnecessarily from the accepted type is an unpleasing interruption and must be very good indeed in order to be acceptable on its own account. When one comes to a place like the new part of New York, where there is as much variety of architecture in a square mile as there is in the whole of France, all architectural character is gone. The technical merit is of the highest order, but the effect of the whole upon the imagination is no greater than that of a museum of art.

As we are in the same position as architects in the United States, that is to say without tradition or governing idea, this is perhaps not a comforting impression to have received, but it is at least confirmatory of views which have been expressed here before and are, I believe, the architectural faith of many of us:—That attention to our own problems is both the surest safeguard against going wrong in our taste, and the surest way of giving to our work the expression of character to which style is always subordinate, and which is the essential characteristic of all good work in all styles.

ILLUSTRATIONS.

DESIGN FOR A SUMMER HOTEL.—G. A. MONETTE, ARCHITECT, MONTREAL.

SKETCHING COMPETITIONS IN THE SCHOOL OF FINE ARTS, PARIS.—SKETCH BY J. A. MARCHAND.

RESIDENCE ON MADISON AVENUE, TORONTO.—HENRY SIMPSON, ARCHITECT.

BUSINESS PREMISES AT GANANOQUE, ONT. C. J. GIBSON, ARCHITECT.

RESIDENCE OF W. M. KNOWLES, WESTMOUNT, MONTREAL.—R. FINDLAY, ARCHITECT.

This building recently erected occupies a magnificent site upon the mountain slope. In the arrangement of plan advantage has been taken of the extensive view of the city, river, rapids and lake, and every effort made to secure comfort and convenience combined with all the advantages of this commanding position. The superstructure is built of pressed brick with sandstone trimmings and half-timbered work. A large staircase-hall forms the central feature of the house, from which the principal rooms are reached; and the interior has been handsomely finished throughout in hardwood. The lighting, heating and sanitary appliances and fittings are first-class in every respect.

Erratum.—In connection with the illustration of the proposed East End C. P. R. Depot, at Montreal, published in the Architect and Builder for March, the name of Mr. Geo. B. Post, of New York, was given as the architect of the building. This is incorrect. The architect is Mr. Bruce Price, of New York.

Note.—The following description of the design for a town hall, by Messrs. Edward Swales and W. Watkin, should have accompanied the illustration published in the Architect and Builder for March, but was inadvertently omitted: "The design for a town hall for a provincial town was recently submitted in public competition. The object aimed at was symmetry of plan and elevation, with simple treatment. The four departments provided are grouped round a central public hall with their inquiry offices, and are provided with private corridors, exits and conveniences, each department being distinct in itself. The main staircase immediately faces the entrance. The central feature, the large hall on the first floor to hold 500 (gallery included), is lighted from both sides, the buildings at the back being kept low, and is flanked by staircases treated as low towers. The council chamber is placed at the back, on the quiet side, away from the main street. Committee rooms, Magistrate's room, and retiring rooms have all private corridors and approaches. Caretaker and offices are provided on the second floor. Lifts to all floors. Storage for chairs from the hall. Heating and lighting is provided in the basement.

MR. JOHN ALDRIDGE.

PRESIDENT TORONTO BUILDERS' EXCHANGE.

THE gentleman of whom the accompanying portrait is a good likeness is Mr. John Aldridge, president of the Toronto Builders' Exchange and a prominet builder of the city. He is a native of Scotland, having been born at Brockenhurst, County of Hampshire, in 1851. At an early age he was apprenticed to the building trade with his father who carried on an extensive business. In 1871, when only 20 years old, he came to Toronto. At the commencement of the agitation that preceded the nine-hour movement in 1872 he removed to Peterboro'. At this time the old wooden town, which was burned down, was being reconstructed as a brick town, and contractors found plenty of employment. In partnership with his brother he erected many of the buildings which exist to-day in that town. In 1878 he returned to Toronto, where he has since resided, and for the greater part of that period has been engaged in building. Among other buildings erected by him may be mentioned the following: The Jesse Ketchum school; the block at the corner of Yonge and Gloucester streets;

MR. JOHN ALDRIDGE.
President Toronto Builders' Exchange.

James Robertson & Co.'s factory, King street west; the Crompton Corset Co.'s factory; the Nasmith building on King street, and the building lately occupied by the Empire Printing Company.

Mr. Aldridge was one of those who felt the necessity of a material change in the old Federated Association of Builders and Contractors, and advocated the formation of an association on more modern lines and in keeping with similar institutions in the United States. The ultimate result was the formation of the Builders' Exchange, with its working sections. Mr. Aldridge was elected a director on the Board of the Exchange at its organization, and has filled the position continuously ever since until last January, when he was elected to the office of President. He has always taken a deep interest in the success of the Exchange, and well deserves the honor which has been conferred upon him by its members.

Mr. Aldridge was one of the promoters of the organization of the Trades and Labor Council, in which society his executive ability was also recognized by his election as chief officer.

MANUFACTURES AND MATERIALS

READY-MADE MORTAR.

IT has long been the custom in many European cities, particularly in Germany, for builders to purchase their mortar ready-made from persons exclusively engaged in the manufacture of the material, instead of making it for themselves on the site of the building, as is the custom in Canada. Of late the European method has come into use in some of the larger American cities, and has been found to be more satisfactory than the old plan.

The writer had a conversation recently with a well-known contractor of Toronto, who proposes to try the experiment of manufacturing and supplying mortar to the builders of that city. It is beyond question that the material manufactured in this way should be superior in quality to that made under the present system, without proper facilities and by inexperienced workmen.

The present method is necessarily expensive and much of a nuisance to the builder and the public. No doubt builders would be glad enough to be rid of it if a more satisfactory one were presented to them. The only apparent obstacle in the way of the success of this new manufacturing venture is the inactivity in building enterprise prevailing at the present time, but which it is hoped will soon pass away.

The Prismatic Glass Co., of Toronto, has increased its capital stock to $25,000.

It is said that the Williams' stone quarry near Stonewall, Man., will be operated this summer on an extensive scale.

Mr. John Harrison, of Owen Sound, Ont., has commenced the manufacture of mantels for the decoration of fireplaces.

Granite is now being quarried in Shelburne county, N. S., for export to Scotland. Formerly granite was imported from Scotland for construction works in that province.

Messrs. Tayte, Meating & Co., of St. George, N. B., are supplying 20,000 feet of New Brunswick red granite for the construction of the Museum of Natural History at Manhattan Square, New York City. The granite will be shipped to New York by schooner.

A company is being formed at Ottawa, Ont., with a capital of $100,000, for the establishment of a manufactory of wood mantels and fancy woodwork. Among the promoters are Messrs. H. N. Bate, J. C. Brennan, C. A. Douglas, D. O'Connor, A. McKinnon, Sproule, Dowsley, and others.

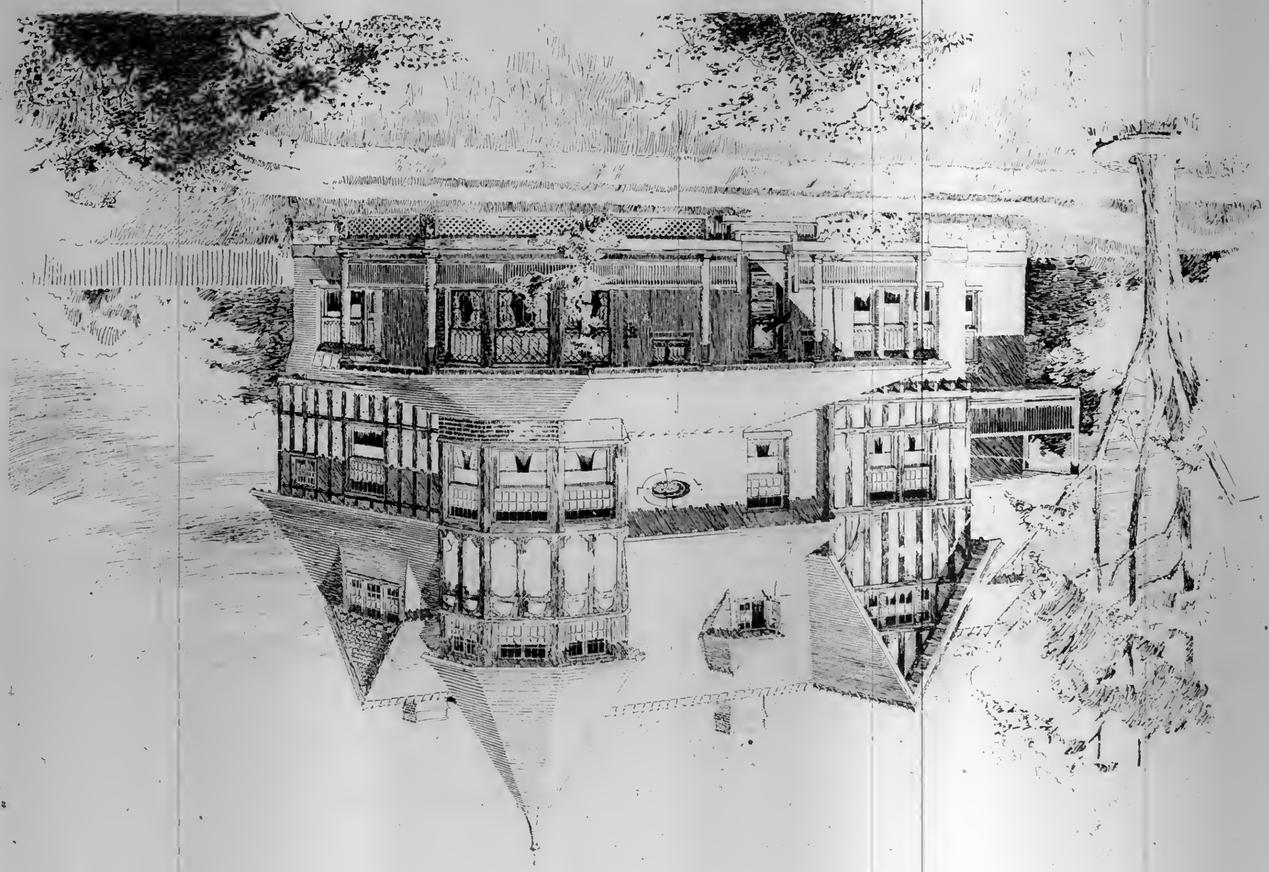
The Whitton Granite Quarry Company, with a capital of $50,000, has been incorporated to deal in granite, stone and other building materials. The promoters are Joseph Bolduc, and G. H. Lacourciere, of St. Victor de Tring; Rufus H. Pope, of Cookshire; L. I. Frechette, of St. Ferdinand d'Halifax; Wilfred Trudeau, of Fall River, and D. Alfred Roy, of New Bedford, all of the province of Quebec.

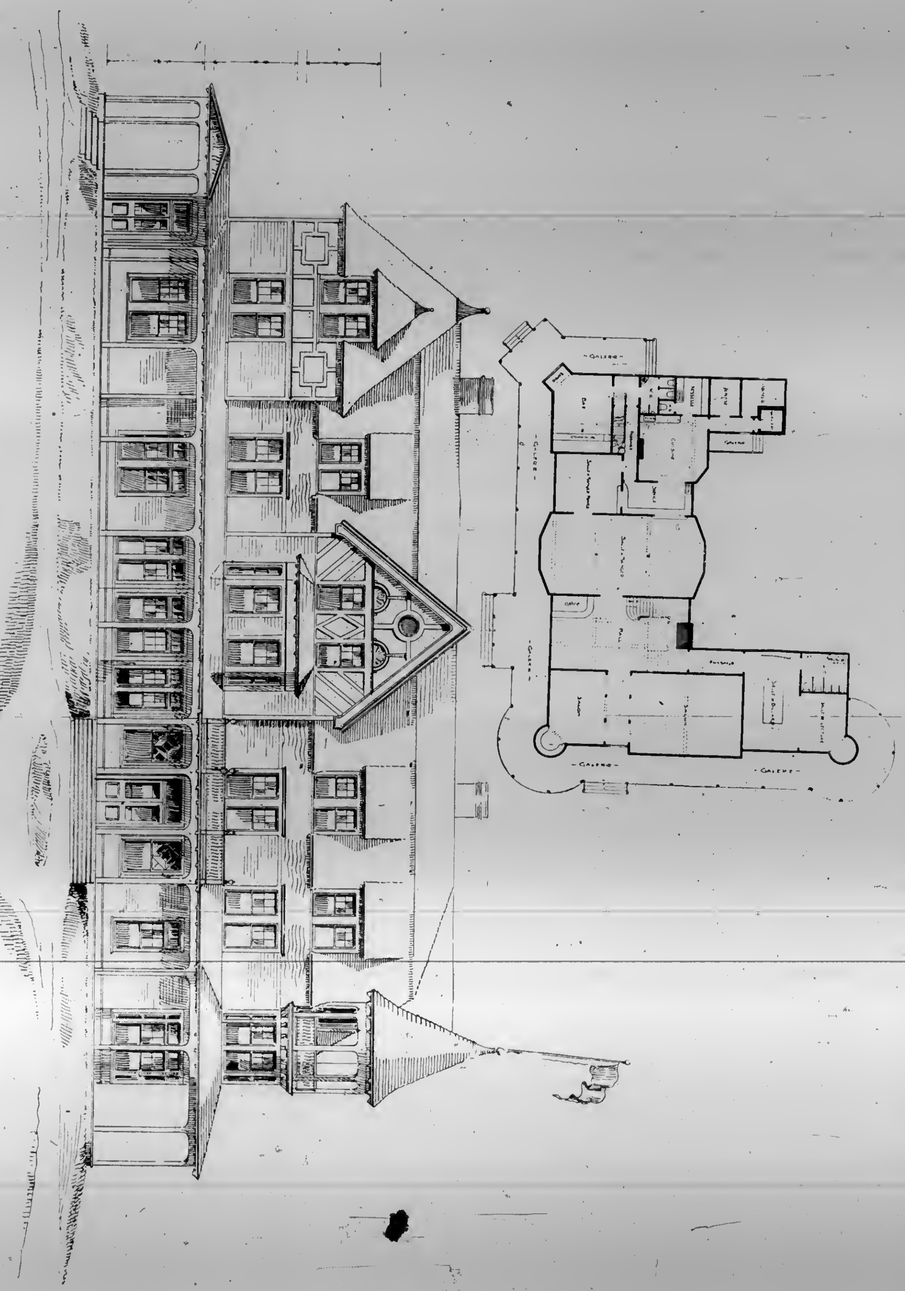
There are about sixty three-cement works in the whole of Germany. The Rhine is the principal centre for this manufacture, but in the neighborhood of Hamburg there are three or four in operation for the production of the article. The annual production of Germany amounts to nearly 11,000,000 barrels. The largest customers for this article of trans-Atlantic countries are the United States, Brazil, Chile and Venezuela. The exportation to Great Britain and British possessions is comparatively small. The following table gives approximately the quantity and value exported to America: United States, 1,386,872 cwt., £168,000; Brazil, 449,340 cwt., £40,200; Chile, 131,000 cwt., £13,000; Venezuela, 103,000 cwt., £9,800.

We have received from Messrs. Copp Clark & Co., the publishers' Canadian agents, a copy of a book entitled "Electric Wiring," by Mr. Russell Robb, published by Messrs. McMillan & Co., New York. This book is designed for the use of architects, underwriters and the owners of buildings. Considerable space has been given to the National Code of Rules for electric wiring, reasons being given for each rule, together with explanations of the meanings of the technical terms and phrases used. The book appears to be well suited for its purpose and will doubtless be found of practical benefit to the classes in whose interests it has been compiled.

RESIDENCE OF W. M. KNOWLES, WESTMOUNT, MONTREAL.

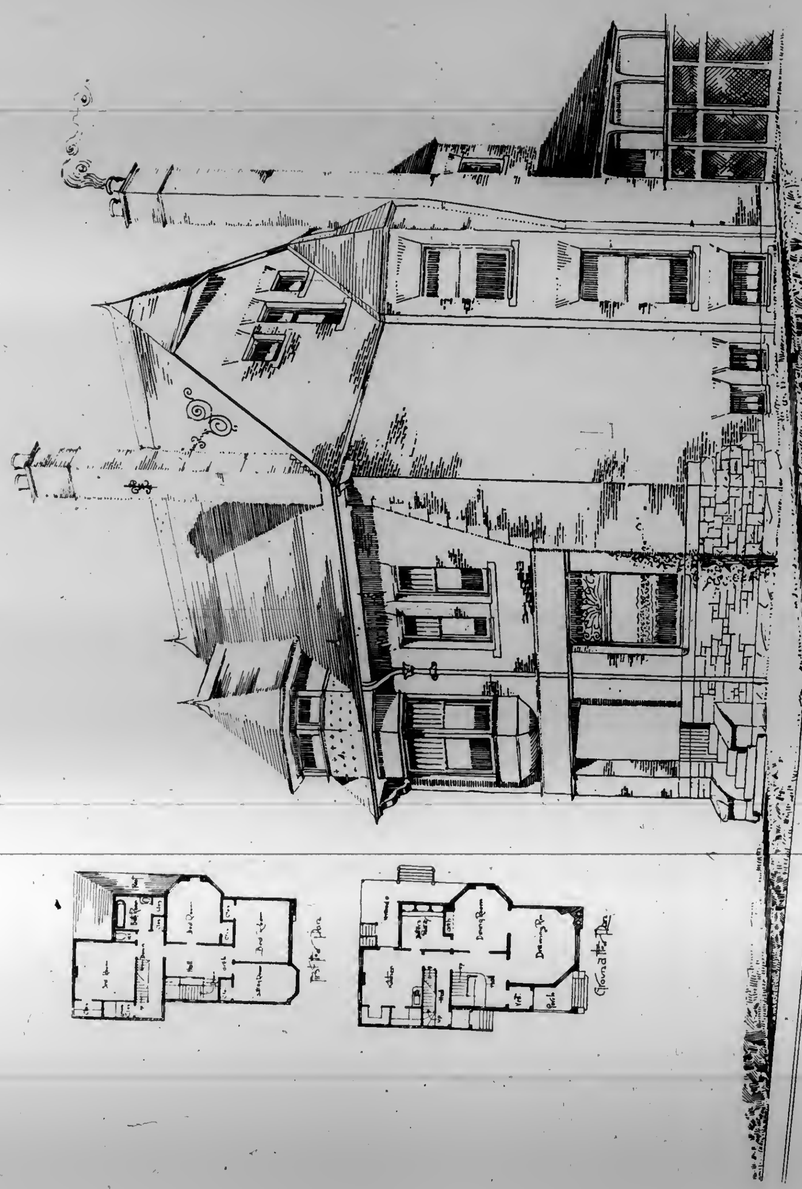
R. FINDLAY, ARCHITECT





DESIGN FOR A SUMMER HOTEL.

G. A. MONETTE, ARCHITECT, MONTREAL.

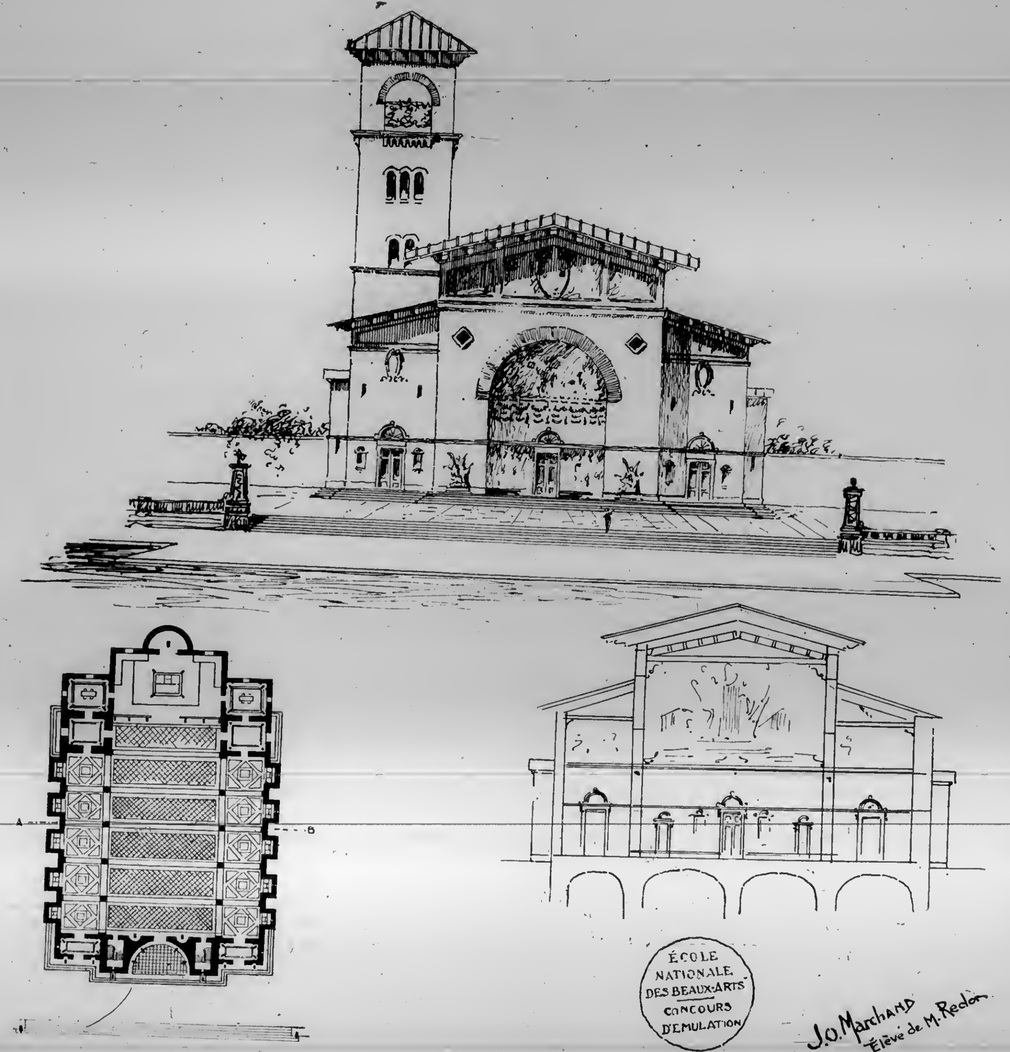


RESIDENCE ON MADISON AVENUE, TORONTO.

H. SIMPSON, ARCHITECT.

BUSINESS BLOCK, GANANOQUE, ONT.

C. J. GIBSON, ARCHITECT



SKETCHING COMPETITIONS IN THE SCHOOL OF FINE ARTS, PARIS.

ILLUSTRATING ARTICLE BY J. O. MARCHAND IN THIS NUMBER.

CANADIAN ARCHITECT AND BUILDER.

VOL. IX.—NO. 5. MAY, 1896 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS; AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	H. B. GORDON, Toronto.
1ST VICE-PRESIDENT	J. GEMMELL, Toronto.
2ND VICE-PRESIDENT	JOS. W. POWER, Kingston.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

F. J. ALEXANDER	Ottawa.
THOS. FULLER	Ottawa.
E. J. LENNOX	Toronto.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. C. HUTCHISON, Montreal.
1ST VICE-PRESIDENT	A. T. TAYLOR, Montreal.
2ND VICE-PRESIDENT	J. F. PEACHY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

CHAS. BAILLAIRGE	Quebec.
ROBT. FINDLAY	Montreal.
J. Z. RESTHER	Montreal.
A. H. LAPERRE	Montreal.
G. E. TANGUAY	Quebec.
THEO. DAOUST	Montreal.

AUDITORS—A. J. FOWLER and C. CHAUSEE, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

JOHN ALDRIDGE, President.
THOS. CANNON, Jr., 1st Vice-Pres.
JOHN VICK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. BOOTH.
JOHN WICKETT.
JOHN RUSSELL.
H. LUCAS.
JOHN VOKES.
JAS. CRANG.
JOHN M. GANDER.
GEORGE HENRY.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Students' and Draughtsmen's Competition.

WE desire to call special attention to the announcement appearing in the Students' Department of this number of a competition for students and draughtsmen. The subject—a cover design for the next New Year Number of the CANADIAN ARCHITECT AND BUILDER—is one which affords ample scope for the display of artistic skill. It is hoped, therefore, that the competition will be keenly contested, and that a satisfactory result will be achieved.

Canadian Country Architecture.

THE past few years have witnessed a most decided and marked change in the class of dwellings erected in Canada. Many new and elegant buildings scattered throughout the country, particularly in Western Ontario, have been characterized by a better construction, a finer finish, and the exercise of greater care in regard to detail. Pine is rapidly giving place to black birch, cherry, ash, oak and maple. It is quite a common sight now to see a pretentious farm house faced with pressed bricks, having generous windows with plate glass, and with painted glass in hall windows, hardwood doors built up on a pine or basswood core, ornamental stairs and handrailing, and alternate strips of dark birch and light maple floors. We notice these improvements in materials and good taste over old methods, with a great deal of pride and satisfaction, for it denotes a measure of substantial prosperity that tells of the progress the whole country is making.

Hardwood Finish.

THERE is no part in the whole construction of a dwelling where the amount of money expended counts for so much as in the woodwork, especially that part of it that shows in the hallway and drawing room, and where possible, it is always in the interest of the builder to finish these parts in hardwood. A hardwood trim creates an instant impression of something substantial, while the expense is not greatly increased, for the quantity of lumber used in a hallway and drawing room of a country house is really small, and the extra labor involved in working hardwood is not by any means great. A few dollars at the most, will be all that will be required to cover the expense, the style of work being the same as in pine. The wide-awake contractor must be aware that country people have been seized with the onward march of progress, and he will bend his energies accordingly and be up to the times in arming himself with a knowledge of all new styles of

CANADIAN ARCHITECT AND BUILDER.

VOL. IX.—No. 5. MAY, 1896 {PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 15th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	H. B. GORDON, Toronto.
1ST VICE-PRESIDENT	J. GEMMELL, Toronto.
2ND VICE-PRESIDENT	JOS. W. POWER, Kingston.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

F. J. ALEXANDER	Ottawa.
THOS. FULLER	Ottawa.
E. J. LENNOX	Toronto.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. C. HUTCHISON, Montreal.
1ST VICE-PRESIDENT	A. T. TAYLOR, Montreal.
2ND VICE-PRESIDENT	J. E. PEACHY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

CHAS. BAILLAIRGE	Quebec.
ROBT. FINDLAY	Montreal.
J. Z. RESTHER	Montreal.
A. H. LAPIERRE	Montreal.
G. E. TANGUAY	Quebec.
THEO. DAOUST	Montreal.

AUDITORS—A. J. FOWLER and C. CHAUSEE, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

JOHN ALDRIDGE, President.
THOS. CANNON, Jr., 1st Vice-Pres.
JOHN VICK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. BOOTH,
JOHN WICKETT.
JOHN RUSSELL.
H. LUCAS.
JOHN VOKES.
JAS. CRANG.
JOHN M. GANDER.
GEORGE HENRY.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Students' and Draughtsmen's Competition.

WE desire to call special attention to the announcement appearing in the Students' Department of this number of a competition for students and draughtsmen. The subject a cover design for the next New Year Number of the CANADIAN ARCHITECT AND BUILDER—is one which affords ample scope for the display of artistic skill. It is hoped, therefore, that the competition will be keenly contested, and that a satisfactory result will be achieved.

Canadian Country Architecture.

THE past few years have witnessed a most decided and marked change in the class of dwellings erected in Canada. Many new and elegant buildings scattered throughout the country, particularly in Western Ontario, have been characterized by a better construction, a finer finish, and the exercise of greater care in regard to detail. Pine is rapidly giving place to black birch, cherry, ash, oak and maple. It is quite a common sight now to see a pretentious farm house faced with pressed bricks, having generous windows with plate glass, and with painted glass in hall windows, hardwood doors built up on a pine or basswood core, ornamental stairs and handrailing, and alternate strips of dark birch and light maple floors. We notice these improvements in materials and good taste over old methods, with a great deal of pride and satisfaction, for it denotes a measure of substantial prosperity that tells of the progress the whole country is making.

Hardwood Finish.

THERE is no part in the whole construction of a dwelling where the amount of money expended counts for so much as in the woodwork, especially that part of it that shows in the hallway and drawing room, and where possible, it is always in the interest of the builder to finish these parts in hardwood. A hardwood trim creates an instant impression of something substantial, while the expense is not greatly increased, for the quantity of lumber used in a hallway and drawing room of a country house is really small, and the extra labor involved in working hardwood is not by any means great. A few dollars at the most, will be all that will be required to cover the expense, the style of work being the same as in pine. The wide-awake contractor must be aware that country people have been seized with the onward march of progress, and he will bend his energies accordingly and be up to the times in arming himself with a knowledge of all new styles of

work and methods of performance. If he fail to do this some more progressive man will soon be in his neighborhood quietly but surely taking away his trade. In these days of active competition a man to be successful must keep abreast of the times, for the law of evolution obtains in the building trades as well as in other matters, and it is only "the fittest that survive."

A Generous Offer.

THE Maharajah of Jeypore, India, has offered to supply free of charge to public institutions for the education of the young, six portfolios, containing 374 plates 15 x 22 inches in size, some in color, illustrating the most beautiful architectural work of India. The only expense will be the cost of packing and carrying charges. These portfolios may be obtained through Messrs. W. Griggs & Sons, Elm House, Hanover Street, Rye Lane, Peckham, London. Our Canadian educational institutions should lose no time in making application for these interesting illustrations.

The Utilization of Convict Labor.

CANADA'S expenditures on public works have probably been larger than those of any other country of equal population and resources. These expenditures have been made for the purpose of promoting immigration and assisting the country's development. The latter object has been realized in a more satisfactory degree than the former. The government should now turn its special thought and attention to devising means of increasing by immigration the population of the country. There are yet a number of public works, the carrying out of which would tend to assist our national progress, but which cannot, at the present stage of our history, be paid for out of the public exchequer. Why should not the labor of the inmates of our prisons, who are now being supported at the public expense, be utilized for the construction of such public improvements? If the financial resources of the country forbid that these improvements be undertaken in the ordinary way, is it not advisable that they should be carried out by this only available method? No injury would be done to free labor, and the country would derive some return for the large sums of public money which are annually expended for the support of the criminal classes.

Advantages of Building in Summer.

BUILDING in the country is now well advanced, and in many of our towns and villages, work that was commenced before the cold weather departed, is drawing rapidly towards completion. Country contractors generally find a lull in the building trades about midsummer, and often owners, who intend building, delay giving out their work, so that out-door operations have to be done when the weather is in an unsuitable condition. This is a factor, seldom taken into consideration in the summer, which often proves a matter of serious loss to the contractor, who should try and urge those having work to give out, to let their contracts as early in the summer as possible. Generally work taken during the winter previous to execution, is not the most profitable, as frequently the necessities of individual workmen compel them to cut prices down to almost starvation point, and as a rule, before the work is completed both contractor and owner become disgusted with the job; then comes a series of dishonest strategems by the workman on the one hand, to beat the owner; and a period of dissatisfaction and grumble by the owner when he discovers the knavery of his contractor. Summer jobs always pay best, and are more certain to give satisfaction all round.

If work be taken in the fall of the year to be completed the summer following, the chances are that both contractor and owner will be better served than if let under any other conditions. This would give the contractor ample time to digest his plans and to decide on the best and speediest methods of going about the work, and the owner would be better served, inasmuch as all his joiner's work would be—if the contractor does his duty—better seasoned, and in a much better condition to "stand" than if hurried from the factory to the building and put in place at once. The tendency in all our smaller towns is to "rush matters to completion," a tendency which acts injuriously to the whole building interests, and everyone engaged in these interests should set their faces against it. A good building, like a good tree, can only be the result of time naturally dispensed.

Safe Scaffolding.

As the tendency of the law is to make the contractor responsible for accidents to workmen caused by defective or improper scaffolding, it should be one of the chief objects of the foreman to see that every piece of scaffolding is sound, strong and sufficient. Many a limb has been broken and many a life lost because of the use of rotten or imperfect materials, or because enough nails have not been used in making the scaffold. Every contractor should have in stock a good scaffolding plant suitable for all work he may be called upon to perform. The English method of using good stout poles instead of sawn scantlings, is to be commended, as being safer and stronger, as the fibres of the grain are continuous throughout the whole length of the pole, whereas, in scantling, cross grain and knots render them liable to snap asunder at every sudden shock or strain. In scaffolding, when round poles are used, the putlogs or cross pieces are generally lashed to the poles with ropes—sometimes with chains—and this does away with the necessity of using nails to secure the brackets, and leaves the scaffolding undamaged when the work is completed. Taken all in all this manner of scaffolding, apart from being the safest, is, in the end, much more economical than the old slovenly way of nailing.

Tamarack or spruce poles are easily obtainable in Canada, and when once prepared and seasoned, if properly cared for, will last a lifetime and be as strong in the end as when first used. Putlogs should be made of straight grained rock elm, oak or rim ash. By using either of these woods, the dimensions may be small—not more than 3″ × 5″, and six feet will be found long enough to have them for most purposes. The ropes used for lashing should not be more than ¾ of an inch diam. and should be laid away in a dry situation when not in use. If the building is of wood that requires scaffolding, an ordinary right-angled bracket with braces nailed on each side, may be used instead of hardwood putlogs. The stuff from which these braces are made should be for the top and back, about 2″ × 5″, and the braces nailed on the sides at an angle of 45° should be of good sound stuff—pine—1″ × 5″. The space between these braces is where the sustaining pole is inserted when the bracket is in use. The height of the scaffold is regulated by moving the foot of the pole. To raise it higher the pole is moved closer to the wall, to lower it the foot of the pole is moved further away from the building. The difference between the lowest and highest point the bracket can reach, is limited by the length of the pole.

BUILDING TRADE DISSENSIONS.

BUILDING operations in Toronto have been affected during the past fortnight by a disagreement between employers and employees with respect to wages. Efforts were made by the Builders' Exchange, as well as the various building trades unions, to arrive at an agreement by which the season's operations would be carried on in harmony, and with the majority of trades this was effected. The agreement with the stonecutters has been renewed at the same rate of wages per hour as last year, while the stonemasons and bricklayers have signed an agreement at a considerable reduction. The Bricklayers' Union held out strongly against reduction but finally recognized the necessity of acceding to the proposition made by the master builders.

The Builders' Laborers' Union, however, notwithstanding the fact that agreements had been signed by the other branches at lower figures than last year, would not even accept the same rate as last year, which the builders were willing to pay, but apparently without considering existing conditions, demanded an increase of three cents per hour.

The refusal of the master builders to grant the request resulted in a strike being declared, which is still in progress. Several conferences between the parties to the disagreement have been held to endeavor to effect a settlement, but without success.

We are convinced that the strike has been brought on without proper consideration of the conditions in the building trades. It is admitted that building operations in Toronto during the present year are not likely to exceed those of last year, while many hold the view that their extent will be much less. The time, therefore, is not opportune for such a strike. The labor market is glutted, work scarce, and competition extremely keen.

Four years ago, the Trades and Labour Council, of which the Laborers' Union is a part, were successful in having a by-law passed by the City Council fixing the wages to be paid to laborers at 15 cents per hour as the least upon which a family could be maintained. At that time the purchasing power of a dollar was about one-half what it is to-day, consequently the workman who receives that amount to-day is in a much better position than he then was.

But probably the strongest proof of the unwise action of the laborers is found in the fact that the bricklayers and masons, who are skilled mechanics, and are compelled to spend several years in learning their trade, have considered it to their advantage to accept a lower rate of wages than last year. It is further claimed that few carpenters in Toronto receive a higher wage than is asked for by the laborers.

The master builders recognize the fact that it is not to their own interest to pay low wages, but in the face of the existing depression in the building trades the standard of wages is as high as can reasonably be demanded.

Mr. W. A. White, contractor, of Lindsay, Ont., was recently seriously injured by a safe falling upon him.

CORRESPONDENCE.

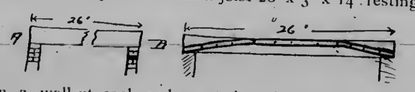
[Letters are invited for this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

A PROBLEM IN CONSTRUCTION.

KINGSTON, ONT., April 20, 1896.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—Will you please answer the following question and give the figures to show the difference in carrying power, or rather the resistance to bending stress of the two beams of pine. Given a joist 26′ x 3″ x 14″ resting



on a wall at each end as at A and another of same dimensions as at B but having pieces of 1″ x 5″ pine, nailed on as shown, does the addition of these pieces stiffen the joist, and how much?

Yours truly,

JOHN H. BIRKETT.

ANSWER.—The safe load for a 3″ x 14″ white pine beam having a clear span of 24′, is 2,940 lbs. The 1″ x 5″ pieces, if thoroughly nailed to the beam or joist, would help to stiffen the same against sagging, but that would not materially strengthen the beam. It is impossible to secure the rider firm to the main beam when the span is so great and the depth so little, that the whole will act together as one piece. The resultant strain is very great and the side pieces would slip upon the main beam in response to any weight thrown upon them. There is also the shrinkage in the timber to be taken into consideration.

THE O. A. A.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—As the proposed amendment to the Ontario Architects' Act has been withdrawn for the present, would it not be an opportune time for a discussion in your columns of the best means by which the Association might be strengthened? The more really active members the Association contains and the more good work can be done by it in raising the standard of architecture in our province, the more easily will the much desired legislation be obtained in the future.

The suggestion to form local chapters, which was made at one of the annual meetings, seems a good one. As it is now the members meet but once a year, while by more frequent gatherings of a less formal nature, much good fellowship might be promoted and much benefit be received by those attending. In this connection mention might be made of the meetings held by the English architectural societies, the reports of which in the English papers show the lively interest taken in them, not only by the members, but also by the professional journals, these reports forming no mean item in the contents of each number.

As Toronto is the headquarters of the Association and contains the largest proportion of its members, the initiative in the formation of such local chapters might well be taken here.

To carry out the proposal, convenient down town club rooms should be obtained. If these were comfortably furnished and provided with the leading technical journals, etc., they would soon become a pleasant meeting place for the architects. During the winter months lectures and occasional social gatherings could be arranged for the members, while for the students' section special classes and sketch competitions could be provided. By this means the social as well as the educational advantages of the Association would be greatly increased, and by keeping the daily papers informed of all meetings, the Association would become better known, and would be practically a necessity to all architects.

If these club rooms were obtained it should be arranged that the Registrar have his office and the library of the Association in connection, and all non-resident members should be made welcome to the use of the rooms, when in town. Of course the expense attached to such an undertaking would be borne by the local members. The way things are at present many Toronto architects support not only the O. A. A., but also the Guild and Sketch Club, which, of course, seems a needlessly heavy expense. If the two latter were in some way merged into the O. A. A., surely it would add to the power of the latter. It is surely not impossible to make the O. A. A. cover the entire ground of the three, and would most probably induce a better feeling and a stronger interest among those architects who are at present only half-hearted in their assistance to the O. A. A. in reaching the goal it is striving to attain.

Trusting that these views may meet with approval, and that some action may be taken accordingly, I am, dear sir,

Yours very truly,

A TORONTO MEMBER.

Toronto, May 1st, 1896.

DEFECTS OF ASPHALT PAVEMENTS.

THE doubts expressed in these columns last year concerning the merits of asphalt as a paving material on streets traversed by street car tracks, have proven to be well founded. The disappearance of ice and snow from the principal business thoroughfares of Toronto, viz., Yonge, King and Queen streets, has revealed the fact that between and on either side of the street car tracks, the asphalt has broken away in large patches from the concrete foundation, leaving the roadway full of great holes, unsightly to look upon and highly dangerous to traffic.

These pavements were laid four years ago at a cost of $2.80 per square yard, and in the belief that in them the city was securing a truly permanent pavement, the foundation of which would endure for about thirty years and the asphalt surface for about half that period. It is greatly disappointing to find that these expectations are not to be realized in any satisfactory degree, and that the recent large expenditures on pavements must be supplemented almost immediately.

It is true that the contractors are bound to keep the pavements in repair for five years, but a year hence that period will have expired, and then the cost of maintenance will fall upon the city. Soon after the city is called upon to assume the responsibility for keeping these pavements in repair it will probably be found necessary to renew entirely the asphalt surface. The cost of doing so will amount to about $1.50 per square yard, or above half the total original cost. Unless a better class of material and workmanship can be secured, the asphalt surface will require to be renewed three or four times at least during the lifetime of the concrete foundation, so that in the end the pavements will cost double the amount of the original estimate.

We believe that had vitrified brick been used on these streets instead of asphalt, the result would have been much more satisfactory in every way.

OFFERING BRIBES TO ARCHITECTS.

WE have more than once called attention to the reprehensible practice of some manufacturing companies who, instead of relying upon legitimate business methods and the merits of their goods, aim to secure contracts by offering commissions and other forms of bribes to architects. A well-known firm of architects in Western Ontario lately received a barefaced offer of this kind, which they have sent to us with the request that we would assist to put a stop to the practice. Believing that exposure is one of the most effective means to this end, we print the communication in full, as follows :—

DETROIT HEATING & LIGHTING CO.

DETROIT, Mich., April 7th, '96.

Messrs. —
—, Ont.

Dear Sir :

As we conduct our business for profit, we assume that you conduct yours from a like motive. We propose to increase our profits by adding to yours, and, therefore, submit the following proposition for your consideration :

More than ten years ago, we began to manufacture hot water and steam heating apparatus. Such work was not then understood by the local fitter, and, in order to bring such systems into general favor, it became necessary for us to employ a force of about one hundred expert hot water fitters for installing the systems all over the United States ; a force of about fifteen engineers and draftsmen, for preparing plans, and about thirty traveling salesmen, to drum the country. The situation has now completely changed, in that : 1st, we no longer contract for the installation of such systems, and, consequently, do not carry a force of traveling fitters. 2nd, the local fitter is now familiar with the work, therefore, it is no longer necessary to employ a force of engineers and draftsmen. It is admitted that the present price on first-class heaters is too high, but manufacturers still maintain present high prices, because they continue to employ, at a heavy expense, a large corps of fitters, engineers, draftsmen and drummers.

Our heaters are well and favorably known all over the United States, and, as we now sell them only to local fitters, we propose, (allowing other manufacturers to conduct their business as may seem best for them), to dispense with our large force of engineers, drummers, etc., and divide the saving thus effected with the local fitter and architect : 1st, by offering our heater to the fitter at a lower price than any other first-class heater in the country ; 2nd, by paying to the architect a commission of 10 per cent. on net sale price of the heater specified by him, if sale is finally effected. Therefore, after this date, our representative will not visit you, as has been his custom in the past.

We trust you may be pleased to co-operate with us in the plan outlined above, and if so, to avoid errors or misunderstandings, when you specify our apparatus, will you kindly fill out the memorandum in the enclosed book, and forward to us, without delay, so that we may place on file, and when transaction is fully completed, we will remit, or protect your draft on us, for the amount of commission. This proposition also includes our Combination gas machine, at a commission of 5 per cent., net amount sale, up to, and including, seventy-five (75) lights, and 4 per cent. on one hundred lights, and larger.

We know that our plan of dividing profits will prove mutually profitable, and hoping that we may have your early reply, indicating that you will co-operate with us, we remain,

Yours very truly,

DETROIT HEATING & LIGHTING CO.

P. S.—Price lists and discounts on application.

The form of memorandum above referred to is as follows :

Owner of Building	Date .....
.....	Specified by Architect .....
Capacity Gas Machine	State and City .....
Heater Specified, No.....	Address of Owner.....
Date Advised D. H. & L. Co.....	Heating Contractor's Address.....
Heating Contract awarded to	Lighting Contractor's Address .....
Lighting Contract awarded to	Capacity or No. Heater .....
.....	Capacity or No. Gas Machine .....
Detroit Heating and Lighting Co., Detroit, Mich.	Mail this to Detroit Heating and Lighting Co., Detroit, Mich.

It may be that some architects do not scruple to receive and accept offers of this kind, and that the idea has consequently got abroad that all architects are open to do business on this plan. If so, the impression is a false one. We believe the leading architects of the country are guided in their practice by higher principles, and that an offer like the one printed above would be considered a sufficient offence to warrant the exclusion of the person making it from tendering upon future contracts. It is still true that honesty is the best policy.

MOVABLE FOUNDATIONS.

PROF. JOHN MILNE, of the Imperial College of Engineering at Tokio, Japan, has devised a novel form of foundation for buildings erected in countries subject to earthquakes, involving the use of huge ball bearings. About half a century ago a Japanese builder became convinced that the secret of protection rested in the foundations of buildings, and erected an immense bamboo structure on wooden beams resting on long iron rollers. Upon the occasion of the first earthquake the structure rose and fell with the undulations of the earth, but as soon as the trembling changed the building collapsed, for the reason that the rollers could only move one way. He next erected a building equipped with two sets of rollers, one above and at right angles to the other. This was more successful. At a later date, Prof. Milne, in taking apart a bicycle, noticed the ball-bearings at the axles, and erected a building on this principle, making the walls with a groove at the base and resting them on rows of iron shot and balls. These in turn rested in grooves running in all directions, so that the house could move to and fro. This experiment proved entirely successful, and while the building swayed in a startling manner it did not collapse.

EXAMINATIONS FOR BUILDING INSPECTORS.

THE following questions were set at the late examinations for building inspectors, both for iron and steel-work and for the general inspection of buildings, by the Civil Service Board of New York :—

TECHNICAL—MARCH 10, 1896.

1. State in full (giving their names) what drawings are in your opinion needed to give an inspector the information he should have to properly inspect a building.

2. Is it part of the duty of an inspector to examine the specifications of a building he is in charge of, and for what purpose in general?

3. What is the very first thing an inspector has to do in connection with the preparation for a building about to be erected, and how should he perform that duty? (State this in detail.)

4. Suppose that shelving rock be found in making the excavation for a building, what must be done?

5. What accidents are liable to happen in making the excavation for a building, and how are they to be guarded against?

6. Suppose the ground under one portion of an excavation to be loaded to 10 tons per square foot, and that under an adjacent part of the same building to have 5 tons load, what will be the result?

7. When you wish to build strictly sound stone masonry, state every detail of the process and every precaution you must use. (This does not refer to the cutting.)

8. State what are the characteristics of a strictly well-built brick wall, and all the details necessary to be observed by the mason in building it; including the inspection of the materials.

9. Give every detail of the mixing and placing of first-class concrete, (1) cement, (2) sand, (3) gravel or broken stone, including the inspection of the materials.

10. Is it a good plan to cement closely the ends or other portions of timber? Give a reason for your opinion.

MARCH 19, 1896.

11. Will painting, cementing or tarring timber prevent decay? State all you know about it.

12. What are the objections, if any, to the use of grout in masonry, where other methods can be used?

13. Add the following measurements together, 10 feet 9 inches, 13 feet 7 inches, 15 feet 2 inches, 12 feet 11 inches, 17 feet 1 inch, 23 feet 8 inches.

14. Subtract 27 feet 9 inches from 97 feet 5 inches.

15. Multiply 19 feet 5 inches by 6.

16. Divide 99 feet 7 inches by 5.

Six additional questions will be asked verbally respecting plans of buildings.

MARCH 17, 1896.

1. Suppose the excavation for a building to be completed, how would you determine whether the earth or other natural material under the foundation was suitable to found upon without further preparation or work?

2. Suppose rock to be exposed in making an excavation for a building, and that it slopes considerably so that its surface under a portion of the foundation runs below the level at which it is proposed to start the foundation, what should be done?

3. What matters would you expect to find described in the specifications for a building which are not usually given on the drawings or plans?

4. What is the reason for making the footing of a wall wider than the wall itself? Also, is there any reason for ever making this excess of width greater under one building than under another of the same dimensions?

5. Suppose a brick building to be 50 feet by 100 feet and 45 feet high, and to have no cross walls ; and that, while putting on the roof beam one of the bearing walls shows signs of weakness, what steps should be taken to prevent accidents?

6. Describe fully the operation of cutting an opening through a bearing wall in a safe manner?

7. Suppose the ends of wooden floor beams to be left square where they enter a bearing wall, what objections are there to this method, and what danger may result?

8. What is the object of filling the space between the floor and ceiling in partitions?

9. Suppose an old brick wall is to be lined with a new one to make it heavier, how can you make the two work together?

10. In putting timbers under the wall of a building for the purpose of underpinning it, how do you tell when the wedges on the timbers are driven up sufficiently or sufficient strain taken on the lifting screws?

11. What makes the most solid work, cement mortar or cement grout, and for what reasons?

12. In the following specification for stone masonry, state what important omission there is.

"Stone to be found, free from weathered faces, beds to be full and square to face with no large pitch holes, exposed faces to be pitched true, to be laid in cement mortar mixed 1 cement to 2 clean sharp sand, all joints to be ⅜-inch and thoroughly filled, the stones to be bonded as shown in the drawings. The wall to be laid true and plumb, and all joints to be cleaned out for 1 inch from the face and thoroughly pointed with rich cement mortar."

13. Give, in your own language, every one of the requirements needing the attention of an inspector to insure that the brickwork in a building shall be as good as it can be made?

14. State what you know as to the best methods of protecting iron floor beams from damage by fire.

15. State what you consider the best method of protecting iron columns against fire.

16. What are the causes of dry rot in timber?

17. How would you know from the plans what materials were to be used in the walls of a building?

18. What is a transverse section?

19. To what drawings would you refer to determine the construction of floors?

20. What do the various colors on plans denote?

IRONWORK—MARCH 10, 1896.

1. What should be the finish of the ends of all columns or parts of columns to insure sound and plumb work?

2. How would you proceed to make a careful inspection of wrought-iron columns, girders, &c., before erection?

3. Suppose that in the erection of wrought-iron work some of the holes for rivets do not come fair with each other, what is the correct procedure?

4. How should the head of a rivet look after it is driven, and what test should be applied to rivets?

5. Can a rivet be driven tight if the plates to be joined are not in absolute contact? If not, why not?

6. Are bolts as good as rivets for fastening the parts of iron work together? Give your reasons for so thinking.

7. Is ironwork ever damaged in transportation? State what you know about it.

8. Does the wind ever displace or damage ironwork after its erection and before completion, and what provision, if any, should be made against such damage?

9. Are the floors of a building ever damaged during erection by overloading, and in what way does the damage show itself?

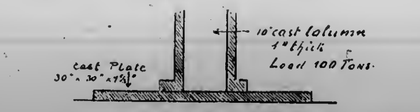
10. In which way is a rivet the stronger when sheered by a side strain or pulled endwise?

11. Could you tell with a cold chisel whether a piece of steel in a girder was soft and tough or hard and brittle, and how?

12. How would you inspect a cast-iron column if called upon to do so?

13. Criticise the following details of the tops of cast-iron columns and give your reasons for your conclusions. State also what should be done to make the one marked "A" correct.

14. How would you change the following base, &c., of a cast-iron column to make it safe?



15. In addition to the above, six questions will be asked verbally in connection with a set of plans.

MARCH 17, 1896.

1. Is there any objection to the use of "shims" in plumbing columns or parts of columns? If there is, state it.

2. State some of the dishonest expedients proposed by work

men at the shops used to hide bad work and mistakes, or to cover flaws or other defects in wrought-iron work?

3. Is "drifting" rivet holes a good thing to do when they do not meet? Is there any other course to pursue, or is this the best?

4. What are the characteristics of the best work in riveting?

5. Does it make a difference in the quality of rivetting whether the blows struck in driving the rivets are light or whether they are heavy?

6. State the requirements for the best work in the use of bolts for fastening the parts of ironwork together.

7. Is ironwork ever displaced or damaged after its erection and before the completion of a building, and in what ways?

8. Suppose the floors of a building to be too heavily loaded with material during erection, how would you expect to discover that they were so loaded?

9. Have you ever seen cases where the fastening of floor beams to girders was insufficient; if so, how did you know it was insufficient?

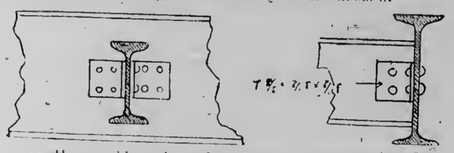
10. How would you test a piece of steel in a girder, &c., to tell whether it was soft and tough, or hard?

11. What defects are cast-iron columns subject to, and how would you proceed to discover them?

12. What is the very best way of protecting iron which is below the water-line in a foundation from damage by rust?

13. Is there ever occasion to provide for the expansion or contraction of iron roof trusses? If so, state when it is necessary and how it is done.

14. Is the connection shown below for joining a floor-beam to a girder of correct design? State what you know about it.



15. How would you know from the plans what materials were to be used in the walls of a building?

16. What is a traverse section?

17. To what drawings would you refer to determine the construction of floors?

18. What do the various colours on plans denote?

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

VICTOR BOURGEAU.

In connection with the letter of a correspondent, the Inland Architect prints the accompanying portrait of Victor Bourgeau, who was the architect of St. Peter's Cathedral, and the designer of the altars, pulpit and organ of Notre Dame Cathedral, in this city. Many of the Catholic churches, schools and convents in the province of Quebec were erected from his designs and under his supervision. He died about three years ago, being upwards of eighty years of age.

MONTREAL SKETCH CLUB.

The Club has commenced to hold monthly competitions. The following problem has been given out for the month of May: "An Entrance to a Public Building leading directly from an open court to a large hall." Drawings must be sent not later than the 29th inst. The students one Saturday afternoon recently visited the Canada Life Building, now in course of construction. The meetings of the Club are well attended.

EAST END C. P. R. DEPOT.

Workmen are at present engaged in clearing the site for the proposed C. P. R. east end depot. Considerable work is to be done on the building this season.

P. Q. A. A.

The series of lectures in connection with the monthly dinners of the P. Q. A. A. was brought to a close on the evening of the 14th of April by a lecture by Mr. W. E. Doran on "Truth in Architecture." The Association held a general meeting on the 12th ult. to consider preliminaries in connection with a proposed Architectural and Arts and Crafts Exhibition to be held in Montreal next fall in connection with the annual meeting. A general committee has been organized to complete arrangements, and will hold its first meeting on Tuesday, the 19th prox.

SANITATION AND HEATING

PLUMBERS' SUPPLY MERCHANTS ORGANIZE.

A MEETING of manufacturers of and wholesale dealers in plumbers' supplies was held in Toronto on Tuesday, May 5th, to consider questions affecting the trade. The meeting was the result of certain concessions asked for by the Master Plumbers' Association. The attendance was representative, and included the following:

A. A. McMichael, Jas. Robertson Co.; James Morrison, James Morrison Brass Mfg. Co.; A. J. Somerville, Ontario Lead and Barb Wire Co.; A. D. McArthur, Craig & McArthur; John M. Taylor, Toronto Radiator Mfg. Co.; W. H. Carrick, Gurney Foundry Co.; H. S. Hergert, M. & L. Samuel, Benjamin & Co.; J. H. Patterson, Toronto Hardware Mfg. Co.; H. W. Anthes, Toronto Foundry Co.; A. G. Booth, Toronto Steel-Clad Bath & Metal Co.; W. B. Malcolm, W. B. Malcolm & Co.; Geo. Booth, Booth Copper Co., all of Toronto; E. Smith, Robert Mitchell & Co., Montreal; Geo. McAvity, T. McAvity & Sons, St. John, N. B.; T. A. Stevens, Stevens Mfg. Co., London; W. Armstrong, Essex Brass & Iron Co., London.

The necessity of organization, in order to more effectually carry out the objects desired, was apparent, and at the suggestion of Mr. Somerville, it was resolved to form an association, to be known as the Association of Manufacturers and Dealers in Plumbers', Steam and Hot Water Fitters' Supplies. Temporary officers were elected as follows: A. A. McMichael, president; A. J. Somerville, vice-president; A. G. Booth, secretary.

A committee was appointed to draft a constitution and by-laws, and a report therefrom will probably be presented at a meeting to be held on the 21st inst. A resolution was passed pledging the members of the Association to supply goods only to legitimate master plumbers and steam fitters.

The Association gives promise of developing into a strong organization. It is intended to represent the whole Dominion, and already a majority of the largest manufacturers have signified their intention of becoming members.

The organization of a Master Plumbers' Association, at London, Ont., has been effected, after a determined effort on the part of the promoters. The officers-elect are: W. J. Hazlett, president; W. Smith, first vice-president; W. J. Skelley, second vice-president. The Association held its initial banquet on May 19th, at which Mr. W. J. Burroughes, president of Toronto Association, was present.

The Master Plumbers of Toronto must have had a very good time at their recent convention, judging from the reports which we have read, says the Chicago Master Steam Fitter. At the banquet following the business session about 150 guests were present. During the toasts and speech making considerable merriment was caused by numerous amusing stories told on the plumber. Amusing stories did not occupy all the time, as the members seem to have had an eye to business and the welfare of the association at all times, and many of the jokes contained a strong business pointer.

He who refuses to consider heating and ventilation together, as a part and parcel of the same art, is not likely to achieve much in his efforts at improvement, says Domestic Engineering. In all future attempts at advancement in heating or in ventilating appliances they must be considered together. Good heating of buildings cannot be attained without ventilation, neither can good ventilation be obtained without heating. As well try to consider the steam engine alone, or the steam generator alone in the art of gaining power from steam as to separate the twins, heating and ventilation. No house, heated independently of the aid of airflow, is well heated. The ventilation of a building in winter without warming the inflow would not be good ventilation.

STUDENTS' DEPARTMENT.

"CANADIAN ARCHITECT AND BUILDER" STUDENTS' AND DRAUGHTSMEN'S COMPETITION.

THE publisher invites from architectural students and draughtsmen, other than practising architects, designs for front cover page for the New Year (1897) Number of the CANADIAN ARCHITECT AND BUILDER.

Designs must be rendered either with pen and perfectly black ink or with brush in sepia on a sheet of white drawing paper or card-board, drawn to the size or 22 × 14 inches, and capable of being reduced to 7 × 11 inches. The wording to appear on the design is as follows:

"CANADIAN ARCHITECT AND BUILDER.
NEW YEAR NUMBER. 1897. TORONTO, CANADA."

Drawings must be marked only with the motto of the author, and accompanied by the motto, full name and address of the author, in sealed envelope, must be sent, charges paid, addressed to the publisher of the CANADIAN ARCHITECT AND BUILDER, Toronto, so as to reach this office on or before 5 o'clock p. m., on Monday, the 6th of June next.

This competition will be decided by a majority vote of a committee of architects to be appointed for that purpose by the Council of the Province of Quebec Association of Architects and of the Ontario Association of Architects. The decision of this committee will be final.

If two or more suitable designs are submitted, a prize of $10.00 will be given to the author of the one awarded first position and $5.00 to the one awarded second place. The right is reserved to withhold the prizes if two or more suitable designs are not submitted. The right is also reserved to publish any of the designs submitted.

NOTE. This competition is announced with the object of testing somewhat outside the lines of their every day work the artistic skill of Canadian students and draughtsmen. It is hoped that the response will be generous and earnest, and the result satisfactory.

PERSONAL.

James Hobbs, a well-known builder of Hamilton, Ont., is dead.

Mr. Kivas Tulley, chief architect of the Public Works Department of Ontario, has been succeeded by Mr. F. R. Heakes, formerly assistant architect. Mr. Tulley has been retained as consulting architect and engineer.

Mr. J. B. Resther, senior member of the architectural firm of Resther & Sons, Montreal, and a leading member of the Province of Quebec Association of Architects, died on the 14th inst., after a brief illness. He was sixty-six years of age, and had been a resident of Montreal for many years.

The death occurred in Toronto, on the first of May, of Mr. William Hynes, at the age of 69 years. In his earlier days Mr. Hynes was a prominent contracting plasterer, being a member of the firm of Hynes Bros., who carried on business from 1840 to 1875. During that time contracts were executed in many of the best buildings of the city, among which were Osgoode Hall, Toronto Insane Asylum, Customs House and R. Walker & Son's store.

ELECTRICITY IN STONE QUARRIES.

IN Europe electricity is being largely used in the operation of stone quarries, and is claimed to have many advantages over steam power. A French writer has recently made comparisons showing the efficiency and economy of the two systems. Concerning the steam plant he says: Suppose we have a boiler evaporating 8.5 kilograms per kilogram of coal. A good machine of 300 horse power requires not more than 6.5 kilograms of steam per horse power indicated. This will give an additional horse power for every 765 grains. The transformation of mechanical into electrical energy means 6 per cent. loss; add to this 7 per cent. lost in conductors, and absorption in receiver of 7 per cent., and there is a total loss of 23 per cent. Suppose we have a stone saw motor of 20 horse power, the central machine will develop 30 effective horse power, or about 33 indicated horse power. The consumption of coal then will show a total of 610 kilograms per 24 hours.

In the old method condensation was responsible for much loss of valuable power, and the great item was the enormous consumption of coal in comparison with the amount of work done.

On the other hand, with electrical apparatus the principal generator only absorbs an amount of energy proportioned to the work. Other advantages are fewer employees, and consequently a smaller percentage of accidents, the prevention of many breakages, while the speed of the machinery is more readily controlled.

The electrical system of operating their quarries was adopted about two years ago by the Hainaut Quarries Company, at Soignies, Belgium. The quarries of this company cover an area of 96 acres. For the handling of immense blocks a travelling crane of 60 tons capacity is actuated by an electric motor. A second motor is at the bottom of the quarry for drawing the blocks away from their bed. A travelling crane of 10 tons capacity is moved by a third motor. All the machines are shunt wound and have reversing rheostats. The system is said to have given entire satisfaction.

ILLUSTRATIONS.

ONE-ROOM SCHOOL, PORTAGE LA PRAIRIE, MAN., — GEO. BROWNE, ARCHITECT, WINNIPEG, MAN.

HOUSES ON EMSLEY PLACE, TORONTO — LANGLEY & LANGLEY, ARCHITECTS.

STAINED GLASS WINDOW, ST. ANDREW'S CHURCH, BELLEVILLE, ONT. BY N. T. LYON, TORONTO.

"ROBERTSON MEMORIAL WINDOW," SICK CHILDREN'S HOSPITAL, TORONTO — BY WM. HALLIDAY, LONDON, ENG.

SOLAR ROOM, STOKESAY CASTLE.

NOTE. The design for a summer hotel, by Mr. G. A. Monette, architect, published in the ARCHITECT AND BUILDER for April, is to be built shortly at Grosbois Island, opposite Boucherville, Que. The building has a frontage of 120 × 100 feet, and will contain about 120 bed-rooms, with all modern conveniences. It has been so planned that a part of the hotel may be used in winter and the other part closed. The exterior will be clap-boarded and shingled, with panels in rough-cast work.

The James Smart Manufacturing Co., of Brockville, Ont., in their advertisement in this number, print some particulars of the Kelsey Warm Air Generator, of which they are the exclusive manufacturers for Canada.

MANUFACTURES AND MATERIALS

CANADIAN SLATE—ITS FORMATION, EXTRACTION AND USES.*

THE growing importance of the slate industry of Canada demands a consideration of the utility and value of the mineral, its occurrence and distribution, especially in the province of Quebec, and the method of extraction and usage. The subject is so comprehensive that adequate justice cannot be given to it in a short paper of this kind. I find nothing written upon the subject except the meagre references made in Geological reports of Sir Wm. Logan and others. Therefore, as no thorough examination has been made of the slate formations of this province, our knowledge of the same must be limited. No clay slate of any value is found in the Laurentian range nor anywhere in the Province of Ontario. In coming east through the Province of Quebec, we find the first slate formation near Stanbridge, and this appears to be a continuation of a similar slate found in an island in Lake Champlain, and also in Hatch Hill, south of Whitehall, in New York State. No work has been done on this vein except on the island above mentioned. Then farther east we strike purple and green slate in Missisquoi county, and at Granby, where some small openings have been made. This formation continues to the north-east to Actonvale, where a quarry was opened and operated by Mr. Rankin, of Montreal. Then we come to the Kingsby formation, which is a very wide purple and green belt. A quarry was opened on this vein at Trenholmville, but the slate that was produced was of poor quality. This formation is different from all the others, it being a laminated formation, the bedding about one-quarter inch and more apart, and not capable of being split between the beddings. A slate of similar character is found in Birds-Eye Mountain, near Castleton, Vt., which possibly is a continuation of the same formation. East of this are the Melbourne veins, upon which several openings have been made, to wit, Melbourne quarry, the New Rockland quarry, which is now being worked; the Steele quarry in Cleveland, and the Danville quarry in Shipton. Slate of excellent quality is being produced from this vein. The next formation east of this is found near Windsor Mills. It is an extensive deposit, but owing to its ribbony character, the ribbons in it being hard and occurring at intervals of only a few inches, renders it unworkable and of no value. Next we come to the Brompton formation, upon which two openings were made near Key Brook, about thirty-four or thirty-five years ago, but this also is full of ribbons, which unfit it for the production of roofing slate. Slabs for sidewalks and cellar bottoms have been taken out of it at several places which at a greater depth would be good for that purpose. This formation is very extensive, being about a mile in width at Brompton. It is identical with the beds at Montpelier, North Johnsbury, and also Guilford, south of Brattleboro, Vt. Quarries have been opened in each of these places and were wrought for many years, the Brattleboro or Guilford quarries being undoubtedly the oldest on this continent. They were worked as far back as 1812. This vein runs south of Guilford for about ten miles when it is pinched out by the granite. Then we come to the information of East Angus and Garthby and several veins of different colors in Beauce county. From the number and variety of the slate deposits of Quebec, it would appear that many remunerative quarries might be opened.

The main ingredients in the composition of slate are silica and alumina, which show it to have been at one time ordinary clay. Blue (of different shades), purple red and green are the ordinary colors met with. The blue color is derived from the presence of protoxide of iron, or iron and oxygen mixed in the proportion of one part of the former to two of the latter. The red and purple varieties take their color from iron in the form of peroxide, two parts of iron combined with two of oxygen. Into slate of a green color, which is the best common variety, iron less largely enters, and in combination with magnesia, gives them a greenish hue. The clay beds were deposited in ages long past, in the bottom of the sea, and in process of time they have been hardened into stone, and lifted up so as to form dry land. That these beds were originally deposited in the sea, geological authorities mention among other reasons the fact that they contain abundantly the remains of former sea life, which lie along the planes of the bedding, such as zoophytes, mollusca and crustacea. The fossils of these strata may be studied from Sedgwick and McCoy's "Palæzoic Rock and Fossils," and other works. The presence of soda and potash in the slate deposits, being the record of the saltness of those ancient seas, is an additional proof of the beds of clay in the sea. It can be well imagined how when this deposition was made that it went through a process of sorting. The heavy, coarser material would be deposited first near to the shore; the finer matter would be carried farther to the sea, and the lightest portions of all would be held longest in solution and would reach the farthest from the shore line. We can well understand then that the variations we find in the quality, color, consistency and thickness of the strata, etc., are all due to the disturbance of the water, caused by oceanic and tidal currents, as well as by storms, which then as now occurred periodically. As a result of these storms we might naturally expect to find, even in the finest deposits, layers of coarser material.

From these simple statements relative to its formation it will readily be seen that in a slate bed which extends over miles of country, a great variation in consistency and color will be found. The deposition of the coarser or finer portions will determine the former, while the latter is dependent on the presence in the water of the different oxides of iron in combination with carbon, when vegetable growth has occurred, magnesia and other elements, it will be seen also that it is fallacious to suppose, that because a vein has been proved good or bad in a certain portion, that it must necessarily continue the same throughout its entire course. Each particular portion must speak for itself only. In all slate veins, lines, or bands, sometimes wavy, but oftener straight, will be seen crossing in. These are lines of bedding, and it does not follow that the lines of cleavage will coincide with them, as it can only be supposed that the phenomenon of cleavage resulted from an action which occurred long subsequent to the deposition of the muddy layers in beds. There is some difference of opinion among those who have given attention to the subject as to the manner in which this slatey cleavage was produced. It is explained by some to be the result of a crystallizing action; by others to be due to magnetic currents, while others, again, claim it to be the effect of mechanical forces that compressed the sediment at right angles to the direction of cleavage always at right angles to the dip of the vein.

The occurrence of joints, such as floor or foot joints, face or side joints is accounted for by the mass slowly hardening and consolidating by pressure as well as heat. Lifted out of the water it cracked and split in various directions in drying, and, influenced by the law of crystallization, it assumed definite shapes, being split into rough and rhomboidal masses. Had our original deposition been homogeneous and subsequent action constant and uniform our present slate veins would all have been practically perfect; as such, however, was not the case we have to contend against many conditions which determine its possibility of being worked to advantage. The presence of dykes, posts, wavy cleavage, impure beds, etc., we find in all slate formations, and it is only after a careful and intelligent study of the conditions that we are enabled to know of its value.

The industry in the Province of Quebec is at present confined to the workings of but two quarries. One operated by the New Rockland Slate Co., at New Rockland, and the other by the Danville Slate Co., near Danville. Both these quarries are located on what is known as the Melbourne vein, previously mentioned. The former is the most extensively worked of any that has been opened in Canada. Here the rock stands nearly straight, having a dip of 80° to the southeast. The slate is of excellent quality, being hard, tough and strong, and blue-black in color, which is unfading. It is of compact and close grain, admitting of no soakage of water, making it very durable.

The first workings were opened about 1865, on what is known as the west bed, lying in the serpentine rock. Operations were entirely confined to this bed until the year 1881, when a cutting was made through a hard bed, and a body of slate found which was equal in quality to that of the other vein. Operations have continued in this new vein up to the present time. This vein is very regular in formation, not being intersected by any foreign rocks, but parts of it are very subject to chicks, or an unsoundness known as slants by quarrymen, which chicks, running at an angle with the cleavage renders it unworkable for roofing slate or slab work.

A very extensive quarrying and milling plant is in use. The Salmon river here affords a very excellent water power, which is conveyed to the hoisting engines and mills by means of wire rope transmission. Cable derricks of the Blondin system are extensively used. A large mill, 100×60 feet, thoroughly equipped with all modern milling machinery, produces slab work of all descriptions. A narrow gauge railroad, about five miles in length, connects this quarry with the Grand Trunk railway, at a point about five miles east of Richmond.

At the Danville quarry the vein is intersected by a series of hard ribbons, which, however, are at a sufficient distance apart to enable slate to be made from between them. The equipment here, though on a much smaller scale, is similar to that at New Rockland, except, that the power used is steam. In addition to their roofing slate and slab work, school slates are manufactured.

Owing to the private character of the companies operating I am not able to give satisfactory statistics of the industry. The trade, however, has grown to be a very important one. This has been due principally to the efforts made by these companies to introduce slate, by the opening up of the country with railroads, and by the protection which the government has seen fit to bestow upon it. So rapidly has the trade grown of late that the demand is far in excess of the production, and with the extensive deposits of slate that we have in this country, there is every inducement for a thorough examination of the various veins, which I do not doubt would lead to the opening up and working of several remunerative quarries. And I look forward to the time, in the near future, when slate quarrying shall have become one of the principal industries of the province.

* Abstract of paper by H. J. Williams before the General Mining Association of the Province of Quebec.

GRANITE CUTTING APPARATUS.

IT is necessary in order to lessen the cost of production and withstand the inroads of competitors, that manufacturers of materials should employ such machinery as will produce the maximum of results at the minimum of cost. That Messrs. McIntosh & Sons, of Toronto, fully realize this is shown by the introduction, in connection with their granite and marble works, of what are said to be the first pneumatic hammers in use in Canada for dressing purposes. The apparatus, although simple, is quite expensive, which, together with the fact that it is not generally known, no doubt largely accounts for the fact that its adoption has not become more general.

A Northey pump forces the water up from the well to a compressed air pump, the power being supplied by a 15 h.p. engine. From this pump the air is forced through a common iron pipe to an overhead reservoir, from which the pipe extends around the building in which the carving is executed. Dropping from this pipe at different points are lengths of common garden hose, through which the compressed air passes to the pneumatic hammers. These hammers are of the most delicate mechanism, being only about one foot in length, and are controlled by the workmen in the same manner as ordinary hand work. The air operating on the hammer forces to and fro a pinion in the centre at the rate of 250 strokes per minute.

Five of these hammers are in operation at the works of the above company, the cost being about $100 each. The compressed air pump cost upwards of $300. All the apparatus is of American manufacture, having been purchased in Illinois. It is claimed that by the use of one of these hammers a workman can accomplish three times as much as by the old hand method, while the work is also of a much finer quality. In the United States these hammers are being extensively used, but they have only recently been adopted in Great Britain.

A company has been formed at Chatham, Ont., with a capital of $300,000, to manufacture a patent elevator.

The Crown Pressed Brick Company are building another patent dry kiln at Ormstown, Que., for burning dry pressed brick.

Messrs. Seaman, Kent & Co., Toronto, have recently had printed an attractive illustrated catalogue relating to their sliding and venetian blinds.

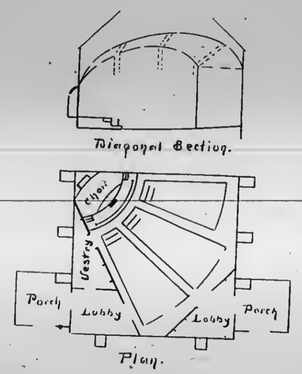
During the year 1895 there were received at the port of Montreal by vessel 146,971 barrels of cement, showing an increase of 4,599 barrels as compared with the previous year.

Arrangements are being made for the transfer of the pottery works at St. Johns, Que., to a French company, known as the Comptoir Ceramique Francais. This company controls all the pottery works in France.

The Diamond Brick and Tile Company, of Kansas City, U. S., have been experimenting with Manitoba clays for the purpose of ascertaining their adaptability for the manufacture of vitrified brick for street paving purposes. The tests thus far have not been satisfactory.

SOUND IN ITS RELATION TO BUILDINGS.

THERE is, perhaps, no subject connected with building on which so little exact knowledge is obtainable as that which forms the title of this article. The experience of architects and builders in past ages seems not to have evolved fixed laws by which the designer of a building may certainly know what its acoustic properties will be. Only to a limited extent is the operation of sound understood—beyond that all is guesswork, and the individual designer must choose his own theory and experiment for himself. It is not surprising that under such conditions, failure is more often achieved than success.



Two years ago, at the annual convention of the Ontario Association of Architects, Mr. D. G. Baxter, of Stratford, presented a paper on this subject, in which some original theories were advanced and evoked favorable comment. Our readers will doubtless be interested to learn that Mr Baxter proposes to put these theories to a practical test in connection with a Methodist church to be erected at Wellburn, near London, Ont. The auditorium of this church will be funnel shaped with the object of securing the best acoustical effect. The interior will be like the accompanying sketches, while the outside will not be noticeable from the added wings. We invite an expression of opinion from our readers concerning this new departure in church design. Indeed, a statement from a number of our readers of their experience in this direction, would prove an interesting and helpful feature.

The Royal Institute of British Architects are showing recognition of the importance of this subject by instituting a series of enquiries with a view to collect and record fuller information than is at present obtainable. The enquiries are as follows:—

1. PLAN.—Give a general plan, with elevations and sections of the interior of the building.

2. MATERIALS.—Describe the materials of which the building is constructed, carefully noting the finish of the interior surfaces and the disposition of carpets, hangings, or other similar fabrics.

3. CONSTRUCTION.—The construction of the building should be described as fully as possible.

4. SEATING.—Illustrate the method of seating by plan and section.

5. SPEAKERS, ETC.—Show position of speakers or musicians in relation to the audience.

6. EFFECT OF AUDIENCE.—The effect of an audience should be carefully noted. State if the room is better if partially or entirely filled.

7. VENTILATION.—Describe in some detail the system of ventilation. If possible, note the mean and extreme temperatures and the effect of the variation produced by it and by changes in direction of the ventilation. State the position in which the thermometers are placed.

8. KEYNOTE.—If the keynote of the building is known, state it, and say whether or not, if the voice is pitched in this key, any improvement in sound is noticeable.

9. QUALITY OF SOUND.—(a) State what is the general reputation of the building for (1) Music; (2) Speaking. (b) State what the quality of the sound is—full and resonant, &c., and note any peculiarity of effect, such as echoes and the like. (c) If defective, state the nature of the defect as carefully as possible.

10. REMEDIES.—If remedies have been tried to obviate defects, state them, and the result obtained. The precise nature of the remedy should be fully detailed.

11. ADDITIONAL PARTICULARS.—Add any particulars not above scheduled which may be considered necessary or desirable, and state age of building.

12. REFERENCES.—Give references (if any) to published descriptions of the building, especially those dealing with its acoustic properties.

13. AUTHORITY.—Give the names of the experimenters and date of experiments.

BY THE WAY.

A CORRESPONDENT sends the Inland Architect his impressions of Canada and Canadians. Much of what he writes can be classed as "rubbish," inaccuracy of statement being a conspicuous feature. As an example of the latter the following will suffice: "The Canadians are rather slow in adopting novelties. Their elevators are few and far between, and are looked at askance by many yet who would as soon attempt to walk upon the waters, as did Peter of old, as to trust their precious lives in one of those "bird cages." I admit that with most of these elevators it would be a saving of time for a busy man to walk, even leisurely, up or down stairs."

× × × ×

ARCHITECTS and builders were among the first to avail themselves of the advantages in the way of convenient and rapid local transit afforded by the bicycle. By means of the wheel, the expense of keeping a horse can, in many instances, be saved, while those who formerly went about on foot are effecting a large saving in time and strength. I wonder how many architects and architectural students have made a sketching tour on the bicycle. An opportunity is now afforded in this direction which every architectural student, in particular, should be quick to recognize and take advantage of. The officers of the Toronto and Montreal Sketch Clubs should endeavor to organize a series of short sketching tours during the coming summer.

TRUTH IN ARCHITECTURE.*

By W. E. Doran, Architect, Montreal.

"Magna est Veritas et prevalebit."

Architecture is capable of expressing truth in various forms. Firstly, from an historical point of view, it reveals with a veracity not to be found in written records the state of civilization, the manners, customs and intellectual life of peoples. "By their works ye shall know them." Without these records of imperishable stone, much of written history would, if it were not entirely incomprehensible, at least lose half its light and meaning. The character of a people is in no way more truly exemplified than in its architecture, and religion of all kinds has ever found in this art its highest form of appeal to human sympathy and worship. To illustrate the truth of these propositions it is sufficient to glance at a few of the leading historic styles and the stories they convey. Leaving aside the architectural remains of earlier peoples, and commencing with the Egyptian, had we never read a line of their history, their architecture tells us of mysteries, a learned few, an ignorant mass, a history of work achieved by automatons in the hands of a priesthood which ruled by mystery, and pretended to occult powers.

Turning to Greece we find written there freedom and enlightenment, the expansion of the human mind keeping progress with the appreciation of the beauty of nature, and its reproduction in art. Greece discovered that there was no straight line in Nature, and she proceeded to apply the principles of curves so well that she exhausted all the higher orders of them. Everything was done intellectually, and so much so that even now we can discover new beauties in which to revel amidst her antiquities.

Rome became the ruler of the world and art had to serve the mighty mistress, but the character of the work betrays itself—her architects and artists were slaves. Mighty are her monuments; building skill existed; everything that could wait on luxury is to be found—palaces, baths, aqueducts, triumphal arches; fora—all tell their tale—a people ruled first by demagogues and then by tyrants, all the world subject at her feet, all that could tend to greatness except freedom.

In the earlier periods of Christianity we can read the history of the church in its architecture, first in the catacombs and then emerging forth triumphant at Rome seizing boldly the Pagan temples, and transforming them into places of Christian worship—consequently no marked change of style was developed.

In the east a more determined attempt was made to free Christianity from all influences of Paganism, and to create a style for itself. The result was the Byzantine; however praiseworthy the motives, the best that can be said of it is that it came as nearly as possible to success, and served to prove the impossibility of any sudden creation of a style in architecture, and to illustrate one of the greatest truths of the art, viz., that all its best results must flow from patient study of certain needs and conditions and the gradual unfolding of the best and most appropriate structures to meet those conditions; insensibly, therefore, a new style will develop, but it can never be launched forth a full-fledged creation of one man's brain, or indeed as the concerted effort of any number of men.

It remained for the incursions of the barbarians to overthrow the last vestiges of Imperial Rome in Italy; when Christianity in turn succeeded in subduing these fierce tribes unto herself, there commenced a simpler and ruder architecture, that of Northern Italy, which to my mind contained elements of great merit, but which, however, were arrested before arriving at their full development. What with the incursions of Byzantine architecture from the East, and later of Gothic architecture from Germany, the Lombardic style met with an untimely death. It seems to me much might be done by modern architects beginning where they left off, instead of following a debased Renaissance of later periods.

Passing over the Norman and other transition periods, we come to the real development of Christian architecture in what is miscalled Gothic. When the church was everywhere triumphant and faith ruled supreme, there dawned this glorious triumph of the mind, aye, and of the soul of man, because, although the term Gothic comprehends so many different styles peculiar to the various countries of Europe, there was to be found everywhere a certain development, though not contemporaneous, still resulting always in three marked periods, viz., early or simple, middle or perfect, and highly florid or debased. It is of the middle period generally that I speak, and I think of that middle period in all lands it may safely be said that it exemplified all that was spiritual in our nature, not merely copied, as was the beauty of the ancients, from the book of Nature, but founded on geometrical truth and associating therewith Christian symbolism and mysticism. The Gothic architects succeeded in raising to God temples, built, it is true, by human hands, but one of these grand old cathedrals, with its misty heights, its spires and pinnacles, its niches and saints, might be easily associated with the New Jerusalem coming down from heaven.

In juxtaposition the Moslem on the ruins of the Byzantine constructed an architecture embodying all his ideas of a sensual heaven.

Leaving aside for the moment the historical view, there is another form in which architecture is capable of expressing truth, and one which concerns us more particularly as practitioners of the art, it must be based on the principles of truth. In the first place, a building or structure of any kind must adequately serve the purpose for which it is intended, and must to a certain extent be indicative of that purpose; all its parts must be harmoniously blended together, and each part must have the relative importance to the whole which its rank or office demands; thus, although there are certain established proportions which are or should be applicable on general principles, each structure also has particular proportions which depend on the skill of its designer and his perceptions of this law of truth which should govern.

In the hands of a master the observance of this rule will probably develop a new type or style, more particularly when the conditions under which the structure is to be erected, the materials to be used, or the climatic influences it may encounter are altogether novel, but more frequently the case is that this consideration leads to expression in some existing style more or less modified according to circumstances. It follows that the choice of style should never be arbitrary, and that some at least of the conditions under which it was originated must be existent in the structure which we wish to clothe with its features.

Unless an architect reads aright the story told by a certain style, and be familiar with its origin, he cannot intelligently use it. Having stated that perfection existed only in two historic styles, viz: Pagan or Natural in the Grecian, and Christian or Mystic in the Gothic, you might, at least, if you were not architects, expect me to denounce all others as vain and unprofitable, and declare that the battle of the styles should rage round these two alone, but the history of the Renaissance delivers me from this seeming dilemma.

As the cause of the Renaissance so called is a very much debated question, and would in itself require a lengthy research, I will only touch on facts which are generally admitted. That it had its origin in Italy was natural, as its people having the old monuments before them, though never studied, and serving rather as quarries for their new buildings than any other purpose, still insensibly their minds must have been affected by these remains, so much so that their Gothic work is, no doubt, mostly foreign, and in every example of native Italian Gothic some traces of classicism still remain. On account of its mis-nomer "Renaissance" or "Revival," this modern Italian misled enthusiasts who, leaving the beauties of classic literature, came to the conclusion that all perfection existed in the works of the ancients, and that art of all kinds should return to its fountain head for inspiration. But that it should have been universal, displacing all national styles, and spurious as it was, conquered, the world argued that this style contained in itself something that met the wants of men, and which could not be so suitably met by any other. I think the key is in the building of edifices of several stories. The previously considered historical styles had their development mainly in temples and monuments, churches, shrines and cloisters. Architecture had not occupied itself in habitations for man, save in the palaces of Rome, and these were on a par with its temples, or at any rate never exceeded one-story; the castles of the nobility were military strongholds rather than residences. I would therefor ascribe the success of the Renaissance to the ease with which it lent itself to the dividing of buildings into stories, marking them with external orders and balustrades. It has since been demonstrated by the failure of the Greek revivalists that anything like pure classical forms would be unsuitable for modern habitations. It is true also that England for a long time successfully resisted the invasion, and sought to create in the Elizabethan an adaptation of the Gothic to modern habitations, producing certainly a picturesque effect according well with sylvan beauty, but there as elsewhere the Renaissance came to stay. Another cause of success (though this ought to have condemned it in the mind of any person with a true feeling of the grandeur of architecture) was that every detail was so reduced to rule that most any one with a fair knowledge of drawing and construction could learn the complete art. In fact the tradition still remains with a great many otherwise well educated people that all of architecture is contained within the five orders according to Vignola or Palladio. I regret to say that the tendency of the modern art school seems to confirm this, for although more latitude is given to the skill or want of it in the designer, we rarely see anything from their graduates but variations of orders, pediments and porticos; it is a remarkable fact also that many of the most successful Renaissance architects were attracted to the profession in middle life, and were in reality amateurs.

Certainly many architects of the present day can lay claim to have improved on the work of their predecessors in this particular style, but the term Renaissance is too comprehensive, and is applied equally to the carefully studied work of the man who with true classic taste tries to avoid the errors of Vitruvianism, to the mediocre compositions of the disciples of that school, and also to the meanest aggregations of walls having band courses dividing them into sections containing one or more lines of badly proportioned openings with or without decoration, the whole finished with or without cornices. Really the term has no meaning. But the question arises: What story does the architecture of the present day tell? and how is it that there is no particular style belonging to the nineteenth century, a century so prolific of improvements, the century of steam and electricity, the century of triumphs in surgery and in all that pertains to progress, and in war and destruction. Is architecture alone stationary or retrograde? Has engineering, which was formerly only a branch of architecture alone the power to advance? My answer is that the architecture of to-day reflects all these conditions of life in this century of steam and electricity. It is all high pressure—no time for calm study, no time for experimental advance; everything must go up by magic as it were. The architect must know everything, must be equally at home in all styles, be able to use all methods of construction, attend to the most trifling matters of detail, please all tastes, be an artist, a man of business, financier, lawyer, electrician, tradesman, all in one. There is no such thing as human perfection, yet the law says his work must be perfect—not only his own work, but he is obliged to see that the work of

(To be Concluded in June Number.)

* Paper read before the Province of Quebec Association of Architects.

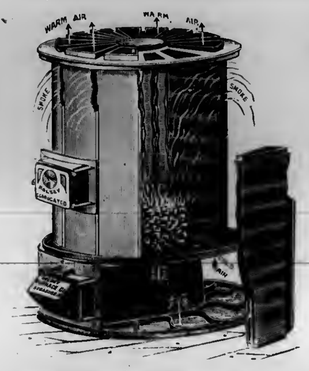
CONTRACTORS' ESTIMATES.

Omission of items in figuring contracts is probably the most common cause of disaster prevalent in building contracting, and many a good man who has intended well enough has been brought to grief because of having left out some things in his bill of estimates that ought to have been figured on. Every man who is desirous of succeeding as a contractor, should prepare a complete and minute schedule of all the items that could possibly be included in any manner of building construction. These should be classified and arranged under sub-heads, according to the different building industries or trades, and prices, where possible, should be added. By having a schedule as suggested, and consulting it closely when making up an estimate, the possibility of an omission would be reduced to a minimum.

Many careful contractors follow some such system as this in estimating, but the majority fail to see just where it would be to their interest to assist in educating other contractors to greater accuracy in figuring. It is forgotten that a contractor's ignorance or mistakes are a thousand times more to be feared in a bidding competition than accurate competency in making estimates. We know of a case in point. Bids were asked for an ordinary building. A half dozen bids were grouped closely together, varying only from $3,500 to $4,000. Then came in a bid for twenty-eight hundred dollars. In the language of the architect, "that fellow probably left off the roof, and forgot there were any floors in the building." More than one fellow has actually done such things.

If the architect could convince the owner of the advisability of rejecting such bids, when the possibility of an error is so very obvious, the demoralizing element might be thus removed, but the owner is usually hot on the trail for a bargain. He can see nothing but the price on the paper, and he thinks if the contractor has blundered that that is not his affair, and it will give him an opportunity to get something for nothing, which is generally a great mistake on his part, for in nine cases out of ten the owner gets mulcted in one way or another before the work is completed. Even when slight omissions are made in figuring the result is very unsatisfactory, for special orders for extras must be added, and these are not usually obtainable at the same rates as is paid on the main contract, and all this leads to confusion and bickering. There should be a uniform system of figuring adopted by builders in every community. Its main object should be to avoid the omission of items in figuring, and to prevent such glaring discrepancies in contractors' estimates.

Tenders for work that are not based on correct quantities, or where omissions exist, do infinite harm in many ways, and this is one reason why men who have not the requisite knowledge, should refrain from tendering for work of which they have had no previous experience. In country places, and in our villages, there are very seldom works of such magnitude that the local builder cannot encompass, but he should not forget that even in buildings of similar size, and built of similar materials, the style of finish may cost anywhere from ten to fifty per cent. more or less, so that the method of estimating by "comparison" is no more reliable than estimating by cubing, unless the estimator has a thorough grasp of all the conditions surrounding the work. There are instances, however, when estimating by "comparison" may prove fairly correct, but they are few, and in any case where one building should be contracted for at the price that a former and similar building was completed for, we should prefer to figure up the cost of the new building, item by item. There never was, there never will be, any "royal road to estimating," and the successful contractor is the man who figures up everything, and figures them up correctly.



THE... KELSEY CORRUGATED WARM AIR GENERATOR

PATENTED

The Greatest Heat Producer on the Market—
Simple, Practical, Effective, Durable and Economical

The KELSEY having such a very great radiating surface and very large capacity for air makes it possible to do the largest amount of heating with the smallest consumption of fuel.

The KELSEY will heat rooms at long distances by simply capping any required number of the upright sections with our PATENT POSITIVE ATTACHMENT, thus obviating the necessity of using a combination of hot water and hot air.

The KELSEY furnishes a nice pure fresh warm air—not a dry superheated air, as in the ordinary hot air furnace.

The KELSEY has been made and sold in the U. S. for the past eight years with the most gratifying results, and with largely increased sales each succeeding year.

Please write for Descriptive Catalogue.

The JAMES SMART MFG. CO., Ltd.

Exclusive Makers for Canada — BROCKVILLE, ONT.

E. F. DARTNELL, 180 St. James St. - MONTREAL. TELEPHONE 2382.

REPRESENTING:

Northumberland Stone Co. Brown and Grey New Brunswick Sandstone, of high grade and fine color, easily worked. Price moderate.

Grafton Stone Co. Buff and Blue Ohio Sandstones. Block Stone, Sawed Caps, Sills, Steps, Ashlar, Flagging, etc., etc.

Potsdam Red Sandstone Co. Block Stone, Flagging, Ashlar, etc. Prices quoted from specification or blue print for finished work, delivered ready to put into building, stone being cut at Prescott, Ont.

Crown Pressed Brick Co. Fine Pressed and Ornamental Bricks and Terra Cotta. Every pattern of red brick made to order. Our bricks are of a rich warm red unexcelled in quality or color by any on the market.

American Mineral Wool Co. Mineral Wool and Mineral Wool Sectional Covering. For Insulation of Heat, Protection against Frost, Fire-proofing, Insulation of Sound, Cold Storage, etc.

Dillon Cement Plaster Co. Aluminite Cement Plaster. Nature's own mixture. Most perfect plastering material known to the trade. A pure natural plaster without admixture of any kind.

Translucent Fabric Co. Translucent Fabric. The great substitute for Glass. Especially adapted for skylights and windows in factories, skylights and storm doors in houses, hot-houses, etc. Strong, Durable, Light, Unbreakable, a Non-Conductor.

CORRESPONDENCE INVITED. - - SAMPLES AND PARTICULARS ON APPLICATION

ERRATA.

In the sketch of Mr. John Aldridge, president of the Toronto Builders' Exchange, which appeared in our last issue, it should have been stated that Mr. Aldridge was a native of England, instead of Scotland, having been born at Brockenhurst, County of Hampshire.

A BOND OF UNION.

Mr. Jos. Greenfield, architect, Winnipeg, in renewing his subscription to the ARCHITECT AND BUILDER, writes: "Permit me to express my appreciation of the value of your publication as a means of information and a bond of union between the members of our profession in this Canada of ours."

THE HAMILTON AND TORONTO **SEWER PIPE** CO.

WATER PIPE CULVERT PIPE
FLUE LININGS CHIMNEY TOPS
SMOKE PREVENTIVES INVERTS, &c.

Write Head Office for Discounts:
HAMILTON, - ONTARIO.

CREDIT FORKS MINING & MFG. CO.
(FORMERLY CARROLL & VICK.)
84 Adelaide St. W. - TORONTO

Brown Stone Quarries,
✠ ✠ ✠ **Credit Forks, Ont.**

Supply the Best . . . **BROWN STONE** IN . . CANADA

DIMENSION COURSING
RANDOM SHODDY
HEADS, SILLS RUBBLE

CRUSHED STONE FOR CONCRETE

GREY LIME of Superior Setting Quality shipped in car lots to dealers.

Office: 84 Adelaide St. West, TORONTO
Telephone 208.

"ECONOMY"
WARM AIR FURNACES
COMBINATION HEATERS

SEND FOR CATALOGUE

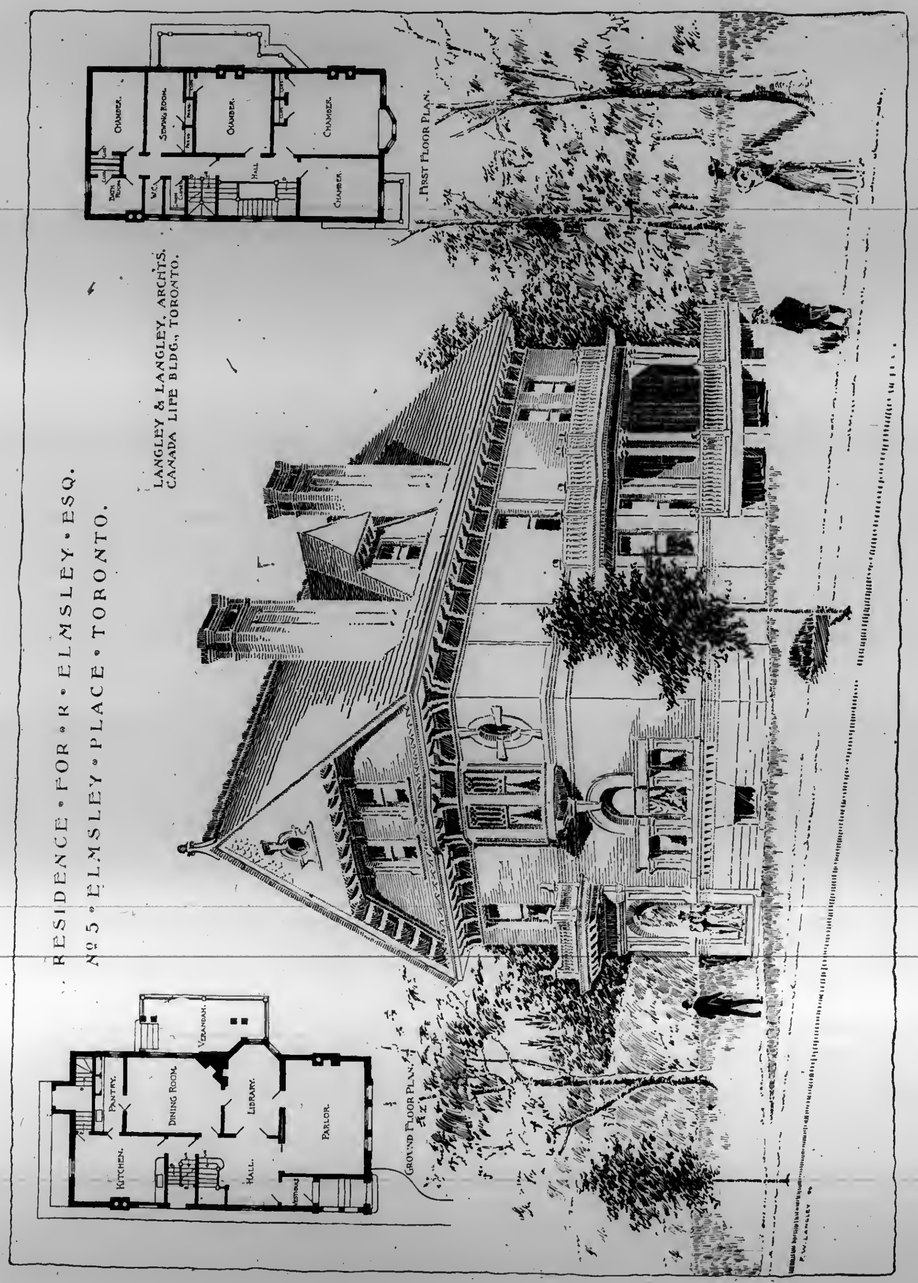
J. F. PEASE FURNACE CO.
HEATING ENGINEERS
TORONTO

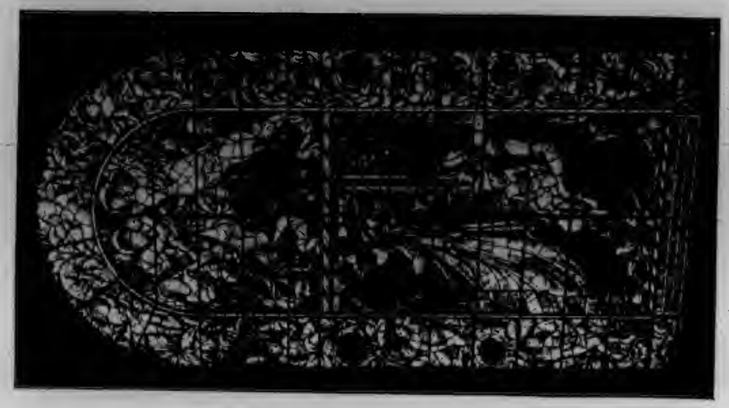
"Since we used Mica

to cover our flues the insurance companies have reduced our rate." That is what the Allan Mfg. Co. writes to us. After a series of tests, the Boiler Inspection and Insurance Co., of Canada, says of it: "Its non-conducting property, its durability, and its portability, unite in making it the most effective and convenient boiler covering on the market." The Toronto Dredging and Contracting Co. says: "It has effected a saving of coal of about 25%. The Toronto Ferry Co. found a saving of 20%; the Aylesbury Dairy Co. of 33%.

THE MICA BOILER COVERING CO.
9 Jordan St., TORONTO

SOLAR ROOM, STOKESAY CASTLE.


RESIDENCE • FOR • R • E • ELMSLEY • ESQ.
Nº 5 • ELMSLEY • PLACE • TORONTO.
LANGLEY & LANGLEY, ARCH'TS.
CANADA LIFE BLDG., TORONTO.
FIRST FLOOR PLAN.
CHAMBER.
SPARE ROOM
CHAMBER.
CHAMBER.
HALL
CHAMBER.
BATH ROOM
W.C.
GROUND FLOOR PLAN.
VERANDAH
PANTRY
DINING ROOM
LIBRARY
PARLOR
KITCHEN
HALL
CELLAR

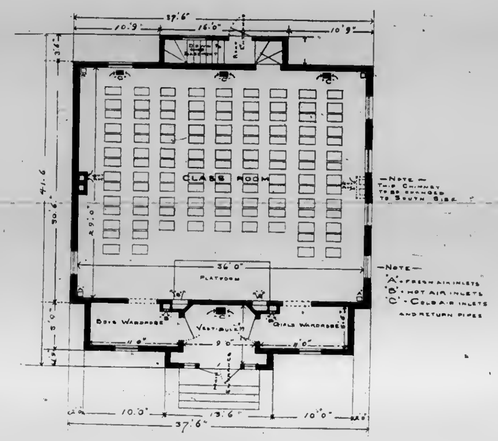


"ROBERTSON MEMORIAL WINDOW," SICK CHILDREN'S HOSPITAL, TORONTO.

DESIGNED AND EXECUTED BY HENRY HALLIDAY, LONDON, ENG.

CENTRAL PORTION OF STAINED GLASS WINDOW, ST. ANDREW'S CHURCH, BELLEVILLE, ONT.

DESIGNED AND EXECUTED BY N. T. LYON, TORONTO.



GROUND PLAN

ONE ROOM SCHOOL, PORTAGE LA PRAIRIE, MAN.

GEORGE BROWNE, ARCHITECT, WINNIPEG, MAN.

RESIDENCE FOR R. ELMSLEY, ESQ.
COR ELMSLEY PL & ST JOSEPH ST. TORONTO.

CANADIAN ARCHITECT AND BUILDER.

VOL. IX.—NO. 6. JUNE, 1896 { PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisemnets should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	H. B. GORDON, Toronto.
1ST VICE-PRESIDENT	J. GEMMELL, Toronto.
2ND VICE-PRESIDENT	JOS. W. POWER, Kingston.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

F. J. ALEXANDER	Ottawa.
THOS. FULLER	Ottawa.
J. LENNOX	Toronto.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. C. HUTCHISON, Montreal.
1ST VICE-PRESIDENT	A. T. TAYLOR, Montreal.
2ND VICE-PRESIDENT	J. P. PEACHY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

CHAS. BAILLAIRGE	Quebec.
ROBT. FINDLAY	Montreal.
J. Z. RESTHER	Montreal.
A. H. LAPIERRE	Montreal.
G. E. TANGUAY	Quebec.
THEO. DAOUST	Montreal.

AUDITORS—A. J. FOWLER and C. CHAUSEE, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

JOHN ALDRIDGE, President.
THOS. CANNON, Jr., 1st Vice-Pres.
JOHN VICK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. BOOTH.
JOHN WICKETT.
JOHN RUSSELL.
H. LUCAS.
JOHN VOKES.
JAS. CRANG.
JOHN M. GANDER.
GEORGE HENRY.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Improvement of the Architect and Builder.

FROM this time forward each number of the CANADIAN ARCHITECT AND BUILDER will include 36 pages of letter press instead of 28 as heretofore, in addition to the usual illustrations. The added space at our disposal will be especially devoted to information of a practical character designed to interest and prove helpful to contractors in all departments of building work. This information will be found in this and succeeding numbers under the title of "The Builder." It is hoped that this increase in size and scope will be appreciated by our readers, and lead to an increase in our already large list of subscribers.

Building Conditions.

THERE is a fair amount of activity in building enterprise throughout the Dominion, the volume of which will probably equal that of last season. On the whole, however, the work is of a less important character than last year, and the expenditure proportionately less. Toronto architects and builders have good cause to complain of the lifeless conditions prevailing in that city the present year. The number and value of buildings for which permits have been granted is greatly below the record of last year. This is in a large measure due to the fact that with one exception there have been no fires of any consequence involving the destruction of buildings. While rightly enough every precaution is taken to prevent the danger to life and property from fire, we are sometimes led to wonder what would become of architects and builders if the destroying element were put entirely under control. The amount of their occupation would be so greatly reduced that many would be forced into other callings.

What Constitutes a Party Wall?

CANADIAN architects and builders should be interested in a point of law relating to the definition of a party wall, which came up for argument in the English courts recently. A firm of store-keepers were summoned to appear in court on the charge of having violated the London building law by piercing openings in a party wall. The section of the law bearing on the case reads as follows: "Every party wall shall be carried up of a thickness in a building in the warehouse class, equal to the thickness of such wall in the topmost story above the roof-flat or gutter of the highest building adjoining thereto to such a height as will give a distance of at

least three feet measured at right angles to the slope of the roof. The wall in question divided one portion of the defendant's warehouse, one-story in height, from another portion, five stories in height. The defendants contended that only the portion of the wall to the height of the one-story part of the warehouse could properly be classed as a party wall, and that above this height it should be classed as an exterior wall. The court sustained the defendants in this contention.

Queen's Park Improvement.

THE work of improving that part of Queen's Park in front of the Toronto Legislative Buildings will very soon be completed. The large stretch of sloping and finely graded lawn, with its statues, walks, trees and flower-beds, produces a very agreeable effect. The driveway in the Avenue from Queen Street north and around the west side of the park has been entirely reconstructed since last season. This is one of Toronto's beauty spots, and it is gratifying to see it being put in a condition somewhat becoming its importance and possibilities.

The Recent Labour Troubles.

JUST as our May issue had left the press a settlement was reached between the Toronto Builders' Exchange and the builders' laborers with respect to the wage question. The latter have agreed to accept the same rate as was paid during the season of 1895, viz., 18 cents per hour, an agreement having been signed to that effect covering a period of two years from the first of May last. This step removes the possibility of any further dispute between the master builders and employees during the present season, agreements having now been signed with all the trades. This is a cause of congratulation, for while it was imperative upon the laborers to accept the offer made by the master builders, the wisdom of so doing becomes more apparent as the season advances and few new buildings are shown to be in contemplation.

School Sanitation.

WE are pleased to learn that the Toronto Public School Board has taken a very important step this season towards bringing all the school premises under their control up to a proper sanitary standard. There are still quite a number of the schools where the closets are the old-fashioned brick pit in open sheds. While they are provided with sewer outlet and kept in as good condition as possible, they are in some respects positively unsanitary. At one of the large schools these outside closets will be removed, and complete new modern water-closets will be provided in the basement of the main building, with the best plumbing work and thorough ventilation. This is the first time that such a change has been made by the Board except in case of rebuilding or enlargement of a school, and will undoubtedly be followed by the same kind of improvement at other schools as rapidly as funds for the purpose can be obtained.

What Should be Taught in our Public Schools?

WE have occasionally heard the opinion expressed that our system of public education is too liberal, in that it goes beyond instruction in the three R's. Strange to say, this opinion is sometimes heard from well-educated persons. This is on a par with the opposition of representatives of labor organizations to manual training in the public schools. Both ideas are wrong. Train the mind and train the hand of the young as liberally as can be afforded. True education need not be feared by anyone, but will prove an advantage to all. Such critics as those referred to would shut out from a public system of education such studies as drawing and hygiene. But a careful grounding of pupils in these studies develops a taste for art and an interest in sanitation, which is of positive advantage to architects and builders, as well as the public, in that it stimulates the demand for artistic and healthful buildings.

Value of Improved Fire Protective Appliances.

THE fire which destroyed one of the large departmental stores in Toronto on the evening of the 9th inst., furnished several good lessons to persons interested in city property and business. The building and stock were of a very inflammable character, and were burning fiercely before attacked by the firemen. Had it not been for the improved fire apparatus supplied to the department last year, especially the water-tower and the steam engines, the loss would have been far greater. The outlay for new apparatus was clearly saved many times over in this instance alone. Notwithstanding, had there been a fair to strong breeze the danger would have been greatly increased. Three things are indispensable to prevent the ruinous spread of such fires first, buildings constructed as nearly fire-proof as possible, consistent with their location and purpose; secondly, the best appliances for extinguishing fires; and thirdly, competent men in a well organized fire department. The first of the above mentioned requirements is first also in importance.

Safe Construction.

THE bridge failure at Victoria, B. C., on the Queen's Birthday, involving the sudden destruction of nearly one hundred lives, is a startling reminder of the necessity of proper design and construction not only of bridges but also of buildings, upon the safety of which human life depends. Especially does it emphasize the danger of putting a structure to a different use from that which it was designed to serve. The bridge at Victoria was originally constructed for vehicular and foot traffic only, but was afterwards subjected to the enormously increased strain imposed by overcrowded street cars, with what result is now sadly apparent. Since the disaster the statement has been made that the safety of the bridge had previously been called in question. Presuming this to be the case, the warning, as too frequently happens, was disregarded. Now that a large number of precious lives have been lost, and sorrow carried to hearts in every part of the Dominion, a rigid inspection of the bridges throughout the province has been undertaken. This bears the appearance of locking the stable door after the horse has been stolen, yet it is to be commended, in view of the possible prevention of like disasters, and we trust will lead to similar action being taken by the governing authorities of the other provinces. Investigation would be certain to reveal the existence of many unsafe structures of an engineering and architectural character. Periodical inspection of traffic bridges and buildings by officials of either municipal or provincial authorities, seems to be necessary for the public safety. Of even greater importance than this, however, is the need of legislation such as the Ontario Association of Architects have sought to obtain,

restricting the use of the titles "Architect" and "Engineer" to persons who shall have given proof of qualification for the work.

DEFECTIVE ELECTRIC WIRING.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—As perhaps no part of house fitting has made such rapid headway and none is known less about by the average citizen than electrical wiring, will you kindly permit me to use your columns in giving a few hints in this direction which will be of service to the public.

Let us suppose Mr. Citizen decides to erect a house, electrically equipped for bells and light. He naturally knows little or nothing about the matter, but hands it over to the architect, who in nine cases out of ten knows less, but contents himself with inserting a few stereotyped phrases in the specifications, which he has learned parrot fashion, and as like as not, to save himself a little trouble, includes it in the plumber's tender, (although why, now that the electrical trade is recognized as a distinct business, he does not just as reasonably include it in the plasterer's tender, can only be explained by the parrot theory). The contract is adjudged to the lowest tenderer, whether it be John Jones, who carries his office in his hat, and is here to-day and there to-morrow, or the None-Such Electrical Company of recognized ability and honesty—taxpayers, with an established place of business where they can always be found.

Does Mr. Citizen happen to be skeptical about Mr. Architect's knowledge, he is at once met by the latter triumphantly pointing to the clause that the wiring is "subject to Underwriters' rules" (parrot again). But Mr. Citizen has been posting himself and knows that the Underwriters have never been known to pay any attention to whether their rules were adhered to or not, and that so far as the insurance companies are concerned, this clause might as well read "subject to the rule of thumb." Again Mr. Architect is ready, and inserts another (parrot) clause, that a certificate of inspection will be demanded from the successful tenderer, said certificate to be paid for by the latter (not by insurance company), and the citizen feels that now indeed he has taken every precaution. Vain hope; false security! The initiated know that this certificate reads that "the work has been inspected and found free from grounds and short circuits, at time inspection was made," which is usually before plastering, the most fruitful season for both these evils, and does not cover grounds in wiring of fixtures not then put up. The job is finished, the contractor is paid and the citizen is left—to discover that he has either to do without his light or employ some on to put it in shape, whose account, added to the "lowest bidder's," makes the cost for this patched-up job more than if he had given it to the highest tenderer at first, and he does the inspector a grave injustice by including him in the blame which rightly should be saddled upon himself for sacrificing everything to price, and to the architect, for not advising him otherwise.

This condition of things can only be remedied by adopting the United States plan of putting safety before cost, and by either the city or insurance companies making certain rules compulsory, and seeing them enforced. As it is, an inspection certificate is optional, and is not a complete safeguard if received. A specification may call for rubber-covered wire, and the house be wired throughout under plaster, with cheap weather-proofing which only a man in the electrical business could distinguish, but which would be likely to cause a fire, and neither citizen nor architect be the wiser, by unscrupulous tenderers goaded on to low prices. I can point to houses in the city of Montreal to-day so wired.

Go into any supply house in our city and ask for dummy rosette, and you will get them; ask their use and you will be told they are merely a blind. Let me try to talk up the superior merit of some article to an architect and he will answer: "A socket is a socket," —without my daring to remind him (under the penalty of his everlasting wrath) that "an egg is an egg," but there are such things as rotten ones.

I fear I have already encroached too much upon your space for the present, but may take a future opportunity of further expressing my views on the subject.

Yours truly,

"WIREMAN."

Montreal, June 8, 1896.

A GREAT MOSAIC.

THE British Vice-Consul in Venice in his last report says that mosaics still continue in great demand there. The Venice and Murano Company executed last year a splendid mosaic for a palace now in course of construction in Vienna. It measures a thousand square feet, and is copied from cartoons by the painter Edward Weitk. It represents the five parts of the world. Murope stands in the centre of the frieze, represented by the symbolic figures of its various nations, having on one side the emblems of industry and trade, and at the top the emblem of the flying genius of light. On the right are Asia, India, China and Japan, with their rajahs, mandarines and the allegorical chrysanthemum. Next follows Africa, with camel drivers, palm trees and other African symbols; on the left, America and Australia, with natives on horseback and on foot, foliage and other emblems. All this variety of types, from the fair Circassian down to the negro, and the display of costumes from the most decorative to the simplest, have enabled the painter to arrange twenty-four figures with great delicacy of coal and in an artistic manner. Over these figures, which rest on an ornamental base, a blue sky reflects all around its light so as to unite all the tints of the mosaic, and to give the whole a harmony of effect which is said to be most delightful to the eye. The same company is executing another important mosiac for the apse of the Guards' Chapel at the Wellington Barracks, in London, from cartoons painted by Messrs. Clayton & Bell.—London Times.

At the Master Plumbers' session recently held at Cleveland, the Executive Committee was instructed to aid the master plumbers of Canada to organize their Dominion Association.

The roof pitch of forty-five degrees from the horizontal, leaving ninety degrees at the ridge, is not too flat for head-room nor to shed rain and snow. Roofs should as far as possible have one predominating pitch over all the house.

An interesting little brochure relating to the use of Cabot's Sheathing and Deafening Quilt in sound-proof construction, has reached our table. This "quilt" consists of fettled matting of eel-grass, held in place between two layers of strong manilla paper by quilting. Mr. Samuel Cabot, Boston, Mass., is the manufacturer.

ARCH AND VAULT TESTS OF THE AUSTRIAN SOCIETY OF ENGINEERS AND ARCHITECTS.*

DURING the years 1891 and 1892 the Austrian Society of Engineers and Architects conducted a series of tests on brick and concrete arches and vaults that were in every way much more complete than any hitherto attempted. The results obtained have attracted much attention from engineers and architects, although the arches tested are not in general use in this country.

Some idea of the scale on which these tests were conducted may be gained from the statement of the contributions of money,

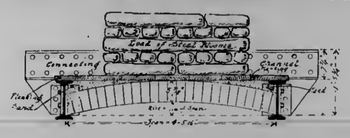


FIG. 1.—SECTION OF BRICK ARCH.

materials and labor from Government departments, railroads, manufacturing companies and private concerns, the total contributions from these sources amounting to $19,800.

The report covers (1) tests of eighteen floor arches, representing eight different types of floor construction; (2) tests of two culverts of 32.8 feet span and 1 in 10 rise; (3) tests of four bridges of 75 feet span and 1 in 5 rise; (4) an exhaustive series of tests to determine the strength and elasticity of all materials used in the above arches; (5) a theoretical calculation based on the results attained; (6) conclusion from the results in regard to theory and construction.

The object of the society in printing the report for general circulation is to bring about desired improvements.

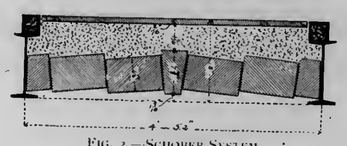


FIG. 2.—SCHOBER SYSTEM.

Of the various tests made those on the flat arches for floor construction will probably prove of most interest to architects. These tests include four arches of ordinary brick, five of flat tiles

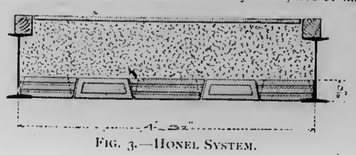


FIG. 3.—HONEL SYSTEM.

(differing entirely from those used in this country), three of concrete, three according to the Monier system, two of corrugated iron and one arch constructed according to the system Melan.

The above tests were divided into three series: A, seven arches with a span of 4 feet 5.16 inches; B, seven arches with a span of 8 feet 10.2 inches; C, four arches having a span of 13 feet 3.6 inches.

The arches in the first and second series were built between I-beams, which were rigidly secured and supported, so that no possible movement could take place. The third series was built between solid masonry abutments, as shown in Fig. 6.

This latter series of arches were regarded as a connecting link

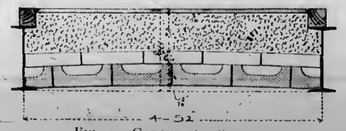


FIG. 4.—GLUCKSELIG SYSTEM.

between floor arches of small span and those of highway bridges, and the tests were instituted principally for making a comparison between arches of concrete, those of the Monier system and of brickwork. The tests of the flat arch systems were for spans of 4 feet 5.2 inches only, as these arches are not designed for much greater spans.

The construction of these arches is shown in Figs. 2 to 5.

Of the seven arches in the short-span series two were of brick (one header, one stretcher), one of concrete and one of each of the systems shown in Figs. 2-5.

The two brick arches laid up in white lime mortar showed practically no change under a load of 1,436 pounds per square foot.

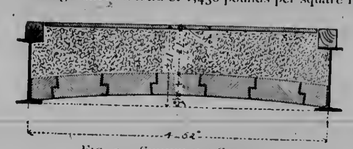


FIG. 5.—SCHNEIDER SYSTEM.

Of the ways of laying the bricks—headers or stretchers—the latter in every case showed a superiority, probably on account of the lesser number of joints.

The concrete arch, which was only 2 15/16 inches thick, with a rise of 4½ inches, was composed of one part Portland cement and five parts sand, and sustained 1,638 pounds per square foot without failure or cracking. The deflections of the concrete were about an average of the two brick arches, hence this arch may be considered as equal in strength to a brick arch 5⅞ inches thick, while it has the advantage of lesser weight.

The four flat arches showed an unexpectedly high carrying capacity.

The Schober arch (Fig. 2) and the Honel arch (Fig. 3) gave evidence of a very small deflection, even less than that of the brick arches, and a load of 1,638 pounds per square foot caused them to undergo very little change.

The Gluckselig arch (Fig. 4) failed under 1,638 pounds per square foot, and the Schneider arch (Fig. 5) under 1,651 pounds per square foot, both arches showing considerable deflection beforehand.

It may therefore be concluded that these arches are completely safe for all practical purposes, provided the skewback beams are not placed too far apart and the workmanship is first-class.

When using either of these systems, however, one must not be too economical in the use of tie-rods, to prevent any lateral deflection of the floor beams.

All of the above arches were tested by loading with iron and steel blooms. To get as uniform a load as possible a layer of cinders, etc., was evenly distributed over the arch and a planking composed of floor boards was placed thereon. The load was applied over the whole surface, and the arch had at least four months to set before testing.

SECOND SERIES.—This series consisted of one concrete arch 3⅜ inches thick; one arch of ordinary bricks, one arch of Honel's bricks, two Monier arches (one leveled up with cinders, the other with concrete) and two arches of corrugated iron, one with the edges reinforced and the other without reinforcements.

All were spring between I-beams placed 8 feet 10.2 inches apart between the webs.

Each of these arches was loaded over one-half of the arch only, although the arches were leveled up and the planking laid over the whole surface as in the first series.

The arch composed of ordinary bricks gave evidence of but little change under a load of 410 pounds per square foot, and carried 885 pounds per square foot before it failed. This arch was 5 5/16 inches thick, composed of a single course of brick, and had a rise of 9.85 inches.

To see if a thinner arch would answer the same purpose, one arch was constructed of "Honel's" bricks, which were only 3 15/16 inches thick, with a rise of 5 5/16 inches (1 in 20). This arch, however, failed under an eccentric load of 491 pounds per square foot, after having shown considerable deflection beforehand. It does not seem advisable, therefore, to use a 4-inch arch for so great a span.

The arch of concrete 3 5/16 inches thick, with a rise of 1 in 10, composition 1 to 4, fulfilled all requirements, as it sustained 614.4 pounds per square foot before it began to crack appreciably, and failed under an eccentric load of 1,130 pounds per square foot.

The two Monier arches deflected on an average equally as much as the concrete arch, and showed no appreciable superiority.

The arch leveled up with the concrete showed an increase in strength of only 8 per cent., although the superficial layer of concrete was applied immediately after the arch itself had been built.

The arches of corrugated iron deflected at the crown very much more than either the concrete and Monier arches.

The arch which had 2.3x2 3-inch angles riveted to the edges of the iron proved about 13 per cent. the stronger.

THIRD SERIES.—Span of 13 feet 3.6 inches.

The brick arch, 4⅞ inches thick, with a rise of 13¾ inches, commenced to crack under an eccentric load of 137.5 pounds per square foot, showing that it was much too weak for the purpose.

The concrete arch, 3 15/16 inches thick, with a rise of 15⅞ inches, failed under an eccentric load of 812 pounds per square foot.

The Monier arch, 2 inches thick, with a rise of 15½ inches, failed under an eccentric load of 895 pounds per square foot. The deflections of this arch were somewhat greater than those of the concrete arch.

After the above arches had been tested a new system appeared, the Melan patent, and an arch of this type being constructed by the manufacturers, it was tested in 1893 by the same committee.

This arch which had a span of 13 feet 11 inches and a rise of 11.4 inches, was constructed of curved ribs of 3½-inch I-beams, spaced 3 feet 3 inches apart, with 1 to 5 concrete rammed in between. The thickness of the arch was the same as that of the I-beams, 3½ inches. On account of the lack of material the loading of this arch was interrupted after 1,412 pounds per square foot, over one half of the arch, had been imposed. The

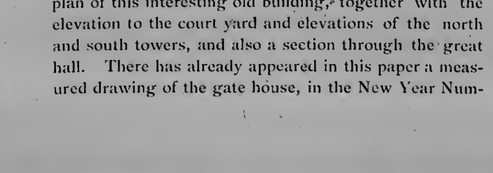


FIG. 6.—CONCRETE ARCH WITH MASONRY ABUTMENT.

permanent changes discovered after the removal of this load were very slight.

The report states: "From the behaviour of this construction there is no doubt that these vaults have a far superior carrying capacity than either the plain concrete or the Monier arch."

Aside from the great strength displayed by the Melan arch, which may be considered as a direct outcome of these tests, the most important fact developed is the superiority of the plain concrete arch, from a commercial point of view, over the Monier arch.

The ordinary Monier arch consists of wire netting imbedded in the concrete. To hold the netting the concrete must not be coarser than 1 to 3, which makes this system much more expensive than the plain concrete arch.

Referring to the two types of arches, the report says: "Compared with a plain concrete arch, a concrete arch with one wire netting has shown but little more carrying capacity, so that the difference cannot have any importance to the ordinary building practice."

Engineers have for a long time recommended Monier arches with two wire nettings for large spans, but it is nearly impossible to use two nettings in a small span.

In making all of the tests careful measurements were made of the deflection under different stages of loading, and these are given in the tables contained in the report.

* Report of the Committee on Arches and Vaults of the Austrian Society of Engineers and Architects. Special reprint from the Journal, Nos. 20-34. Vienna, 1895. (Printed in German.)

ILLUSTRATIONS.

SHORING AND STRUTTING.—REPRODUCED FROM "THE BUILDER."

RESIDENCE, SPADINA ROAD, TORONTO.—CURRY, BAKER & CO., ARCHITECTS.

STOKESAY CASTLE.—MEASURED AND DRAWN BY EDWARD SWALES.

IN this number of the ARCHITECT AND BUILDER I give the ground plan and what we should call the first floor plan of this interesting old building, together with the elevation to the court yard and elevations of the north and south towers, and also a section through the great hall. There has already appeared in this paper a measured drawing of the gate house, in the New Year Number a sketch of the castle from the northwest corner, and in the May number a photographic reproduction of the Solar room.

The plans, I think, will be found interesting. Whether the founder of the house originally intended it for defence is not very apparent. The site at the foot of the hill would in these days be completely at the mercy of modern warfare. The gables and mullioned windows of the house are more suggestive of domestic life, and are so placed that attack would be easy from across the moat. The tower and moat bespeak a troubled time, when the owners found it expedient to strengthen their dwelling against their enemies. So we must consider it an early example of a moated dwelling rather than a castle or stronghold like its neighbor, Ludlow.

Little alteration seems to have taken place through the chances and changes that have levelled so many other similar buildings of that period; thus it has a special interest to the archaeologist. The moat was originally supplied from a pool which existed on the west side, and this by a small stream which ultimately flowed into the river Onny. Whether it was used to supply the moat to the original building is not easy to determine, and the depth cannot now be fixed. It is used as a garden and the ground is of different levels. A string course which runs round the hall and south tower is wanting round the northern one, and the masonry being also of a ruder description, indicating this to be the earliest portion of the structure. The batten on the base of this north tower and the depth of the foundations at this part, show that this portion was moated, a defence with which nearly all the earlier habitations were provided.

The gate-house replaces the original drawbridge, and the court yard was evidently surrounded by a strong parapet, pierced for cross-bows, of which the only remaining part is a few feet abutting on the south tower. Traces of foundations, probably of timber structures, which were usually built up to the parapet, can be traced near the north tower, and may have been used as stables, etc. On the opposite side stands the great hall, and at its southern end the Solar or withdrawing room, with the offices of the household. These would be the private apartments of the lord of the castle, and by the two squints his lordship could keep his eye on the retainers in the great hall below, which at night became the common dormitory for guests and servants. Then even in palaces the common sleeping place was a bench or the floor, which was covered with rushes; while a crib with a straw couch was probably the only furniture in a lady's bed-chamber. The priest and probably the principal guests were housed in the north tower. The south tower was intended as a last defence in case of siege, there being no indication of a drawbridge existing in place of the gangway. There is no doubt that it was always a temporary structure that could be easily destroyed. A covered way, probably of half timber, at one time led from the lower door to the Solar, as indicated by the string weathering under the window.

However picturesque these old buildings may look, the domestic arrangements must have been very draughty even in their best days. The well proportioned windows to the hall, mullioned and transomed with trefoils and circle, are excellent specimens of early English tracery, grooved in the upper parts for sashes, and in the lower, instead of grooves, holes sunk for iron bars, and supplied with shutters. Before the twelfth century glass was a

great luxury. Between the windows are three buttresses, which were found necessary to counteract the weight of the roof, which has thrown the walls out of perpendicular. These additions are considerably later, and marked new on plan.

On entering the hall you are at once struck by its proportions. The massive beams which support the roof are arched, springing from stone corbels on each side. The windows have stone seats, except the two northern ones, which are only half length, the one over the entrance being now built up, and the one at the end on the west side, which will be seen in the sketch published in January, has somehow lost its upper part, and horizontal beams of wood are inserted and now fitted with doors. There was the remains of some iron work, which by some authorities is supposed to have belonged to part of a drawbridge, but it is very unlikely that a drawbridge would communicate direct into the great hall. Some years ago it was used as a barn, and this doorway was made, in my opinion, at that time. There is no appearance at the upper end of any dais, for the small door at the end is on a level with the rest of the floor. Probably a temporary one was used. The hall has never been paved or tiled in any way, except nearly midway between the sides there is an octagonal pavement for the brazier—the only provision for a fire. There is no chimney. The beams of the roof above are blackened with the smoke of centuries. Everything in the place recalls the mediaeval baronial hall, and there still remain parts of heraldic devices that can be faintly traced in the now crumbling plaster.

The northern tower has been fully described in a previous number of this journal. The very narrow loopholes and rubble masonry show that it is the earliest portion remaining. In the lower chamber a well is sunk. Here again rude ornament can be traced on the walls.

Returning to the hall, a flight of solid oak steps lead to the chambers called the priests' rooms, and here is a collection of tiles, the "Centaur" and an "Archer with a Long Bow" being the more unusual patterns. An ogee window has been inserted in this room, and it may have been used as a chapel, although the church, which is quite as old as this tower, is close to the moat. At the southern end of the hall, through a square-headed trefoil doorway, characteristic of Edwardian architecture, into two small apartments, wainscoated and used as store-rooms, and an inner room terminating at the tower, steps lead into the only cellar. Well lighted by windows into the moat, above these rooms, and approached by the external stone steps already mentioned, is the handsome Solar. The tracery of the windows are similar to those of the hall, and are like them furnished with stone seats. In addition they are flanked with small lancets. On the court side the lancet window has been blocked up, and an ogee added, presumably to gain a better view of the gate-house. The two small squints with shutters at each side the fireplace, I have mentioned before. The remains of the elaborate panelling, and the magnificent chimney piece of oak of Charles II. time, still showing the color and guilding, with grotesque figures and scroll work, has even now an extremely rich effect. It rests on a massive grey stone arch. I hope to give a measured drawing of it at a future date. The inner chamber corresponding to the one below is provided with a wardrobe, and was the principal sleeping apartment.

Decending to the court an archway between the buttresses opens into the lower apartment of the south tower. In this is a large fireplace, and has no doubt been used as the kitchen. The principal entrance, however, is from the level of the Solar across the gangway, and in time of siege the lower doorway would be blocked up and the only approach destroyed.

The plan appears somewhat irregular, and the angles within and without do not correspond on examination, a good illustration of the carelessness of the old builders. It appears, as it were, two octagonal towers placed side by side, forming a rude heart shape. The walls are very thick in places (six feet). Each floor is provided with a fireplace, and for better defence the lancet windows on each floor command the different angles of the tower—each with a stone seat. A stair in the thickness of the wall leads from floor to floor, and in one room the decoration, consisting of a gray paint with flecks of brown, like whisps of hair, is still discernible.

The battlements on the roof consist of large embrasures, which originally had shutters, alternating with loop-holes for the use of cross-bows. A short flight of steps on the north side lead to a small watch tower over the stairs. The present owner has repaired the floors and put a good lead flat in place of the old roof which was burnt, and in many places repaired the walls, etc., keeping the whole in good order, but allowing nothing to be destroyed, and nothing is restored to death.

From the foregoing somewhat meagre description, it will be seen that Stokesay consists of three distinct parts. Of these the only portion of which any clear date of its erection can be fixed is the south tower. Any attempt to fix the order in which the others were built must rest on inferences drawn from the plan or the history of its owners. The castle now belongs to Mr. Allcroft, who keeps it in an excellent state of repair. The whole country from Liverpool to Hereford, through Shrewsbury and Ludlow, teams with interesting spots for the artist and archaeologist, and with historical associations—a splendid field for the architectural student visiting England. And the district is comparatively little known.

EDWARD SWALES.

ARTS AND CRAFTS ASSOCIATION.

THE Arts and Crafts Association of Hamilton opened its doors for the third annual exhibition on June 4th. Among the articles of interest was a carved mahogany piano stool by J. R. Seavey, which was a neat piece of workmanship. A. Lutes, an amateur, contributed a pedestal, surrounded at top and foot with oak leaves. P. L. Scriven's wood engravings were also creditable. Bell-Smith's Westminster and Port Neuf's pictures were models in architectural drawing.

Mr. and Mrs. Norris gave an exhibition of pottery-making, which was repeatedly applauded. R. Carroll, wood-carver, exhibited and worked on a panel a modern Italian renaissance, with cupids as central figures. It is a masterpiece of wood-carving, bringing out the cupids to good advantage.

Metal spinning and metal work were among the interesting features of the exhibition. The exhibition lasted ten days, and was creditable to the city of Hamilton.

The Kingston News says there is an opening for a cement works at Kingston, with plenty of material close at hand from which to make cement and pressed brick.

MR. KIVAS TULLY, C. E.

WE have the pleasure to present to our readers the accompanying portrait and particulars of the long and active career of Mr. Kivas Tully, C.E., who has recently retired from the active duties of the position of Chief Architect of the Public Works Department of Ontario.

Mr. Tully, second son of the late Commander John P. Tully, R. N., was born in Queen's County, Ireland, in 1820, educated at the Royal Naval School, Canterwell, London, England, and served his time as architect and civil engineer with the late W. H. Owen, architect and civil engineer, Limerick. After serving his time he was engaged in the erection of workhouses in Ireland, under Mr. Wilkinson, architect for the Poor Law Commissioners, having acted as inspector of buildings during the latter portion of 1843. In 1844 Mr. Tully emigrated to Canada and started business in Toronto as an architect and civil engineer. During 1845 the Custom House and Bank of Montreal on the corner of Front and Yonge streets, recently pulled down for the erection of the present structures, were constructed from his designs, after competition with other architects, and in 1848 the town hall and market building were erected by Mr. Tully, after competition. In 1850-51, Trinity College, Toronto, was erected by Mr. Tully, the

MR. KIVAS TULLY, C. E.

Welland County court house and jail in 1854-55, and the Victoria Hall, Cobourg, in 1857, after competition. In 1855-56-57 Mr. Tully, with Col. R. B. Mason, C.E., of Chicago, as consulting engineer, made the survey of the Toronto and Georgian Bay Ship Canal, and the report was published in 1858, the estimated cost being $22,170,000. In succession to the above the Ontario Ship Railway Company was granted a charter by the Ontario Legislature in 1892, for the construction of a railway to carry ships of 5,000 tons from Georgian Bay to some point on Lake Ontario, to cost $16,000. Mr. Tully was appointed chief engineer with E. L. Corthell, C.E., of Chicago, as consulting engineer, and Mr. David Blain, managing director.

In March, 1853, Mr. Tully was appointed engineer by the Toronto Harbor Commissioners, an office which he still holds with the consent of the Government. On the 22nd of March, 1856, the visiting commissioners of the Asylum for Insane, Toronto, appointed Mr. Tully architect to the asylum, which was afterwards confirmed by His Excellency, the Governor-General, and he has been enrolled as a civil servant since that time. Early in March, 1866, contracts were entered into for the erection of the wings and hospitals of the Asylum for Insane, Toronto, in accordance with his designs, Mr. Tully, by order of the visiting commissioners, having inspected several insane asylums in the United States in the autumn of 1865. The wings, etc., were completed and occupied in 1870—three years after Confederation. In January, 1868, Mr. Tully was transferred to the Department of Public Works, Ontario, the Hon. John Carling being the first Commissioner, and the building of the wings and hospitals was continued under the Commissioner of Public Works. The act organizing the department, which was prepared by Mr. Tully, was not passed until the 23rd of January, 1869. Under that act Mr. Tully was appointed architect and engineer and chief officer and performed the duties as such until 1874, when the act was amended appointing a separate engineer. At the change of Government in 1871, the Hon. Mr. McKellar was sworn in as Commissioner of Public Works, and acted as such until March, 1874, when the Hon. C. F. Fraser was sworn in as Commissioner, and he has continued to act until the present time, a period of upwards of twenty years.

From the year 1856 to the present time, a period of 40 years, the principal public buildings belonging to the province, representing an expenditure of about $7,000,000, were erected under his superintendence and directions.

Mr. Tully has also served the public as a member of the Board of Public School Trustees of Toronto from 1854 to 1858 inclusive.

GUILD OF SCULPTURE OF ONTARIO.

IN response to an invitation made by the Council of the above Guild, which has been formed for the encouragement and training in sculpture, and its allied crafts, a numerously attended meeting of representative artists and workers in the various branches of the plastic arts, including practitioners in marble, stone, wood, metals, art pottery and decorative plaster, was held on Friday last at the studio of Mr. Hamilton MacCarthy, R.C.A.

The object of the meeting was to organize an associate membership, and formulate the basis for holding the first exhibition of the combined plastic arts, which, it was decided to inaugurate in the fall. From the enthusiasm shown at the meeting the project promises every success, and from the well-known talents of the ladies and gentlemen, both professional and amateur, who have thrown themselves into the movement, public interest and advantage cannot fail to result when the exhibition takes place. Ontario has already become the home of many artists of the brush, whose works have done honor to the country, both at home and abroad, and some excellent public monuments, the work of Canadian sculptors, adorn a number of our Canadian cities, and it is of equal importance, not only from an artistic point of view, but also from a merchantile point of view, that both our sculptors and craft-workers should attain excellence in the subsidiary branches of the sculptors' art which go to affect architecture, decoration, design and manufactures.

In several branches of the sculptors' art Canada is still in its infancy; for instance, in metal work, in the goldsmiths' art, in which the Italians in the time of Cellini became so famous in the designing and chasing of trophies, racing cups, and other ornaments in metal.

The work of the hammer in iron, associated with the name of Guinton Matsys, we are glad to see has come into vogue, also the production and treatment of bronze, forming, perhaps, the most beautiful medium, as well as the most endurable material for the work of the sculptor.

In carving in stone our artists have attained much proficiency in Gothic and Romanesque, but little has been done in the human figure. Carving in wood is making some progress in ornament and low relief, yet as in stone much remains to be done in the higher branches.

There is also a field open for a Canadian art pottery. In Europe and the United States national schools of art pottery have been established with great success, and with the many fine clays we possess in this country, there is no reason why a Canadian faience should not come into repute both for home and export, and give employment for ladies and gentlemen of taste and skill. We may further mention the desirability of attaining excellence in designing and modelling of interior decorations in plaster of paris. Terra cotta is also one of the best materials for expressing the conceptions of the sculptor in the figure from the fact of the clay retaining the original impress and touch of the artist's handiwork.

The formation of a society, having for its object the cultivation, training, and encouragement of the plastic arts exclusively, is not only a novelty, but will be an acquisition to our art cults, and we have no doubt, when the exhibition is held, it will be, not only interesting and instructive, but a revelation to the public.

Mr. L. R. O'Brien, R. C. A., an artist who has taken a lively interest in every branch of the fine arts, is president of the Guild, and the Council include several of our best known sculptors and architects.

The membership of the Guild contains a large number of prominent citizens who have taken an active interest in the success of the Guild. The associate members will be exclusively composed of practical art workers in some branch of sculpture. An art union in connection with the Guild has been formed, and two beautiful busts of Canadian heros, General Sir Isaac Brock and Tecumseh, have been prepared in terra cotta for distribution to subscribers, specimens of which may be seen at Messrs. Matthews Bros., Yonge street.

The Guild feels sure that the public may look forward to the coming exhibition with great interest.

C. A. & B. STUDENTS' COMPETITION.

SEVERAL drawings have been received in the Students' Competition for a cover design for the next New Year number of the CANADIAN ARCHITECT AND BUILDER, but there has not been time for the judges to make their report thereon. The result will be made known in our July number.

great luxury. Between the windows are three buttresses, which were found necessary to counteract the weight of the roof, which has thrown the walls out of perpendicular. These additions are considerably later, and marked new on plan.

On entering the hall you are at once struck by its proportions. The massive beams which support the roof are arched, springing from stone corbels on each side. The windows have stone seats, except the two northern ones, which are only half length, the one over the entrance being now built up, and the one at the end on the west side, which will be seen in the sketch published in January, has somehow lost its upper part, and horizontal beams of wood are inserted and now fitted with doors. There was the remains of some iron work, which by some authorities is supposed to have belonged to part of a drawbridge, but it is very unlikely that a drawbridge would communicate direct into the great hall. Some years ago it was used as a barn, and this doorway was made, in my opinion, at that time. There is no appearance at the upper end of any dais, for the small door at the end is on a level with the rest of the floor. Probably a temporary one was used. The hall has never been paved or tiled in any way, except nearly midway between the sides there is an octagonal pavement for the brazier—the only provision for a fire. There is no chimney. The beams of the roof above are blackened with the smoke of centuries. Everything in the place recalls the mediaeval baronial hall, and there still remain parts of heraldic devices that can be faintly traced in the now crumbling plaster.

The northern tower has been fully described in a previous number of this journal. The very narrow loop-holes and rubble masonry show that it is the earliest portion remaining. In the lower chamber a well is sunk. Here again rude ornament can be traced on the walls.

Returning to the hall, a flight of solid oak steps lead to the chambers called the priests' rooms, and here is a collection of tiles, the "Centaur" and an "Archer with a Long Bow" being the more unusual patterns. An ogee window has been inserted in this room, and it may have been used as a chapel, although the church, which is quite as old as this tower, is close to the moat. At the southern end of the hall, through a square-headed trefoil doorway, characteristic of Edwardian architecture, into two small apartments, wainscoated and used as store-rooms, and an inner room terminating at the tower, steps lead into the only cellar. Well lighted by windows into the moat, above these rooms, and approached by the external stone steps already mentioned, is the handsome Solar. The tracery of the windows are similar to those of the hall, and are like them furnished with stone seats. In addition they are flanked with small lancets. On the court side the lancet window has been blocked up, and an ogee added, presumably to gain a better view of the gate-house. The two small squints with shutters at each side the fireplace, I have mentioned before. The remains of the elaborate panelling, and the magnificent chimney piece of oak of Charles II. time, still showing the color and guilding, with grotesque figures and scroll work, has even now an extremely rich effect. It rests on a massive grey stone arch. I hope to give a measured drawing of it at a future date. The inner chamber corresponding to the one below is provided with a wardrobe, and was the principal sleeping apartment.

Decending to the court an archway between the buttresses opens into the lower apartment of the south tower. In this is a large fireplace, and has no doubt been used as the kitchen. The principal entrance, however, is from the level of the Solar across the gangway, and in time of siege the lower doorway would be blocked up and the only approach destroyed.

The plan appears somewhat irregular, and the angles within and without do not correspond on examination, a good illustration of the carelessness of the old builders. It appears, as it were, two octagonal towers placed side by side, forming a rude heart shape. The walls are very thick in places (six feet). Each floor is provided with a fireplace, and for better defence the lancet windows on each floor command the different angles of the tower—each with a stone seat. A stair in the thickness of the wall leads from floor to floor, and in one room the decoration, consisting of a gray paint with flecks of brown, like whisps of hair, is still discernible.

The battlements on the roof consist of large embrasures, which originally had shutters, alternating with loop-holes for the use of cross-bows. A short flight of steps on the north side lead to a small watch tower over the stairs. The present owner has repaired the floors and put a good lead flat in place of the old roof which was burnt, and in many places repaired the walls, etc., keeping the whole in good order, but allowing nothing to be destroyed, and nothing is restored to death.

From the foregoing somewhat meagre description, it will be seen that Stokesay consists of three distinct parts. Of these the only portion of which any clear date of its erection can be fixed is the south tower. Any attempt to fix the order in which the others were built must rest on inferences drawn from the plan or the history of its owners. The castle now belongs to Mr. Allcroft, who keeps it in an excellent state of repair. The whole country from Liverpool to Hereford, through Shrewsbury and Ludlow, teams with interesting spots for the artist and archaeologist, and with historical associations—a splendid field for the architectural student visiting England. And the district is comparatively little known.

EDWARD SWALES.

ARTS AND CRAFTS ASSOCIATION.

THE Arts and Crafts Association of Hamilton opened its doors for the third annual exhibition on June 4th. Among the articles of interest was a carved mahogany piano stool by J. R. Seavey, which was a neat piece of workmanship. A. Lutes, an amateur, contributed a pedestal, surrounded at top and foot with oak leaves. P. L. Scriven's wood-engravings were also creditable. Bell-Smith's Westminster and Port Neuf's pictures were models in architectural drawing.

Mr. and Mrs. Norris gave an exhibition of pottery-making, which was repeatedly applauded. R. Carroll, wood-carver, exhibited and worked on a panel a modern Italian renaissance, with cupids as central figures. It is a masterpiece of wood-carving, bringing out the cupids to good advantage.

Metal spinning and metal work were among the interesting features of the exhibition. The exhibition lasted ten days, and was creditable to the city of Hamilton.

The Kingston News says there is an opening for a cement works at Kingston, with plenty of material close at hand from which to make cement and pressed brick.

MR. KIVAS TULLY, C. E.

WE have the pleasure to present to our readers the accompanying portrait and particulars of the long and active career of Mr. Kivas Tully, C.E., who has recently retired from the active duties of the position of Chief Architect of the Public Works Department of Ontario.

Mr. Tully, second son of the late Commander John P. Tully, R. N., was born in Queen's County, Ireland, in 1820, educated at the Royal Naval School, Canterwell, London, England, and served his time as architect and civil engineer with the late W. H. Owen, architect and civil engineer, Limerick. After serving his time he was engaged in the erection of workhouses in Ireland, under Mr. Wilkinson, architect for the Poor Law Commissioners, having acted as inspector of buildings during the latter portion of 1843. In 1844 Mr. Tully emigrated to Canada and started business in Toronto as an architect and civil engineer. During 1845 the Custom House and Bank of Montreal on the corner of Front and Yonge streets, recently pulled down for the erection of the present structures, were constructed from his designs, after competition with other architects, and in 1848 the town hall and market building were erected by Mr. Tully, after competition. In 1850-51, Trinity College, Toronto, was erected by Mr. Tully, the

MR. KIVAS TULLY, C. E.

Welland County court house and jail in 1854-55, and the Victoria Hall, Cobourg, in 1857, after competition. In 1855-56-57 Mr. Tully, with Col. R. B. Mason, C.E., of Chicago, as consulting engineer, made the survey of the Toronto and Georgian Bay Ship Canal, and the report was published in 1858, the estimated cost being $22,170,000. In succession to the above the Ontario Ship Railway Company was granted a charter by the Ontario Legislature in 1892, for the construction of a railway to carry ships of 5,000 tons from Georgian Bay to some point on Lake Ontario, to cost $16,000. Mr. Tully was appointed chief engineer with E. L. Corthell, C.E., of Chicago, as consulting engineer, and Mr. David Blain, managing director.

In March, 1853, Mr. Tully was appointed engineer by the Toronto Harbor Commissioners, an office which he still holds with the consent of the Government. On the 22nd of March, 1856, the visiting commissioners of the Asylum for Insane, Toronto, appointed Mr. Tully architect to the asylum, which was afterwards confirmed by His Excellency, the Governor-General, and he has been enrolled as a civil servant since that time. Early in March, 1866, contracts were entered into for the erection of the wings and hospitals of the Asylum for Insane, Toronto, in accordance with his designs, Mr. Tully, by order of the visiting commissioners, having inspected several insane asylums in the United States in the autumn of 1865. The wings, etc., were completed and occupied in 1870—three years after Confederation. In January, 1868, Mr. Tully was transferred to the Department of Public Works, Ontario, the Hon. John Carling being the first Commissioner, and the building of the wings and hospitals was continued under the Commissioner of Public Works. The act organizing the department, which was prepared by Mr. Tully, was not passed until the 23rd of January, 1869. Under that act Mr. Tully was appointed architect and engineer and chief officer and performed the duties as such until 1874, when the act was amended appointing a separate engineer. At the change of Government in 1871, the Hon. Mr. McKellar was sworn in as Commissioner of Public Works, and acted as such until March, 1874, when the Hon. C. F. Fraser was sworn in as Commissioner, and he has continued to act until the present time, a period of upwards of twenty years.

From the year 1856 to the present time, a period of 40 years, the principal public buildings belonging to the province, representing an expenditure of about $7,000,000, were erected under his superintendence and directions.

Mr. Tully has also served the public as a member of the Board of Public School Trustees of Toronto from 1854 to 1858 inclusive.

GUILD OF SCULPTURE OF ONTARIO.

IN response to an invitation made by the Council of the above Guild, which has been formed for the encouragement and training in sculpture, and its allied crafts, a numerously attended meeting of representative artists and workers in the various branches of the plastic arts, including practitioners in marble, stone, wood, metals, art pottery and decorative plaster, was held on Friday last at the studio of Mr. Hamilton MacCarthy, R.C.A.

The object of the meeting was to organize an associate membership, and formulate the basis for holding the first exhibition of the combined plastic arts, which, it was decided to inaugurate in the fall. From the enthusiasm shown at the meeting the project promises every success, and from the well-known talents of the ladies and gentlemen, both professional and amateur, who have thrown themselves into the movement, public interest and advantage cannot fail to result when the exhibition takes place. Ontario has already become the home of many artists of the brush, whose works have done honor to the country, both at home and abroad, and some excellent public monuments, the work of Canadian sculptors, adorn a number of our Canadian cities, and it is of equal importance, not only from an artistic point of view, but also from a merchantile point of view, that both our sculptors and craft-workers should attain excellence in the subsidiary branches of the sculptors' art which go to affect architecture, decoration, design and manufactures.

In several branches of the sculptors' art Canada is still in its infancy; for instance, in metal work, in the goldsmiths' art, in which the Italians in the time of Cellini became so famous in the designing and chasing of trophies, racing cups, and other ornaments in metal.

The work of the hammer in iron, associated with the name of Guinton Matsys, we are glad to see has come into vogue, also the production and treatment of bronze, forming, perhaps, the most beautiful medium, as well as the most endurable material for the work of the sculptor.

In carving in stone our artists have attained much proficiency in Gothic and Romanesque, but little has been done in the human figure. Carving in wood is making some progress in ornament and low relief, yet as in stone much remains to be done in the higher branches.

There is also a field open for a Canadian art pottery. In Europe and the United States national schools of art pottery have been established with great success, and with the many fine clays we possess in this country, there is no reason why a Canadian faience should not come into repute both for home and export, and give employment for ladies and gentlemen of taste and skill. We may further mention the desirability of attaining excellence in designing and modelling of interior decorations in plaster of paris. Terra cotta is also one of the best materials for expressing the conceptions of the sculptor in the figure from the fact of the clay retaining the original impress and touch of the artist's handiwork.

The formation of a society, having for its object the cultivation, training, and encouragement of the plastic arts exclusively, is not only a novelty, but will be an acquisition to our art cults, and we have no doubt, when the exhibition is held, it will be, not only interesting and instructive, but a revelation to the public.

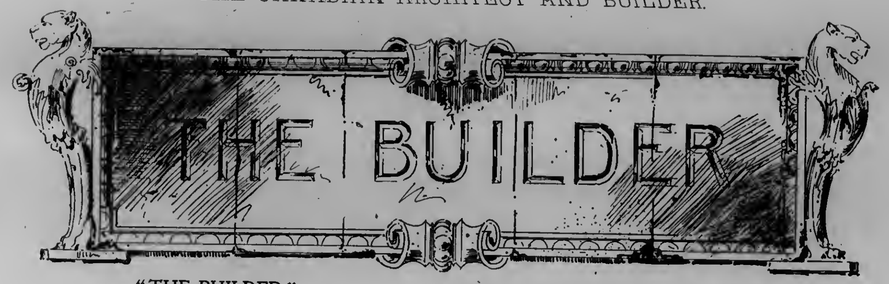
Mr. L. R. O'Brien, R. C. A., an artist who has taken a lively interest in every branch of the fine arts, is president of the Guild, and the Council include several of our best known sculptors and architects.

The membership of the Guild contains a large number of prominent citizens who have taken an active interest in the success of the Guild. The associate members will be exclusively composed of practical art workers in some branch of sculpture. An art union in connection with the Guild has been formed, and two beautiful busts of Canadian heros, General Sir Isaac Brock and Tecumseh, have been prepared in terra cotta for distribution to subscribers, specimens of which may be seen at Messrs. Matthews Bros., Yonge street.

The Guild feels sure that the public may look forward to the coming exhibition with great interest.

C. A. & B. STUDENTS' COMPETITION.

SEVERAL drawings have been received in the Students' Competition for a cover design for the next New Year number of the CANADIAN ARCHITECT AND BUILDER, but there has not been time for the judges to make their report thereon. The result will be made known in our July number.



"THE BUILDER."

We have occasionally been met with the complaint on the part of contractors in the building trades that the Canadian Architect and Builder contained too little information adapted to the requirements of the master builder and contractor. Recognizing the justice in some measure of this complaint, the size of the journal has with the present number been increased to an extent sufficient to admit of the establishing of this department and the publication therein of a large amount of matter suited to the needs of contractors in the various trades as well as of the country builder who requires to be possessed of some knowledge of every department of building work.

Contractors are invited to ask through this department tor any required information which they do not find appearing therein, when every effort will be made to supply it. They are also requested to contribute through this department for the general benefit, anything of value on the line of improved methods of carrying out work, the nature and use of materials, etc. Country builders who have not the same opportunity as their city brethren of becoming acquainted with new materials and methods, should not hesitate to avail themselves of the privilege of asking questions.

If those for whose benefit this department has been especially provided will assist in promoting a free interchange of ideas and experiences on the line of their every-day work, a great deal of helpful information will be the outcome.

BUILDING AND SANITARY CONSTRUCTION.

The following extracts are taken from a lecture on the above subject to students and clerks of works at Carpenters' Hall, London, Eng., by Professor Banister Fletcher, professor of architecture at King's College:

We call it sanitary building. Why might we not call it, as our forefathers did, simply good, sound building? The first subject is bricks. Nearly all buildings are of brick, or of brick faced with stone.

The essential qualities of a good brick are hardness, not absorbing more than one-sixth its weight of water, well burnt, free from flaws, having a good ring when struck, the surfaces level, neither hollow nor round, except the frog, and the surfaces not too smooth, or the mortar will not adhere. A very highly vitrified brick will only absorb from one-thirteenth to one sixteenth its own weight. The softer stock brick will absorb 1 lb. 1 oz. of water; the harder brick about 9 oz. It must be remembered this result is obtained when we have all the surfaces exposed to the water by immersion in a pail for twenty-four hours. In a recent case it was contended by council that a brick in a building absorbed the same quantity as it did when thus immersed—a strong example of the weakness of theory without practice. A practical man knows that only one face is exposed to the weather; if it is a stretcher, then we have only one-fifth of the entire surface exposed, and if a header then still less by one-half. The wall in question had a dust-bin outside, and, it was alleged, was too damp for habitation. As a practical test a brick was taken out just behind the skirting; the painting of the skirting was not injured or blistered in any way, as it would naturally be by the action of damp, and the brick behind was perfectly dry. I cite this to show that theory requires a knowledge of practise to make it of value. An imperfectly burnt brick must be bad because it becomes sodden with water and is easily damaged by frost; it causes also the wall to be cold and damp. If chalk is present imperfectly ground, the brick is liable to serious flakings. The burning turns the chalk into lime, water reaches it, and the brick is blown, or disintegrated, by the action of the water on the lime. The frog gives a key for the mortar, and keeps the brick in position.

Stone.—Durability is the most important item. The most powerful agencies in the destruction of stone are nitric acid, carbonic acid, and the moisture of the atmosphere. Stone in the country ought practically to stand for ever. But in towns it is exposed to the influences of sulphur and hydrochloric acid. Carbonic acid and water causes a great amount of decomposition. The use of porous stone should be specially avoided in facades exposed to the south, south-west or west winds, because from these quarters we get the driving wind and rain. The decomposing gases in the air are driven further in by the rain. Frost increases the bulk of the water and blows out the stone. One way of testing stone is to weigh when dry and after immersion in water, in the same way as the test for brick already mentioned. If you find that the stone does not absorb half a gallon per cubic foot, you may consider it a good building stone. Another test is that of two stones having similar qualities; that which has the greatest density or specific gravity is the best.

Some of you hereafter may probably be sent down to examine stone at a quarry. To assist you in deciding on the merits of the stone, examine the old buildings in the neigborhood; the tool-marks should still show on a good stone. Finding the stone in the old building good is not in itself satisfactory. It is necessary further to inquire about the bed from which the stone was quarried; it may be the bed is exhausted, and beds of stone in the same quarry differ very much. See also that your stone is seasoned. Wren, during the building of St. Paul's, would have no stone used that had not been quarried for three years. The result of this care is that no stone shows signs of decay. A further proof of the necessity of thus getting stone free from sap was given by a recent experience with St. Martin's-in-the-Fields. A portion of the stonework was decaying, and an examination brought out the curious fact that the whole of the faulty stones were stones that had been put there some twenty years before. At that time the mason had ascertained what stones were required, sent off the sizes to the quarry, and with the desire to get the scaffold down the stones had been put in full of quarry sap. The result was that they required renewal in twenty years. This term quarry sap is one that some people are startled at, but it is really no more than the natural sap in timber. It is simply water in the stone and a normal condition for all stone while in its natural bed. You may see when travelling in the west of England large quantities of stone drying where the quarries are near the railway. It is a rule at most quarries to send no stone to London from which the quarry sap has not been dried out. It is sometimes found more economical to have the stone cut and moulded at the quarry, because of the labor being cheaper. Against this has to be set the liability to damage in transit.

Timber should be got from the heart of a sound tree. The sap should be removed; it should be uniform in substance, free from large or dead knots or blemishes, sonorous when struck; the annular rings should be regular in form and color; the dust when freshly cut should smell sweet; the surface should not be woolly in texture nor clog the teeth of the saw, and it should be firm and bright with a silky texture when planed. A wood having a disagreeable smell and a dull chalky appearance, and which gives out a heavy sound when struck, is not a good wood. To mature wood it must be kept constantly dry and free from the influence of damp walls or damp earth. Remember, however good your timber may be, that the best can be destroyed. Allow air to pass all round it; it should be utterly free from resting on walls; all wall timbers should rest on corbels. If your timber does decay there is then no disturbance of the walls.

Mortar, Limes and Cement.—You cannot have sanitary building if the mortar is bad. With bad mortar you get open and decaying joints, and water is allowed to pass through. It has been alleged that bad building is peculiarly a modern achievement, but it may be a cheering refutation of this to be reminded that very early in the Christian era Virtuvius was complaining of bad building.

Mortar is used to bind bricks or stones together, and to give an even bed. We have in ancient buildings, notably in Greek work, some fine examples where no cementing material is used. The stones are large and so nicely fitted that none is needed.

What is our mortar to be composed of? Well-slacked lime and clean sharp sand in the proportion of one to three. The sand must be free from salt; salt attracts and holds water, and if present in the mortar, water would pass from the outer to the inner surface, and you cannot keep it back.

Where you have to build in damp and wet soils, no doubt Portland cement is the best to use. Roman cement sets quicker, but has not the same power of sustaining weight.

Bond.—English bond should always be used unless you want prettiness of effect. English bond is alternate courses of headers and stretchers, and is invariably used for warehouses and all structures where strength is necessary. Bond is of the utmost importance. The lowest course must be properly laid. The first course governs the whole building, even if it is 80 feet high. Bond is a breaking of joint on the face of the wall and in the thickness of the wall throughout. We break it by a smaller brick called a closer. Never put closer next stretcher; always put it next to header; the smaller size of the closer is not then so prominent.

Flemish bond is alternate header and stretcher, and is certainly prettier, but it is not so strong, and it lends itself to the abominable practice of using bats, which are not always half-bricks, but any part of a brick.

Bricks must be of such a size that two headers, with the joint, equal one stretcher. It sometimes occurs on a building that bricks become short; you may be sent to the center brick-fields to obtain more. If so, it is well to take one of the bricks used on the building with you, otherwise you may not get them exactly the same size, and your building may show an unpleasant break in its lines which will always be a source of worry. Take three bricks; lay one as stretcher; then see if two laid as headers just leave room for the mortar joint.

A perfect wall should be so thick as to prevent damp penetrating. Dampness may arise from the bottom. This is prevented by a damp-course. Various methods are employed—asphalt, tar and lime, slate, or hollow stoneware blocks. Asphalt is best. In the event of a settlement it is not easily broken.

Damp from above is prevented by brick on edge or in the form of a ridge, or in what is known as the saddle-back form (the best), or by a plain stone covering or a stone having a feather edge. Damp is prevented from passing through in some cases by means of hollow walls. It does not matter what quantity of water goes into the outer wall as long as you keep it from the inner. It is necessary to provide means for carrying off water at the bottom of the hollow part of a wall and ventilating openings at the top. Formerly the inner portion of a wall might be of less thickness; now the law requires the inner portion of a wall must be the same thickness as if there were no outer wall forming with it a hollow wall. This makes it improbable that many will use it. As an alternative, 1 inch of asphalt can be put against the wall.

After referring to diagram showing the pitch generally used for the various roofing materials and referring the students to the by-laws on plasterer's work, the lecturer said a roof is best described by a bow and a string. The tie beam is the string: the timbers form the bow. Set your lines out within this form. It is a mistake to think it is held up by the king post. The roof is really held up by the tie beam.

Lastly, in all construction, if you have two methods given you, take that which has the simplest parts. Test for yourselves everything you hear. Never rashly adopt new inventions. A new invention probably solves one special need, and in doing so gives you several others to solve. Take as example the old wash-out closet. Every sanitary authority praised and recommended it. Now, it is not permitted anywhere.

TORONTO BUILDERS' EXCHANGE.

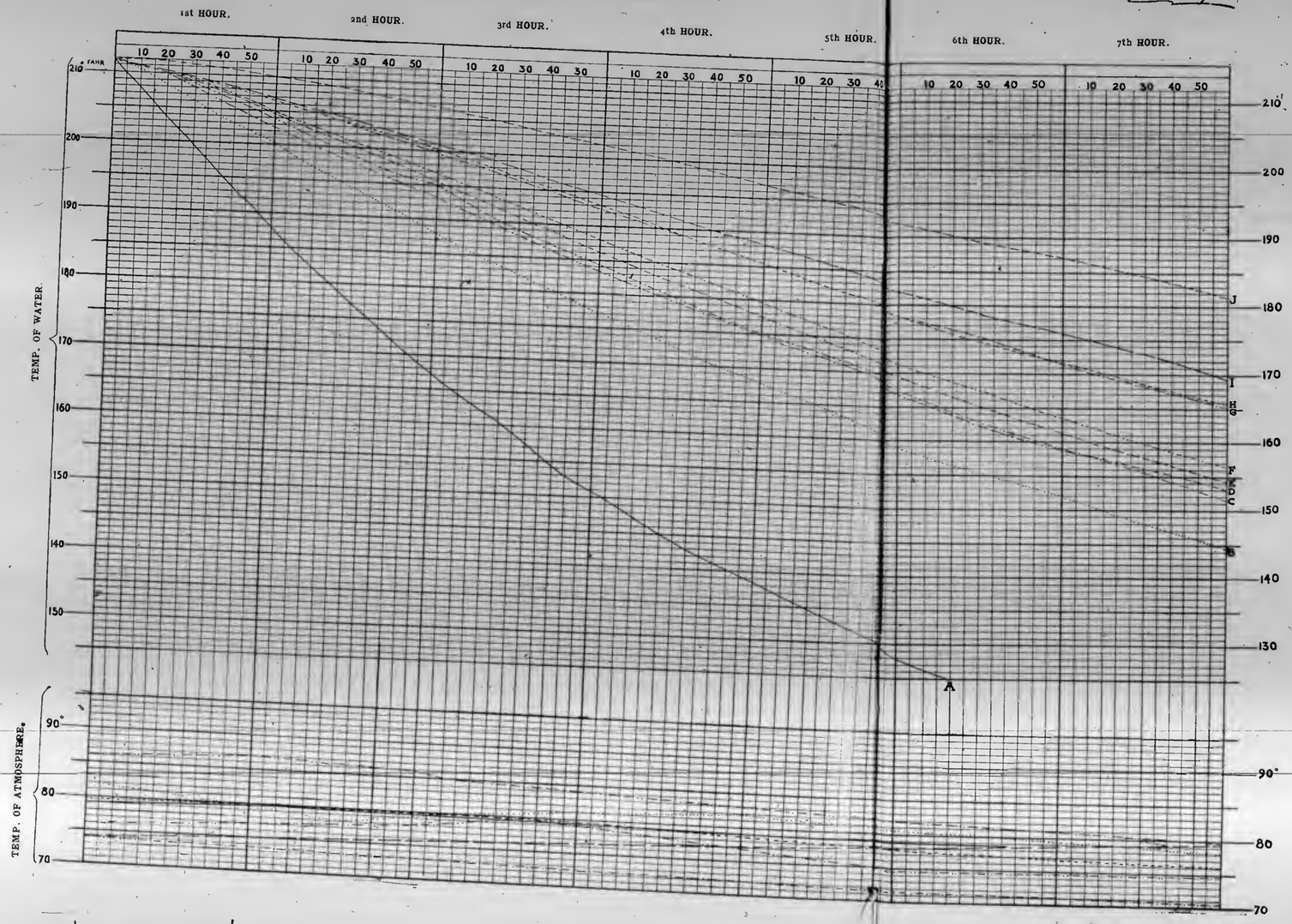
The annual excursion of the members of the Toronto Builders' Exchange and their friends will take place, as usual, to Wilson Park, N. Y., per steamer Tymon, on the 11th of July. This excursion has in past years proven to be a most enjoyable one, and, if the weather should prove favorable, those who may take part in the event this year are assured of a pleasant outing. As usual, an attractive list of athletic sports will be a feature of the programme.

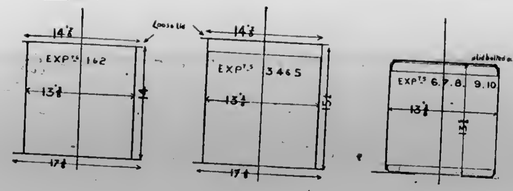
CANADIAN PACIFIC RAILWAY

MECHANICAL DEPARTMENT

DIAGRAM OF EXPERIMENTS WITH BOILER COVERINGS.

(Reproduced from Canadian Pacific Railway Company's Chart.)





The order in which the experiments were made, and the materials tested were as follows :—

1st Expt. Tank uncovered.....

2nd " " with air-space of ⅞ in. next tank, wood lagging ⅜ in. thick, and outer coat of Russian iron ..... H

3rd " " same as in 2nd Expt., but with Asbestos woven cloth ¼ in. thick, inserted in the ⅞ in. space, and placed next tank..... I

4th " " covered with Plastic Asbestos Compound, and outer coat Russian iron Comp. 1½ in. thick ..... J

5th " " covered with Sectional Magnesia Blocks, and outer coat Russian iron Comp. 1½ in. thick ..... G

6th Expt. Tank covered with Patent Mineral Composition, and outer coat Russian iron Comp. 1½ in. thick..... C

7th " " covered with Plastic Asbestos, taken off C. P. R. Boilers, and outer coat Russian iron Comp. 1½ in. thick.. ..... B

8th " " with air-space of 1⅜ in. next tank, air-tight iron coat 1/16 in. full thick and outer coat Russian iron Comp. 1½ thick ..... E

9th " " covered with Patent Mineral Composition...Comp. 1½ in. thick F

10th " " " Mica Boiler Covering..... " 1½ " J

The position of the various coverings on the chart may be found by the corresponding letters.

CANADIAN PACIFIC RAILWAY APR 17 1895 MECH'L SUPT'S OFFICE

R. A. Kinnear
Mech'l Supt.

EXPERIMENTS WITH BOILER COVERINGS.

The accompanying chart is a reproduction of a diagram of experiments with boiler coverings made by the Canadian Pacific Railway Co. to test the values of various compounds as non-conductors of heat.

It will be seen that water at 212° was used, the relative value of the coverings as non-conductors being determined by the number of degrees of heat which escaped through the different substances and the consequent cooling of the water in a given time. A reference to the chart shows that ten experiments were made. It will not be necessary, however, to refer to all of them, as the results of some were so unimportant, as in experiments 4, 6 and 9, as to render them of little interest or value. It is only necessary to say that the trials were made under as nearly similar conditions as possible, as will be seen by the diagram of the atmospheric temperatures during the tests. The readings were taken from thermometers passed through the coverings and down into the body of the water.

The chart shows the loss of heat in the uncovered tank up to the 5th hour only, and to make a fair comparison the others should be taken for same time. The temperature at beginning of each test was 212°, and the following table shows the temperature at end of fifth hour, the loss in five hours, and the loss in the fifth hour :—

	Loss in 5 hours.	Temp. at end of 5th hour.	Loss in 5th hour
Bare tank	84°	128°	11°
Asbestos compound	53°	159°	9°
Sectional magnesia blocks	33¾	178¼	7°
Wood lagging and air space	"	"	"
Asbestos and wood	30°	182°	6°
Mica	20°	192°	5°

The mean temperature of the surrounding atmosphere during the 5th hour may be taken as having been 78°.

The fairest comparison of the merits of the coverings is made by considering the loss of heat in one hour per degree of difference of temperature between the tank and its surrounding atmosphere.

The following table shows this worked out :—

	Mean temp. during 5th hour.	Difference between tank and atmosphere.	Loss in 5th hour.	Loss in 5th hour per degree of difference of temperature.
Bare tank	133½°	55½°	11°	.198
Asbestos comp	103½°	85½°	9°	.105
Sectional Magnesia blocks	181¼	103¾°	7	.0674
Wood lagging and air space	181¼	103¾	7	.0674
Asbestos and wood	185	107	6	.056
Mica	194½°	116½°	5°	.0428

The following table shows the value of the coverings as compared with the bare tank.

Amount of heat which escapes from the bare tank was
1.88 times greater than through the Asbestos compound.
2.92 " " " " " Sectional Magnesia Blocks.
2.92 " " " " " Wood lagging and air space.
3.53 " " " " " Asbestos and wood.
4.62 " " " " " Mica.

Mica shows by far the best result as a non-conductor of heat, and saved
245 per cent as much heat as the Asbestos compound.
157 " " " " Sectional Magnesia blocks.
157 " " " " Wood lagging and air space.
139 " " " " Asbestos and wood.

It will be seen from the diagram that the loss by radiation through "sectional magnesia blocks" and "wood and air space" was practically the same, there being less than ½° Fht. between them at the expiration of the test.

It will be seen that asbestos cement, which is in very

general use, particularly on marine boilers, showed infinitely the worst results. There seems no room for doubt that this is largely attributable to the fact that it is a solid composition, and lacks one of the most vital requirements of successful non-conductivity, i. e., "diffused air." That the air must be diffused or separated into minute cells is strikingly illustrated in experiments 2 and 3. In the first, wood and air space of ⅞ inch next to the tank, as used on locomotive boilers, the loss per degree of difference of temperature was .0674°. When the same air space was filled or packed with asbestos fibre the loss dropped to .056°. In the case of mica, the air theory appears to have been carried to the furthest possible extent, the whole covering forming a veritable air cushion, each leaf or film of mica being separated from the next by minute corrugations, the whole mat presenting the appearance of a porous flexible quilt. The value of this ingenious arrangement was amply proved in the experiments in question, when the loss per degree in difference of temperature was only .0428°. That this is one of the most important qualities of a covering has long been recognized, and a large number of patents have been granted for devices intended to obtain it. But in nearly every instance it has been at the expense of the material. The great differences in the value of the coverings tested by the C.P.R. is due largely to the manner in which the valuable properties of diffused air as a non-conductor have been utilized.

The following table will give some idea of what the loss of power has been found to be from uncovered steam-pipes with the steam at 75 lb. gauge pressure: —

2 inch pipe	.	1	horse power loss for every	132	feet	long.	
4	"	1	"	"	"	75	"
6	"	1	"	"	"	46	"
8	"	1	"	"	"	40	"
12	"	1	"	"	"	26	"

About 90 per cent. of this waste is easily prevented by a proper covering of the pipes. When it is considered that this loss occurs at the comparatively low pressure of 75 lbs., it is apparent that with steam at 130 lbs. and 140 lbs. and higher, the loss becomes very serious, and the necessity for preventing as much of it as possible is a matter of urgent importance.

The accompanying diagram very clearly demonstrates what can be done in this direction by the use of various compositions, as it clearly shows the qualities and capabilities of each. It is possible that the question might arise as to whether the great differences between these substances would still be found had the trials of the C. P. R. Company been made with higher temperature than 212°.

It appears, however, from published reports of trials made some months ago by the engineers of the Boiler Inspection and Insurance Company of Canada that these differences did exist; that company subsequently issued a special circular on the whole matter, as one of particular interest to steam users. It is stated further that the Grand Trunk Railway Company have lately concluded a series of trials, on a large scale and under high steam pressure, of a number of boiler coverings, including the best of those tested by the C.P.R. and the Boiler Inspection Company, the difference between them being even more marked. As no data, however, is as yet available of these trials, it is impossible to speak of them with accuracy. It is encouraging to notice the increasing attention the whole subject is receiving, in view of the imperative necessity for observing the strictest economy in power and coal and the prevention of all unnecessary waste.

CONCRETE FLOORS.

The most complete set of experiments upon the transverse strength of concrete, writes Mr. Geo. H. Blagrove in the Contract Journal, appear to be those of Mr. A. Fairlie Bruce, previously referred to. Mr. Bruce used bars 30 in. long by 4 in. square, broken by central pressure over a 27 in. span, and after some 300 tests he sought to obtain a modulus of rupture, f, by which the transverse resistance of concrete bars or slabs might be calculated. This modulus is to be used in connection with the ordinary formulæ, so that if d = the depth of the bar or slab, I = the moment of inertia, and M = the moment of resistance, then $M = \frac{2f}{d} I$.

The proportions of ingredients used varied from 5 to 1 to 12 to 1, and the age of the concrete varied from one week to half a year. Excluding instances where the materials were known to be defective, a few examples of the value of f may be cited. With 3 parts of broken sandstone and 2 parts crushed fine instead of sand to 1 of cement, we have f = 95 at one week, and 222 at four weeks. With the same proportions, but with red sandstone and pit sand, we have f = 30 at four weeks and only 228 at 39 weeks. Again, with 6 of sandstone and 2½ of pit sand to 1 of cement, we have f = 73 at four weeks; and generally with proportions of about 8 to 1 of cement, the value of f at four weeks varies from 57 to 166. These variations of strength cannot be directly traced to the nature of the materials used. For instance, with 5 of broken whinstone, 1 of the same crushed, and 2 of sandstone crushed—a total of 8 to 1 of cement—we have f = 58 at four weeks; and with 5 of the same aggregate and 2½ of crushed whinstone—a total of 7½ to 1—we find f = 166, or about 186 per cent. more. For purposes of comparison, Mr. Bruce calculated values of f from the results of Mr. Hutton's and Mr. Kyle's experiments. With proportions respectively of 8 and 9 to 1 of cement, we have f varying from 51·7 to 183·8 at 12 weeks, and from 102·2 to 316 at 20 weeks.

All Mr. Bruce's experiments show that there is a very great increase of strength with increased age, the value of f at one month being often doubled, and sometimes more than trebled, after six months. For examples of the transverse srength of concrete at greater ages, we would refer to experiments by Mr. Robert Moore, described in his paper on "Merchants' Bridge Terminal Railway."* Mr. Moore experimented with concrete composed with 6 parts of broken limestone and 3 of river sand to 1 of cement, made into bars 30 in. long and 9 in. square, buried for periods of eight, nine, ten, and eleven months respectively, and then dug up and broken by central pressure over a 27 in. span. The breaking weights varied from 6,030 lbs. to 8,030 lbs., and the values of f which we deduce from these results vary from 335 to 446.

Mr. Bruce has employed a formula for calculating the growth of strength in concrete, the data for which are of course deduced from experiments. Sometimes the calculated and observed values of f agree fairly well, but in many cases there are startling discrepancies. For instance, with concrete made with 5 parts of whinstone

* See Transactions Amer. Soc. C. E., vol. xxxi., 1894.

and 3 of pit sand, we have the calculated value of f at eight weeks = 104, and the observed value = 63; then with the same concrete we have the calculated value at 26 weeks = 141, and the observed value = 204. Such variations in results should suffice to shake our confidence in calculations of this kind.

PRACTICAL RULES FOR TRANSVERSE STRENGTH.

There is often some considerable difference between the quality of work specially prepared for purposes of experiment and that which is executed in large quantities with only a general supervision, which cannot take note of every possible source of weakness due to imperfections of workmanship. Bearing this in mind, it would be rash to assume that the degrees of strength revealed in the experiments to which we have referred can be expected to apply in general practice when the conditions are nominally the same. Two things must, therefore, be done in selecting values of f for practical use. First, the lowest values revealed in the experiments must be taken, because there is no certainty that the strength will rise above these in any given case. The custom followed by some writers of taking the average results of experiments is one that may lead to serious error. Next, a deduction must be made from these lowest values to allow for the difference in quality between ordinary work and samples made for testing.

It is probable that large slabs of concrete would show a higher proportionate degree of strength than the isolated bars used in the experiments, since these latter are devoid of that lateral support which any section of a slab derives from the contiguous portions; and this is a consideration that must influence us in fixing values of f for adoption in practice. Looking generally at the records of the experiments mentioned, and proceeding upon the assumption that our concrete is to consist of about 3 or 4 parts of coarse aggregate and 2 parts of sand to 1 of cement, we suggest the following values for f:

With concrete	1	week	old	f =	30
" "	4	"	"	f =	58
" "	8	"	"	f =	100
" "	12	"	"	f =	140
" "	6	months	"	f =	200
" "	1	year	"	f =	300

These are rough approximate values, and it is pretty evident that any attempt at closer accuracy would be useless. The following table shows the strength of concrete floors for various spans, calculated according to the above figures:

CALCULATED STRENGTH OF FLAT CONCRETE FLOORS.

Thickness in inches.	Span, in inches.	Breaking weight distributed in pounds per square foot for concrete of the undermentioned ages.					
		1 week.	4 weeks.	8 weeks.	12 weeks.	26 weeks.	52 weeks.
4	24	160	309	532	744	1,065	1,597
5	30	160	309	532	744	1,065	1,597
6	30	228	444	766	1,071	1,533	2,300
6	36	160	309	532	764	1,065	1,597
7	36	216	420	724	1,014	1,449	2,173
8	36	282	549	946	1,323	1,893	2,840
8	40	228	444	766	1,071	1,533	2,300
8	48	160	309	532	744	1,065	1,597
9	48	201	390	675	945	1,350	2,025
9	54	156	303	526	735	1,053	1,580
9	60	130	249	432	603	864	1,296

The safe load should under no circumstances exceed one-third of the breaking weight, and one-quarter or one-fifth is preferable for moving loads.

LONDON MASTER PLUMBERS' BANQUET.

The Master Plumbers' Association of London, Ont., celebrated its inauguration on the 19th of May by a banquet at the Grigg House, at which about fifty persons were present. There were noticed, among others, Mr. Stephens, J. Haslett, jun., Mr. Allen, James Haslett, sen., W. Skelly, jun., Wm. Joanes, John Law, C. W. Walker, Robert H. Geldart, Armon W. Irwin, G. Craddock, Herbert Mathews, Wm. Smith, Wm. Skelly, sen., Frank Bickley, Chas. Williamson, Thos. L. Partridge, E. Holland, A. Millan, C. Needham and Mr. Coleman, all of London. The guests from outside places were President W. J. Burroughes, vice-president Alex Fiddes, and Messrs. Andrew Mann and William Mansell, of the Toronto Master Plumbers' Association, and Mr. Flaherty, of St. Thomas. The city was represented by Ald. Skinner, Dr. Hutchison, Medical Health Officer, and Ald. Armstrong.

An efficient chairman was found in the person of the president, Mr. R. J. Haslett.

After the menu had received proper attention, the President made his opening remarks and proposed the toast of "The Queen," which was followed by that of "The Governor-General" and "Canada, Our Home," all of which were fittingly responded to.

The toast of "The Mayor and Corporation of London" was replied to by Ald. Skinner and Armstrong, who urged the necessity of sanitary improvement.

The other toasts were: "Master Plumbers' Association," responded to by Messrs. Burroughes, Mansell, Smith and Fiddes; "Board of Health," acknowledged by Dr. Hutchison and Ald. Skinner; "The Manufacturers and Wholesale Supply Men," which brought responses from Messrs. Mann, Allen, Stephens and Coleman; and "Our Guests," to which was coupled the names of Messrs. Matthews and Craddock.

The members of the Association were well pleased with the success of their initiatory dinner, which it is hoped will become an annual affair. The local officers are:—President, R. J. Haslett; Vice-President, W. Smith; Second Vice-President, W. Skelly; Treasurer, T. Partridge; Secretary, W. Skelly, jr.; Master at-Arms, C. W. Walker. Members: J. R. Haslett, C. Needham, A. Milne, W. H. Heard, F. Bickley and E. Holland.

The Association is making arrangements for the appointment of an inspector of plumbing.

The cubical outline gives the most volume and floor space for a given amount of material and expense. A floor 30x30 gives 900 square feet of area to 120 feet of wall; the same amount of wall arranged in an ell of 30x30x15 give only three-fourths as much area, or 675 square feet. The cubical form can be worked up artistically by giving grouped windows, and by making the eaves, chimneys and roof bold and striking.

Brick walls should be well bonded. The "English bond," in which courses of headers alternate with courses of stretchers, is probably the strongest. Tarred bricks soon blister and wash, and mortar does not take hold of them. Rough bricks, if laid with red or black mortar joists, are very picturesque. Stone trimmings for red brick walls should be of some warm color, as brown, red, buff or green. Terra cotta makes admirable trimmings for brick walls. The foundation stones should lie on their "natural beds," and they will be stronger therefor.

REVISED ENGLISH WORKING RULES.

The following revised working rules for bricklayers, approved by the Association of Master Builders and the Operative Bricklayers' Society of London, Eng., will doubtless be of interest to Canadian master builders :

There are to be fifty working hours during forty weeks, forty-seven hours during six weeks and forty-four hours during six weeks. Overtime when worked at the request of employers, but not otherwise, shall be paid at the following rates, namely, from leaving-off time until 8 p. m., time and a quarter ; from 8 p. m. to 10 p.m., time and a half ; after 10 p. m., double time. No overtime shall be reckoned until each full day has been made, except where time is lost by stress of weather. On Saturday the pay for overtime, from noon to 4 p. m., shall be time and a half, and after 4 p. m., and Sunday, double time. Christmas Day shall be paid for the same as Sunday. Workmen engaged on a night gang shall be paid one penny per hour in addition to the ordinary rate of wages. One hour's notice to be given or one hour's time be paid by either side, on determining an engagement. All wages due to be paid at the expiration of such notice, or walking time if sent to yard. In the event of more than 10 per cent. of the workmen of the trade employed at the job giving notice to leave during any one day (except Saturday), they are not to be entitled to receive their money until noon on the following day. Men who are sent from the shop or job, including those engaged in London and sent to the country, are to be allowed as expenses 6d. per day for any distance over six miles from the shop or job, exclusive of travelling expenses, time occupied in travelling and lodging money. Payment of wages is to commence at noon or as soon thereafter as practicable on Saturday, and be paid on the job. But if otherwise arranged, walking time at the rate of three miles per hour to be allowed to get to the pay-table at twelve noon. Employers are to provide where practicable and reasonable a suitable place for the workmen to have their meals on the works, with a laborer to assist in preparing them. Wages earned after leaving-off time on Friday and Saturday only shall be kept in hand as back time. If application be made to any employer by the central committee of the Operative Bricklayers' Society to discharge any workman on the ground that such workman is obnoxious, and the employer refuses to accede, no strike shall be sanctioned, but the question shall be referred to the decision of the Board of Conciliation. But no such application shall be made in consequence of such workman belong or not belonging to any trade society. Six months' notice on either side shall terminate the foregoing rules.

Small Leaks.

Much of the loss suffered on contracts is due frequently to the carelessness of the foreman of works or to the men employed in not taking proper care of the materials left in their charge previous to their being put in place. In the loading and unloading of bricks many dollars may be lost or saved by handling. A careful handler will gather up the bricks with due attention and place them in piles without making unsaleable "bats" of an undue percentage of them, whereas a careless man will destroy in a day, while handling and piling bricks, more than would pay his day's wages, and this loss, on a building containing two or three hundred thousands of bricks, would make serious inroads in the profit percentage. When bricks are to be stacked up before being laid in the wall, a good solid and level foundation should be prepared, and laid over with rough plank or boards, and the bricks should then be placed on the boards in regular courses "headers and stretchers," breaking joints as though placed in the wall. By this means the pile or stack will be made solid and insured against falling. It is a good plan to scatter a thin layer of straw on every fourth or fifth course ; it has a tendency to keep the courses even and prevent them crushing the lower courses, and the straw also acts as a bond and ties the stack together.

Care of Lumber.

Perhaps the biggest "leak" in a contract will be found in the lumber bill. From experience we know that a much larger percentage of loss usually occurs in the construction of a building than is generally provided for, and this loss is not due to actual and necessary waste, but rather to bad calculation and careless handling. Finished stuff, such as flooring, wainscotting, base mouldings and door and window trimmings, are carted to the building, thrown down carelessly into a hall room, or perhaps left outside, and for hours, and sometimes days or weeks, is tramped over by the workmen before being used, or as is often the case, left outside of the building, or some place where it is exposed to the weather and rendered unfit to work. The trampling over splits, breaks, fills with sand or disfigures a lot of good material, either rendering it unfit for use or making it necessary to expend a lot of work upon it to make it serve its purpose, all of which could be avoided if proper care was taken in "housing" the material the moment it arrives at the works. Trimmings, doors, mouldings, wainscottings and ornamental wood-work of any sort, ought never to go into a building until all the walls have been plastered complete, and thoroughly dry. The practice of trimming doors and windows immediately after the "putty coat" is applied to the walls cannot be too much deprecated. The custom is an evil one and often causes a great deal of trouble in both doors and windows, as the "trim" by expansion is apt to crowd the jambs, causing the sashes to bind and stick, and forcing the door jambs out of shape, causing trouble with the locks and often leaving a defect that can never be remedied. Where time is an important factor, it may be permissible to "put" down base, or even to plant "matched" wainscot, but neither time nor conditions should force the contractor to put on his trimming while the plaster is yet damp, if he values his reputation as a good and careful workman.

Concerning Floors.

In the matter of floors contractors may add to their profits or increase their losses more rapidly than in any other class of work about a building. A careful workman will see that his joists are properly sized before being placed on the wall, and that the "crowning edge" is above, and he will endeavour when "bridging" to give all his joists a crowning edge and have them all on one plane so that his flooring will touch each joist without being forced down or sprung. This is an important matter, inasmuch as if the joists are at irregular heights, it will cause a great deal of trouble in laying the floor and result in a big loss of time, which is loss of money. In driving flooring together some care should be taken, and the tongues of the boards should not unnecessarily be broken off or "mashed" in driving the stuff together. If any difficulty arises in getting down the floor on account of the machine work, the flooring should be discarded at once, as it is the height of folly to wrestle with a lot of badly matched flooring. It will pay two or three times over to have the stuff run through the machine again than to fool away time in trying to make a good job with impossible materials. Well matched flooring should "lay down" with ease and the edge joints should be invisible. In tongue or blind nailing there is no necessity for breaking the tongue where each nail is driven, neither is there any necessity for the mark of the hammer to be seen wherever there is a nail. A man who will persistently leave "his X mark," engraved with a claw-hammer, on every joint of flooring, should be taken from the work at once and given something to do more suitable to his capacity. By a proper cutting of lengths, from 5 to 15 per cent. of the material may be saved, and the shrewd workman, who has the interest of his employer at heart, will always manage the disposition of his "butt joints" so as to have a minimum of waste. When a man fills a room with sheet ends of flooring while laying, he may be put down as an extravagant floor layer. It may be he can lay more surface in a day than another man who does not have so many butt ends, but as a matter of fact, the man who puts down the lesser surface of floor and makes less waste, is often the more profitable man for the contractor. The slasher and rusher who gets in a lot of work each day at an extra waste of material, is profitable only to those who use kindling wood.

Lime and Mortar.

In country places where lime has to be hauled a long distance, proper provision should be made for its preservation when it arrives at the works. In a damp atmosphere a cartage of ten or twelve miles may cause a load of lime to be partly slaked before it reaches its destination, and in cases of that kind, it would be better when possible, to run it in the bed at once and finish the slaking ; then nearly the full virtue of the lime may be captured. When this can not be done the lime should be put in a dry place and used as soon as possible. Lime should never be stored in a cellar or in any place where it is damp, as it will lose half its virtue in a very short time in such a place, and the mortar made with it will never give satisfaction. Good live sand is a necessary requisite for making good mortar, and the contractor should see to it that such is furnished to the plasterer. Dead sand, while easy to work, never makes a good job, and mortar made with it soon rots and crumbles away from the wall. It is the silica in the sand that combines with the lime, that forms the hard solid mortar we find on some of our old houses. Good long hair that has been washed, should be used in the mortar in proper proportions to insure good work. Plasterers, as a rule, stint the hair in their mortar as a matter of economy, but this is wrong, and in a measure dishonest. To insure good and lasting work, the mortar should not be used until it has been made at least ten days. It will be better to stand fourteen days if conditions will permit. The best results in plaster work are obtained with well made mortar that has been made one month or more before being used.

Much carelessness, and consequently much loss, are connected with the piling up of rough lumber preparatory to being used in a building. We have frequently seen joists, studding, rafters, roof-boarding and rough sheeting, thrown off a wagon or sleigh pell-mell without any attempt made to prevent the breaking, splitting or warping, and left in an open pile, exposed to the weather, and perhaps in such a position that it would be trampled over by the workmen or others. The breaking of a joist, a stud or a rafter, or the splitting of a board, or the warping or twisting of any of them out of shape, is loss that will be felt at the wind-up of the work, and the multiplication of these breaks, splits and twists, often make invisible gaps in the profits, and the shrewd contractor will insist on having all his stuff properly and carefully piled in the grounds, and covered with rough boards to keep out the weather, or will otherwise protect his materials. More money is made by giving prompt attention to little matters of this sort, than in "rushing" the work in undue haste. A careful workman must have time to make good work, and a careful workman will, as a rule, save to his employer in material whatever it costs in extra time to do the work ; besides producing work that brings honor to employer and workman.

No good house, frame, brick or stone, should be without one or two fire-places in it, and in the country villages and towns, where the contractor has much to do with designing the house, he should make it a point to impress on the owner the importance of having open fire-places of some sort in the house. When only one of these can be in the house, it should be in the dining-room, as that is the room where the family will be the most of the time they are in the house together. If two or more fire-places can be placed in the house, then one should be in the dining-room, one in the parlor, and a third in the bed-room that is oftenest occupied. If the fire-place is intended for wood altogether, it may be built without a grate, as fire-dogs or andirons may be used on a thick cement or brick hearth. It would be better, however, to build in grates in all the fire-places, as then the opening would be less, and the chimney draught could be better regulated. A good English grate, with tile facings, can be purchased for $15 or $16, and it can be made to do good service with wood as well as with coal. Of course, in our Canadian climate, open fire-places can not be depended on for heating during midwinter, but in spring and fall, when stoves are taken down, or heating by steam, hot-water or hot-air, is discontinued, they do the work effectually. They also act as health preservers, as no device yet put in practice in domestic architecture, can equal the open grate as a mode of ventilation. Where cost is not a great obsticle, it would be better to have an open fire-place in the dining-room without grate, having a "basket" in place. These baskets cost about as much as an English grate—perhaps a little more if damper, etc., are included. And the fire-place will require a little more work to make it suited to the basket. The whole chimney heart may be of exposed brick work. The upper portion above the shelf may drop back four inches, and a neat plain cornice may project from the heart under the shelf, forming a finish, with the shelf (which should be of hardwood) of a mantel. The skilful bricklayer should be able to make a handsome brick mantel if he picks his stock, rubs their faces, lays in fine mortar, and lines up his joints. In a mantel of this kind there is a big opportunity for the bricklayer to display his skill. This makes a mantel without wood, save and excepting the shelf, which may or may not have a moulded edge to suit the brickwork.

TRUTH IN ARCHITECTURE.

By W. E. Doran, Architect, Montreal.
(Concluded from May Number.)

There is no such thing as human perfection, yet the law says his work must be perfect—not only his own work, but he is obliged to see that the work of every cheap Jack whom the cupidity of his client obliges him to employ shall be perfect; he must be omniscient; he must know beforehand the nature of every soil, its powers of sustaining weight, the nature of every kind of material used in construction, its power of resistance to strains of every description, to time and to weather, the nature and strength of all cements and mortars, the value of all paints and pigments, he must be proficient in sanitary science, in all manners and fads of heating and ventilation, in all the details of electrical appliances. In a word, he must be master of all the arts and sciences to a certain extent, and then his powers of observation must be limitless; he must foresee against all possible flaws in materials, all willful or unintentional delinquencies on the part of builders; as a consequence he is not profound, his knowledge is encyclopedic and smattering—he can belong to no particular school; in fact we can hardly recognize any such thing as a school in architecture to-day.

Again national characteristics have almost ceased to exist. In the olden times, when travel was rare, national characteristics were developed by isolation from the rest of the world; a pupil followed exactly in his master's footsteps and improved thereon as far as in him lay. If he did travel, what he sought was to improve his own knowledge, and to graft on his own style anything his taste would find congenial to it, not for the introduction of absolutely new and startling effects. He worked in supreme disdain of the multitude; to-day he must please the popular fancy, he must show himself original, even if he must copy from semi-barbarians to appear so.

The multiplication of the process of illustrations also makes us familiar with the work of the world, hence the almost unconscious plagiarism exhibited by the architects of the world, mutually borrowing from each other until we hardly know which is original—at least it looks as if there was a common stock of ideas and designs the only really original productions of this age being crystal palaces and the tall office buildings, and perhaps I should add the great hotels and the plutocrats' dwellings. When I speak of crystal palaces I include as such the large retail stores the skeletons which frame the plate glass that displays the wealth of merchandise. These necessitated metal construction, and the progress seemed fair enough till greed and the desire to make the most use of land regardless of the right of neighbors to light and air called into existence the monstrosities of seventeen and twenty stories, now promising to reach out to thirty. Dryden, writing of the column of London, said, "like a tall bully it lifts its head and lies." Now this was a libel on the column; it was the inscription which was at fault; but it can be truly said of the modern building that it is in itself a series of lies—the very perspective which the architect makes is taken from a point about half way up. They surely do not imagine the spectator is going on the roof of a moderate sized building or to hang on to one of the cornices of a sister monstrosity in order to view the building. Lie No. 1. Again, the eyes sees piers of brickwork extending skywards ostensibly to support the building which we instinctively know could not support its own weight; we are told the skeleton construction inside of this is all right, the steel work supports the pier, the pier protects the steel and the whole is fireproof. Lie No. 2. Lie No. 3. The whole frame work depends, for retaining its perpendicular upon being tied together in all its parts. The destruction of a few rivets may mean the toppling over of the whole mass. It is a construction requiring, as in bridges, care and supervision, and sometimes renewal of parts, which, enclosed with brick and cement, it can not have. Liable to corrosion, the damp of water services and waste pipes everywhere will hasten the inevitable work of time; the multitude of wires for electrical purposes adds the danger of electrolysis. Granting such a building may survive its designer, has any man a right to commit murder on the unborn? Have we a right to build to-day that which in after years will probably collapse without warning.

It is true that when we build we are not bound to insure permanency, but we are bound in the name of humanity and morality to build in such a way that our structures shall give timely warning of their decay. Truth requires it. I do not wish to be understood as decrying the use of iron and steel in buildings, but what I do advocate is that this construction be tested by the principles of truth, and that the material be protected by coating with copper or other metals which if it cannot prevent decay, will at least retard it, and further will leave any defects that may come, and, which inevitably do appear in all human work, visible to those who might suffer therefrom. There is no such thing as simplicity. This use of exposed iron or steel would therefore lead to an architecture special to itself, and proportions suitable to such construction.

The other two forms of construction, the grand hotel, and the private mansion of the wealthy man, naturally seek the renaissance in their outward form of expression. The renaissance affords the best opportunity of doing this; it lends itself readily, and is universally, and I think rightly, so employed.

Will architecture emancipate itself from these conditions and how? It will take its proper place in modern history when architects adopt modern methods, and the most prominent of these is specialism. In any part specialism is founded upon the principles of its professors being themselves truthful, that is being prepared to admit that while having some knowledge of all the branches of their art or profession, they excel in one or possibly more than one, at all events in a limited number only, and that while claiming pre-eminence in these only, they will call in the aid and assistance of others in relation to branches for which they have neither the inclination nor the time to devote themselves so fully—and these others in their turn would in a similar way consult the former on their specialties and profit by their advice and assistance. Unless a movement of this kind become general it is almost impossible to have it, as naturally A will not consult B on one point if B be not prepared to consult A on another, as this would be an admission of inferiority on A's part; neither will A and B be prepared to openly consult each other whilst C D E and all others pretend to universal knowledge, and the public, their clients, believe them. The first step must be the formation of partnerships, each member of the firm having his particular forte and confining his attention to it.

This will educate the public to the necessity for specialism in architecture as well as in medicine. In the meantime what can individual architects do towards improving the condition of things, and what course can we recommend to our students? Shall we recommend them to neglect all branches except the one they feel they excel in. By no means, but what I should recommend is that while following the general practice of the all round man in its most useful and ordinary branches, they should develop some point in which they know they can and will excel, for the day of the specialist is coming, and soon the all round man will be regarded as a quack. In the meantime every architect, and everyone aspiring to be such, should follow Carlyle's advice, "Avoid shams," and if there is anything in him, produce it.

Of course in cases where circumstances require a certain style to be followed the architect must try and work out his plans so that they will lend themselves as much as possible to it, but when the architect is at liberty in the choice of style it seems to me that the plan should be first developed and studied to a certain extent, and its peculiarities should in a minor degree govern the choice of style, the major consideration being always suitability to the purposes for which the building is intended. If the building be of such a character that no particular style be indicated or required, I think it much preferable to proceed on one's own judgment, and not attempt any labored work when only simplicity is demanded. But if a certain style be chosen, I think the architect should adhere strictly to it as nearly as possible provided he has chosen to follow the period in which that style has reached its zenith.

If, on the contrary, he has chosen an early transitional period, or one in which the style has shown deterioration, he certainly has the same liberty as had the workers of the period which he has chosen to follow in making changes, but these should always tend to bring his work nearer to the best ideal rather than to still further draw it away. While circumstances may sometimes require the use of transitional or debased styles, I think nothing can justify an architect in adopting for the sake of picturesqueness anything that was originally done merely in imitation of better work by men who were ignorant or untrained. On the other hand for the sake of constructive truth, no one should for the sake of strict adherence to style resort to deception.

There is such a thing as conventional truth, and this should never be violated. It makes one shudder to see in an otherwise pleasing building, a long lintel seemingly composed of a number of stones not only hanging in the air, but supporting sometimes an important pier of the superstructure.

Again we see a rounded corner of a building with a lintel which we know could not carry of itself, or a stone bay window corbelled out in seeming violation of all principles of the centre of gravity. How much better would it not be in the first place to show the steel beam with an appropriate treatment and painted to match the stone with a slight difference of shade just to show that it is not pretended to be stone; and secondly, what an improvement an oblique arch would be whilst in the last no amount of tieing in with steel work to the interior construction can justify the unnatural projection in the front.

Speaking of truth naturally raises the question, should materials ever be counterfeited, i.e., should an inferior material be made to look like a superior one? I would say, yes, but it must be conventionally true, that is the richer material if preferable must be such as would naturally be in that place; for instance, I see no objection to marbling a column, providing you do not make a monolith such as is not to be found in the world, or if found, could not be quarried, and provided again that a marble column itself would be suitable in the position of the imitation one. We must remember that art is the imitation of nature, and all that is required of it is that it be conventionally true, but a flimsy material should never be placed instead of a solid one where the solid one only would suit; how ridiculous a tin battlement looks on a house. In the first place a street front in the castellated style is out of place; although the law says every man's house is his castle, they are not made to stand a siege of snowballs, about the only use the mock battlements could be put to.

I have touched on some of these details not in a spirit of criticism, but merely to illustrate the fact that in small things as well as great, there is merit in consistency. We cannot always work in great things or in the channels to which our ambition would lead us, but we can take care that what we do shall be conscientiously and carefully done.

MODERN ORNAMENT.

From time to time attempts have been made to develop and foster new schools of ornamentation, and to throw off the tendency to copy older forms and to substitute new and presumably original designs. Although written more than thirty years ago, the following portion of the concluding chapter of Owen Jones' Grammar of Ornament contains much sound thought upon this subject, especially in view of the extending application of Art to household work.

"Although ornament is most properly only an accessory to architecture, and should never be allowed to usurp the place of structural features, or to overload or disguise them, it is in all cases the very soul of architectural monument.

By the ornament of a building, we can judge more truly of the creative power which has been brought to bear upon the work. The general proportions of the building may be good, the mouldings may be more or less accurately copied from the most approved models, but the very instant that ornament is attempted, we see how far the architect is at the same time an artist. It is the best measure of care and refinement bestowed upon the work. To put ornament in the right place is not easy; to render the ornament at the same time a superadded beauty and an expression of the intention of the whole work, is still more difficult.

Unfortunately it has been too much the practice in our time to abandon to hands most unfitted for the task the adornment of the structural features of buildings, and more especially their interior decorations.

The fatal facility of manufacturing ornament which the revived use of acanthus leaf has given, has tended very much to this result, and deadened the creative instinct in artist minds. What could so readily be done by another they have left that other to do; and have so far abdicated their high position, the head and chief.

How, then, is this universal desire for progress to be satisfied—how is any new style of ornament to be invented or developed? Some will say, a new style of architecture must be found, and we should be beginning at the wrong end to commence with ornament.

We do not think so. We have already shown that the desire for works of ornament is coexistent with the earliest attempts of civilization of every people; and that architecture adopts ornament, does not create it.

The chief features of a building which form a style, are first, the means of support; secondly, the means of spanning space between support, and thirdly, the formation of the roof. It is the decoration of these structural features which gives the characteristics of style, and they all follow so naturally one from the other, that the invention of one will command the rest.

It would appear at first sight that the means of varying these structural features had been exhausted, and that we have nothing left but to use one or the other of the systems which have already run their course. Let us not despair; the world has not seen, most assuredly, the last of the architectural systems. If we are now passing through an age of copying, and architecture with us exhibits a want of vitality, the world has passed through similar periods before. From the present chaos there will arise, undoubtedly, (it may not be in our time) an architecture which will be worthy of the high advance which man has made in every other direction towards the possession of the tree of knowledge.

To return to the subject, how is any new style of art or of ornament to be formed, or even attempted to be formed? In the first place, we have little hope that we are destined to see more than the commencement of the change; the architectural profession is at present too much under the influence of past education on the one hand, and too much influenced by an ill-formed public opinion on the other; but the rising generation in both classes are born under happier auspices, and it is to them we look for hope in the future. It is for their use that we have gathered together these works of the past; not that they should be slavishly copied, but that artists should, by an attentive examination of the principles which pervade all the works of the past, and which have excited universal admiration, be led to the creation of new forms equally beautiful.

We believe that if a student in the arts, earnest in his search after knowledge, will only lay aside all temptation to indolence, will examine for himself the works of the past, compare them with the works of nature, bend his mind to a thorough appreciation of the principles which reign in each, he cannot himself fail to be a creator, and to individualize new forms, instead of reproducing the forms of the past. We think it impossible that a student fully impressed with the law of the universal fitness of things in nature, with the wonderful variety of form, yet all arranged around some few fixed laws, the proportionate distribution of areas, the tangential curvature of lines, and the radiation of a parent stem, whatever type he may borrow from nature, if he will dismiss from his mind the desire to imitate it, but will only seek to follow still the path which it so plainly shows him, we doubt not that new forms of beauty will more readily arise under his hand, than can ever follow from a continuation in the prevailing fashion of resting only on the works of the past for present inspiration. It will require but a few minds to give the first impulse: the way once pointed out, others will follow, readily improving, till another culminating point of Art shall be again reached to subside into decline and disorder. For the present, however, we are far enough removed from either stage."

MANUFACTURES AND MATERIALS

GRANITE FOR THE UNITED STATES.

The granite quaries of Messrs Tayte, Meating & Co., at St. george, N. B., from which the red granite is being obtained for the American Museum of Natural History on Manhattan Square, New York, presents an active scene. There have already been shipped 3,500 feet, while other vessels will shortly go forward with further consignments.

Between 55 and 60 men are employed in the quarry getting out the stone and conveying it to the station for shipment. The firm are said to be doing the work which they have in hand in an eminently satisfactory manner. Extra machinery will be put in at once and the output considerably increased. The architect at New York and the port comimssioners have approved of the granite, and it is probable further orders will be placed with the company for the American market.

SLATES AND SLATING.

The best and most substantial roof known to the architects at present is the slate roof, having at least a square pitch. Such a roof weighs considerably more than a shingle roof, and it also costs a little more, but it is many times more durable.

Some technical terms are used in connection with slating. In England names are used to indicate the size of slate. One 10 × 13 inches being known as a double. Smaller slates are called small doubles. The next larger size is known as plantations; the next size is called viscountess. Sizes ranging from 8 × 12 inches to 10 × 16 inches are called ladies; from 10 × 20 inches are called countesses; up to 14 × 24 inches, which are known as princesses. There are slates that run through all the title of nobility, marchioness, duchess, imperial, and then comes what is probably a poor man's slate, under the delicate title of rags. The noble titles are again resumed, and run queens, empresses, and end with princesses.

In American practice the slates run simply by inches, from 7 × 14 up to 17 × 24 inches. The thickness of slates ranges from 0.125 to 0.3215 of an inch, and their weight varies from two to four and a half pounds per square foot. A square of slating is rated as any other roofing equal to 100 square feet, the gauge is the distance between the courses, while lap is counted as the distance which each slate overlaps the slate lengthwise next below but one. Lap varies from two inches to four inches, and a standard lap about three inches. As above stated, a good slate roof should have about square pitch, but slates should never be put upon a roof which pitches less than one foot in four feet. When it is desired to compute the surface of a slate when laid and the number of squares of slating, subtract the lap from the length of a slate, which is taken as distance from nail hole to tail, and one half the remainder will give length of surface exposed; this, when multiplied by width of slate, will give the surface required.

To ascertain the number of slates required for a square, divide 14,400, which is the area of one square in inches, by the surface obtained above, and the quotient will give the number of slates required for one square. For an example, take a slate 12 × 24 inches; taking a standard lap three inches, the number required for a square will be found by subtracting three from twenty-four, equal to twenty-one, and twenty-one divided by two equals ten and a half inches, which, multiplied by twelve, equals 126 inches, 14,400, the total area to be covered, divided by 126, which equals the area of one slate, gives 114.29 slates required for the square.

Slate weighs from 165 pounds to 180 pounds per cubic foot, and in consequence of lap, it requires an average of two and a half square feet of slate to make one inch of slating. When slate 0.125 inch thick is laid on laths, it weighs 4.75 pounds per cubic foot; when the same is laid on one inch boards it weighs 7.75 pounds per cubic foot. Slate 0.1,875 inch thick on laths and boards weighs seven and nine pounds respectively. A 0.25 inch slate weighs 9.15 and 11.25 pounds respectively. The thickest kind, gauging 0.3,210 inch, weighs 11.15 pounds and 14.10 pounds on laths and boards.

A slate roof composed of 6 × 13 inch slate weighs 1,680 pounds per square, and requires 480 slates. A 10 × 20 inch weighs 6,720 pounds, and requires 171 slates per square. A 12 × 24 inch slating requires 125 slates, and weighs 4,480 pounds. Stone.

ROOFING TILES OF WOOD PULP.

One of the latest things in the way of roofing tile is made of wood pulp, the goods being turned out by an enterprising Norwegian firm doing business in Christiania. The roofing material is known as Norway tiles, the pulp under high pressure being formed into thin cakes of sizes similar to ordinary roofing slate. After a chemical treatment, which is the inventor's secret, the tiles become hard like brick, and attain a deep black appearance, which lends itself admirably to give a soft tone to houses with prominent roofs and gables. It is claimed for the Norway tiles that they possess every advantage of the best slate in the market; their composition makes them light and durable, and they are not so liable to breakage as ordinary slate. They are not subject to any expansion or contraction, and when a roof is once covered with this material, it will stand for a good many years without any repairs whatever. Prominent architects in Norway who have had the opportunity to examine the tiles pronounce them superior as to quality, appearance and price, and the insurance companies seem to regard them as a very desirable and safe roofing material.

The town of St. Johns, Que., has granted a bonus of $20,000 to "La Societe Anonyme des Fainciers du Canada," of France. This is the company which has been negotiating for the St. Johns Stone Chinaware Company's potteries, the granting of the bonus practically closing the deal. The terms of the bonus are $2,000 per annum for ten years, conditionally upon the company employing not less than 150 hands for 11 months in the year, with a pay roll of not less than $40,000 a year. It is understood that possession of the property in St. Johns will be taken almost immediately, and that these potteries will shortly be operated on a large scale. The new concern is made up of wealthy and practical men, and their intention is to manufacture, not only ordinary crockery, but a fine class of porcelain ware on a large scale.

The striking carpenters in Buffalo have given information that contractors were importing alien labor from Canada, and the authorities are taking steps to prosecute the offenders.

THE LATE MR. J. B. RESTHER.

The late Jean Baptiste Resther, architect, of Montreal, Que., whose death on the 14th ult., at the age of 66 years, was briefly noted in our May issue, was born in Montreal, July 17th, 1830. He was the son of the late John Ignace Resther, a contractor of that city, and brother of the Rev. Father Resther, of the Jesuit Order. He received his education in the Christian Brothers school and under private tutors. Mr. Resther, after spending a short time as dry goods clerk, commenced with his father as Clerk of Works for the construction of the Bonsecours Market in 1847. In 1849 he left Montreal for St. Hyacinthe, where he was contractor for the college. He subsequently took a contract for the building of all the stations for the G. T. R., from St. Thomas

The Late Mr. J. B. Resther.

down to Riviere du Loup. While in St. Hyacinthe he was for several years a member of the Council. In 1867 he returned to Montreal, and opened an office as architect, arbitrator and valuator, in which profession he had a large practice. He erected a large number of private and public buildings in and around Montreal, the Exhibition Buildings among others. In 1884 Mr. Resther was chosen first vice-president of the St. Jean Baptiste Association, in which he had always taken a deep interest. He was a leading member of the Architects' Association of the Province of Quebec. He was connected with many important cases of arbitration for the government, railway corporations, etc., in which he distinguished himself.

CHIPS.

A consignment of slates of excellent quality has recently been received in England from Canada.

The organization of a master plumbers' association in Hamilton has been effected. The officers are: Wm. Fairley, president; W. J. Walsh, vice-president; Hugh Wallace, secretary; Adam Clarke, treasurer; Wm. Smith, sentinel.

The president of the Carpenters' and Joiners' Union of British North America recently interviewed the Controller of Customs urging the necessity of reducing the duty upon certain tools used by carpenters and joiners. Some special classes of tools cannot be obtained in Canada, and on these purchasers are obliged to pay a large duty.

At a recent meeting of the local Board of Health at Toronto, the Medical Health Officer informed the board that he intended exercising a personal supervision of the inspection of plumbing, and with that end in view he had given instructions that all applications for inspection must be made at the office, and would be attended to in order of priority. He promised that there should not be any delay in the work, and requested that, if there is any, the matter be reported to him at once.

The old lodge at the west corner of Queen street and University avenue, Toronto, the only survival of four similar structures placed at different entrances to the University and Queen's Park, has been demolished within the past fortnight. It was built by Mr. J. G. Howard, architect and civil engineer, in the year 1832. Its companion, formerly situated on the opposite corner, was torn down some 12 years ago. These two lodges were occupied respectively by Mark Fitzpatrick and George Stacey, who acted as caretakers and gatekeepers at the two entrances.

PERSONAL.

Mr. F. H. Herbert, architect, Toronto, has removed to new offices in York Chambers, 9 Toronto street.

Mr. W. H. Carrick, vice-president of the Gurney Foundry Co., of Toronto, sailed on the steamer Umbria for Great Britain.

Mr. R. C. J. Dunn, architect, St. John, N. B., has removed to new quarters in the Vaughan building on Prince William street.

Mr. Joseph Simmons, builder, of London, Ont., is incapacitated from his duties by a sprained wrist, the result of a fall from his waggon.

Mr. Eugene C. Larose, architect, formerly in the employ of Mr. James R. Brown, architect, of Montreal, has taken up his residence in Ottawa.

Miss Laura Cooper, daughter of Mr. Jos. Cooper, contractor, of Ottawa, was recently married to Mr. Wm. Dewar, of the Canada Atlantic Railway.

Mr. Louis Champeau, a well-known contractor of Montreal, died at Cote des Neiges on the 4th inst., at the age of 72 years. He was taking a rest at his summer cottage.

The wedding is announced of Miss Bertha Wright, of Ottawa, and Mr. Robert Carl Harris, C. E., professor of civil engineering and architecture at the Royal Military College, Kingston.

Mr. C. M. Robertson, secretary-treasurer of the James Robertson Co., Ltd., Toronto, is receiving the congratulations of his friends upon his recent marriage. The bride is Miss West, of the same city.

Messrs. W. J. Burroughes, A. Fiddes and Joseph Wright will look after the interests of the master plumbers of Toronto and the west at the approaching convention in Montreal to organize a Dominion Association.

Mr. James Sinclair, contractor, of Toronto, with his wife and family, have left for an extended tour in Europe. Mr. Sinclair is a native of Sutherlandshire, Scotland, where his presence will by welcomed by his many friends.

A visitor to Winnipeg recently was Mr. J. E. Murphy, of Owen Sound, Ont., vice-president of the Owen Sound Portland Cement Company. His purpose was to introduce his material amongst architects and builders.

While Mr. John Dryan, contractor, of London, was driving on Clarence street, his rig collided with a trolley car, by which he was thrown out upon the pavement. He was rendered unconscious, although not seriously injured.

Mr. John Allen, the well-known contractor of Montreal, has accepted the invitation to represent St. Antoine ward in the City Council, to succeed Hon. A. W. Atwater, who resigned when he accepted the portfolio of Provincial Treasurer. Mr. Allen is an enterprising business man, and has executed many large contracts.

A well-known builder in the person of Mr. James Edgar, of Toronto, is dead. Mr. Edgar had suffered for some time from inflammatory rheumatism, which resulted in this death at the age of 75 years. Mr. Edgar was foreman under Mr. John Worthington at the building of St. James' Cathedral, University College and the forts at Quebec.

A worthy citizen and prominent contractor of Toronto was removed i the death of Mr. Robert Rennie, which occurred towards the close of the month of May. The deceased was born in Aberdeen, Scotland, on March 7th, 1822. In the year 1854 he came out to Montreal, where he lived for a few months and then removed to Toronto, where he has resided ever since. On settling in Toronto he entered into partnership with Mr. C. Duthie, caarrying on business as roofers. After being in business with Mr. Duthie for a few years they dissolved partnership, and Mr. Rennie commenced business in the same line on his own account. About ten years ago his son, Robert B., was taken into partnership, under the name of Robert Rennie & Son. The firm remained in business until about two years ago, when he retired, leaving the business in the hands of his son, who still continues it under the old firm name. Mr. Rennie was noted for his upright business dealings and punctuality. He was a Presbyterian in religion, and a staunch Reformer in politics.

Frank Dean, jr., of Hamilton, Ont., is applying for patents on a brick kiln to burn all hard brick with soft coal. Formerly they have been burned with wood, and in consequence a great many soft brick have to be used in the construction of buildings, soaking up a great deal of dampness as a result.

An Alexandria exchange says that Mr. Borque, the contractor for the new Dominion Reformatory, has commenced the work of laying the walls. A boom derrick for horse power has been erected, and another one is about completed. It is, we believe, intended to dress the stone at the quarry, so that it will be ready for use when laid down at the site of the building.

DOMINION MASTER PLUMBERS' ASSOCIATION.

On July 2nd next there will be held in the city of Montreal a convention of master plumbers of the Dominion, with the main object of forming a Dominion Association. At present local Associations exist at Montreal, Toronto, Halifax, St. John, London, Quebec and other points, the former being the only one incorporated by the government, and capable of entering and defending legal suits as an Association.

The existing Association in Montreal was formed in August, 1884. Previous to that time there existed an Association which was amalgamated with the Contractors' Association as a branch. In the following year an Association was formed in Toronto. These two branches can justly be said to be the father of the present movement for the formation of an Association representing the Dominion, and it is pleasing to know that the promoters have received every encouragement and hope that their efforts will be crowned with success.

All the preliminaries in connection with the convention have not yet been arranged, but from a number of cities and towns word has been received that delegates will be sent. The local Associations will be maintained as at present, and where possible new ones organized, by whom all local questions will be considered.

The Dominion organization will grapple with such questions as affect the trade generally, and by its means it is hoped to accomplish many needed reforms in the plumbing by-laws of the various cities which will ultimately result beneficially to the public at large.

It is the intention to amalgamate with the Master Plumbers' Association of the United States.

It is claimed that too often the persons who comprise the Board of Health in our cities are men entirely unfitted for the position, with little knowledge of the duties which they are called upon to perform.

Such being the case, the plumber is often called upon to execute work in a manner which he knows to be defective, but which he is, nevertheless, obliged to carry out.

It is hoped the master plumbers will be successful in organizing a strong Association which will be the means of raising the status of the trade and also prove a benefit to the public at large.

A DISSENTIENT VIEW.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR,—With your permission I would like to express my dissent from the view stated in an editorial paragraph in THE ARCHITECT AND BUILDER for May on the subject of farm house architecture. In the paragraph referred to pleasure is expressed at seeing pressed brick, plate and colored glass employed of late in the construction of this class of buildings. On the contrary, I think it a matter for regret that such materials should be used. The ideal farm house is one constructed with local materials and in a style as far removed as possible from that of the city residence. It should have an air of homely comfort. Nothing is to my mind more out of place than a farm house with the appearance of having been designed for a 25-foot city lot. I have in mind such a house erected by the M. P. for a rural constituency. A little way distant from it stands an old fashioned farm house with low eaves and long facade and verandahs facing the highway. The contrast is strongly in favor of the older house. The practice of importing city houses into the country should be discouraged.

CITY ARCHITECT.

CREDIT FORKS MINING & MFG. CO.

(FORMERLY CARROLL & VICK.)

84 Adelaide St. W. - TORONTO

Brown Stone Quarries,
Credit Forks, Ont.

Supply the Best . . .

BROWN STONE IN . . CANADA

DIMENSION	COURSING
RANDOM	SHODDY
HEADS, SILLS	RUBBLE

CRUSHED STONE FOR CONCRETE

GREY LIME of Superior Setting Quality shipped in car lots to dealers.

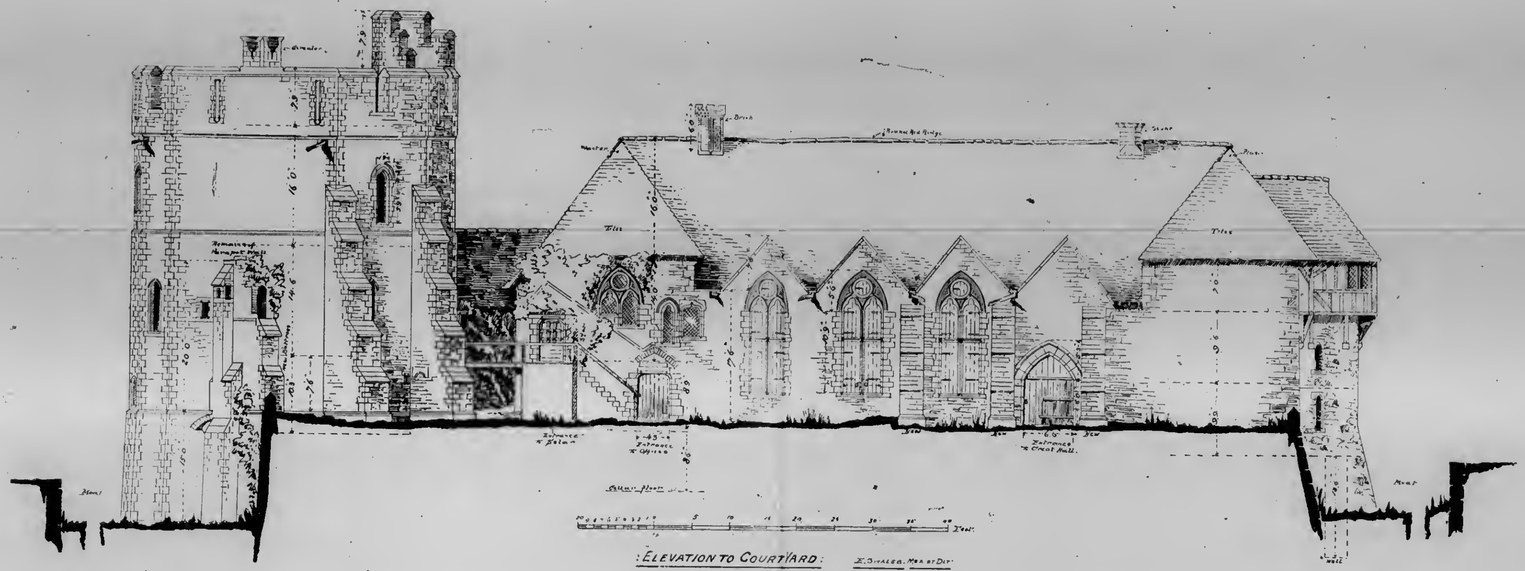
Office: 84 Adelaide St. West, TORONTO
Telephone 208.

"Since we used Mica

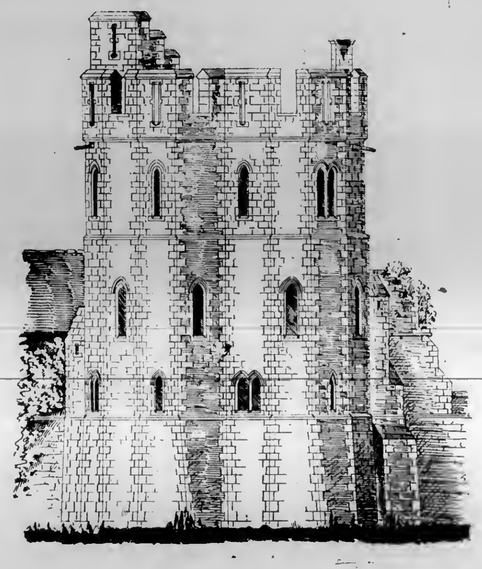
to cover our flues the insurance companies have reduced our rate." That is what the Allan Mfg. Co. writes to us. After a series of tests, the Boiler Inspection and Insurance Co., of Canada, says of it: "Its non-conducting property, its durability, and its portability, unite in making it the most effective and convenient boiler covering on the market." The Toronto Dredging and Contracting Co. says: "It has effected a saving of coal of about 25%. The Toronto Ferry Co. found a saving of 20%; the Aylesbury Dairy Co. of 33%.

THE MICA BOILER COVERING CO.
9 Jordan St., TORONTO

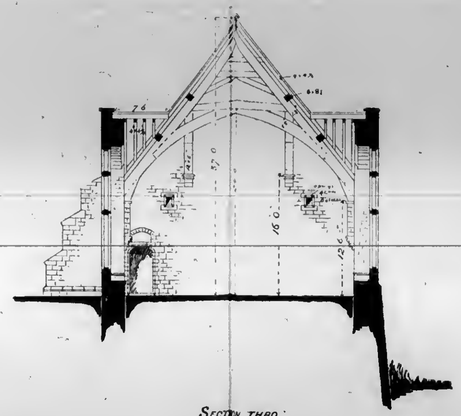
Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers



ELEVATION TO COURTYARD. E. SWALES, MEA et DLT.

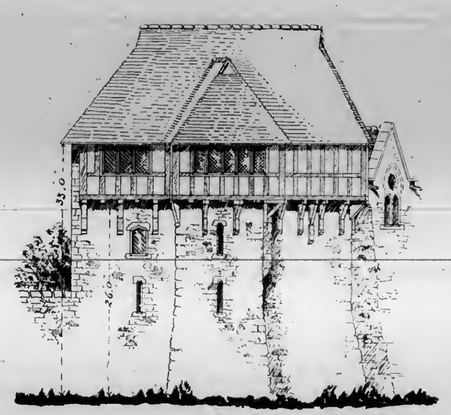


ELEVATION OF SOUTH TOWER



SECTION THRO GREAT HALL

E. SWALES : MEA et DLT :

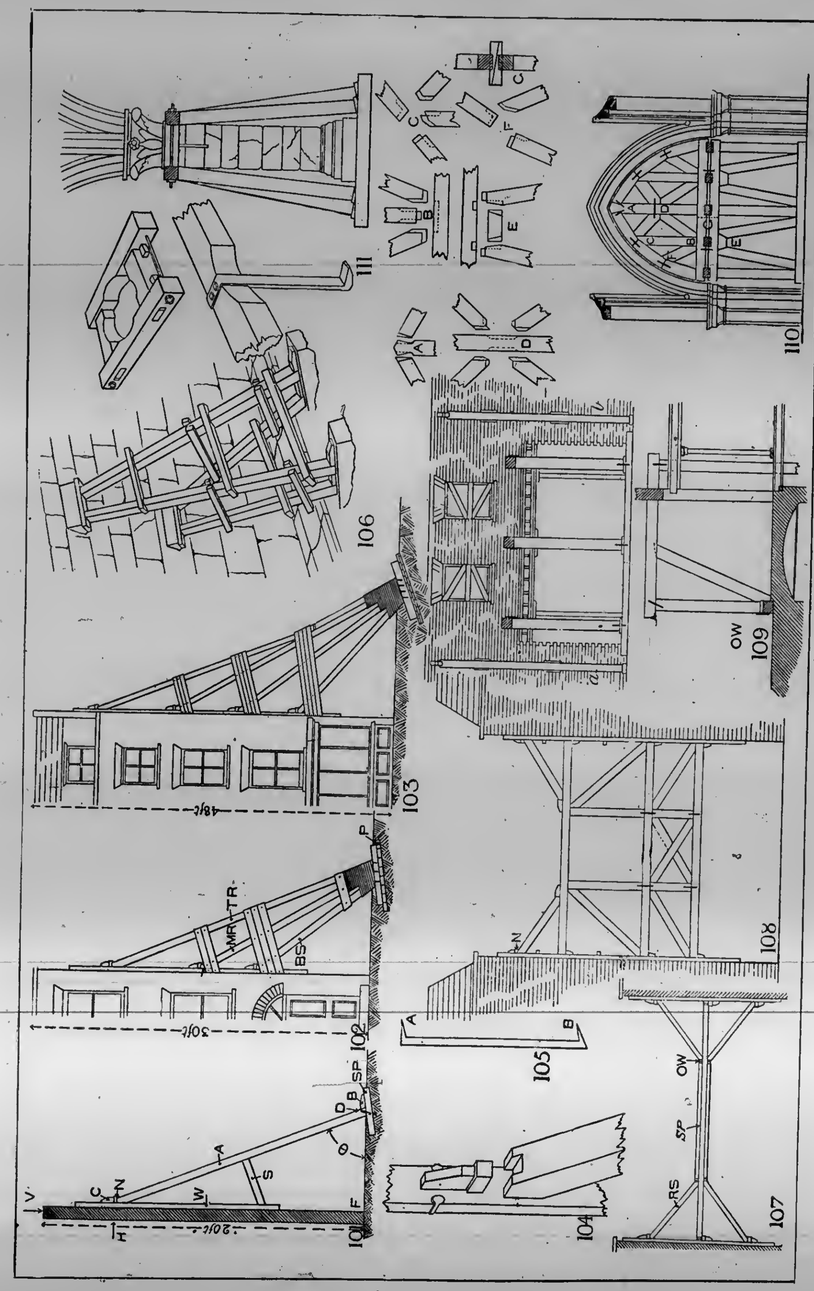


ELEVATION OF NORTH TOWER

STOKESAY CASTLE—DRAWN BY EDWARD SWALES.

RESIDENCE, SPADINA ROAD, TORONTO.
CURRY, BAKER & CO., ARCHITECTS

PLAN OF STOKESAY CASTLE.
DRAWN BY EDWARD SWALES.



From THE "BUILDER."

SHORING AND STRUTTING.

101, Raking Shore; simplest form. 102, Raking Shore; most frequently used. 103, Raking Shore; adapted for very high buildings. 104, Detail showing notching of head to needle. 105, Correct and Incorrect Form of Dog. 106, Strong Combined Shore. 107, Flying Shore. 108, System of Flying Shores. 109, Needling required to support a wall. 110, Special form of Shoring used at Grosmont Church, Ill.; Shoring used to support Cap of a Cylindrical Column.

CANADIAN ARCHITECT AND BUILDER.

VOL. IX.—NO. 7. JULY, 1896 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisements should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	H. B. GORDON, Toronto.
1ST VICE-PRESIDENT	J. GEMMELL, Toronto.
2ND VICE-PRESIDENT	JOS. W. POWER, Kingston.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

F. J. ALEXANDER	Ottawa.
THOS. FULLER	Ottawa.
E. J. LENNOX	Toronto.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. C. HUTCHISON, Montreal.
1ST VICE-PRESIDENT	A. T. TAYLOR, Montreal.
2ND VICE-PRESIDENT	J. P. PEACHY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

CHAS. BAILLAIRGE	Quebec.
ROHT. FINDLAY	Montreal.
J. Z. RESTHER	Montreal.
A. H. LAPIERRE	Montreal.
G. E. TANGUAY	Quebec.
THEO. DAOUST	Montreal.

AUDITORS—A. J. FOWLER and C. CHAUSEE, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

JOHN ALDRIDGE, President.
THOS. CANNON, Jr., 1st Vice-Pres.
JOHN VICK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. BOOTH.
JOHN WICKETT.
JOHN RUSSELL.
H. LUCAS.
JOHN VOKES.
JAS. CRANG.
JOHN M. GANDER.
GEORGE HENRY.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this Journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Iron Construction for Churches.

IRON, which of late has so largely superseded brick, stone and wood in the construction of public and business buildings, is now finding its way into the construction of churches. The frame work of an Episcopal church now in process of erection in New York City and of a Jewish Synagogue at St. Louis, the latter including a central dome, is composed of structural steel. Some months ago it was recorded that a residence was also being built in New York by this method.

The Grotesque in Carving.

IN glancing at the various buildings in progress in the city and at those recently completed, where carving to any extent has been indulged in, it is a little surprising to find how very greatly the grotesque predominates. We might almost say that there is no attempt made to produce a beautiful face; for instance, on caps or string-courses, wherever there is a face it is sure to be one with a grin or a squint, and though these are perfectly admissible, yet the endless succession of them becomes wearisome. The grotesque is, of course, very easy to draw and takes little time or study, but comparatively few can draw a good face. What a pleasure it would be to have a few to look at, and what a satisfaction to the artist it would be to produce them.

The Establishment of a Museum.

A REMARK was recently made in one of our daily papers that the institutions of Toronto could not be complete until there was numbered among them a museum. A museum is a very important educational factor, and we quite agree with the statement. In this country (and it must be the same in every "new country,") the establishment of a museum is necessarily a very difficult thing. Very few real antiquities or original old works of art are likely to find their way into our collections. Efforts of the most praiseworthy character have been made to establish something of the kind in Toronto, and great success has attended these efforts so far as they have gone. If any one body of educated men can do more than another towards making a museum useful and interesting, that body is the Association of Architects. They must know the immense value as a practical educator of the few casts of Egyptian and Assyrian work that are to be found in the museum of the Ontario Department of Education, and if individual architects would show their appreciation of these things by taking

interest in the collection of photographs, examples of colour decoration, sculpture and so on, and occasionally adding thereto, some gift, however small, a great deal would soon be accomplished and the public interest would be aroused. Students certainly cannot complain of lack of subjects to sketch in winter or whenever the weather is bad. There are in the present collection casts of well-known statues and groups and we have no doubt that permission might be obtained for students to go there with their sketch books and spend a few profitable hours. Might not the Architectural Association interest itself in this matter and thereby accomplish a very useful work?

Derrick Marks in Stone.

We should like to call attention to what seems to be an oversight on the part of both architects and engineers as well as contractors. Why should stone cutters or laborers allow the claws of the derrick which is to raise a heavy stone to grip the stone on the face, instead of at the sides? The marks of the iron claw is visible to-day on the surface of stones in many buildings and will be there for all time. It seems a small matter, perhaps, but it creates an eyesore and could easily be avoided. The worst specimen of the kind is the stonework of the King street subway, where nearly every stone has had a small circular sinking cut on its face, to enable the claw to get a firm grip, and every stone so treated is disfigured for life and the general effect is marred.

Penalty for Black-Listing.

For refusing to obey the command of the trades unions to discharge two of their employees, a firm of contractors in London, Eng., were recently black-listed. The unions posted up throughout the city upwards of seven hundred copies of a poster, having a black border, headed "Trollope's Black List," and bearing the names of the two obnoxious workmen. The firm appealed to the courts, and were granted a perpetual injunction restraining the unions from issuing any additional copies of the poster, and £500 damages for injuries sustained as the result of the copies which had been printed and circulated. A few decisions of this character would do much to check the tyrannical practices to which the trades unions are prone to resort for the accomplishment of their purposes.

Sketching by Students.

We wish that it were possible to impress upon students the immense importance of sketching. Too little attention, by far, is given to this, which ought to be a very important feature in the self education of would-be architects. Nothing impresses a detail on the mind so well as to make a sketch of it, and an intricate detail cannot be thoroughly learned unless it is sketched. To say nothing of the facility in the use of the pencil, the lissomeness given to the fingers, the training of the eye acquired by constant sketching, to be able to draw freehand any subject that chance may present is as important to an architect as fluency of speech to a public speaker. We published last month a measured drawing of an old English castle measuring and drawing from such measurements is the constant practise of students in Europe, to which is added the freehand sketching of the details. This may well serve as an example to our students. A great deal has been said from time to time of the necessity of this kind of thing for students; now is the season when they should put it in practise, and surely one who appreciates his profession will find this work a delightful recreation.

The Omission of Design in Examinations.

The question has been raised as to whether the subject of design should be omitted in examinations of students in architecture, or whether it would not be advisable to curtail examinations on that point for the reason that design cannot be taught. No man who has not "got it in him" by nature, can have it "put into him" by any amount of instruction. The subject occupies an important place in the curriculum of architectural schools, and this argues that it should not be left out in examinations without serious consideration. It is true no one can design unless he has a natural gift, but like all gifts, unless of the very highest order, the "heaven-born spark" requires cultivation, and it is only by study that the gift can be developed. If a man is to pose as an "artist in building" there can be no possible objection to his shewing by examination how far he comprehends the "principles" upon which the art is based, and it is upon the "principles" of the art of design that the examination should be set. A man may, if his genius bends in that direction, design for his pleasure or for the benefit of his clients any kind of conglomerate structure, and if he is a true artist—one who has developed his natural instinct by the study of the art in all ages—the principles of the art will be found in all his work, and there will be in his designs the sense of proportion and the feeling of repose. The questions set or the work asked for at an examination should not be so much a test of artistic ability as for the purpose of ascertaining whether the candidate knows anything of the principles of his art. The scientific or more practical part of an architect's work is getting more and more intricate every year entailing continual study in new methods of construction, new materials and so on, to enable him to keep abreast of the times. Certain new methods or requirements may and probably of necessity must be in the hands of the specialist, but the architect must before long know all about everything that has to be introduced constructionally into his building or that has to appear on the surface and therefore be a matter of design; and in this case it is certain that he needs to have the "principles" of design at his fingers ends for he will certainly spoil his work unless he can apply these principles to every detail.

GURNEY FOUNDRY COMPANY'S EXCURSION.

The fourth annual excursion of the employees of the Gurney Foundry Co., of Toronto, was held on the 27th of June at Lake Erie Park, near Port Colborne. The excursionists, numbering about four hundred, sailed across the lake on the steamer Empress of India to Port Dalhousie, where the train was taken for their destination. At the park an enjoyable afternoon was spent in various games, one of the special features being a baseball match between the Gurney Foundry Company and representatives of the retail stove trade, the latter winning the honors.

Mr. T. B. Alcock represented the company, the president, Mr. Edward Gurney, being unable to be present. Among the architects present were Messrs. Edwards, Brown, Siddall, and Bradley.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

ARCHITECTURAL EXHIBITION.

It has been definitely resolved to hold an architectural and arts and crafts exhibition in connection with the annual meeting of the Province of Quebec Association of Architects.

The principal committees are organized as follows:

General committee—A. C. Hutchison, A. T. Taylor, Jos. Venne, Jas. Nelson, E. Maxwell, J. Z. Resther, F. H. Berlinguet, R. Findlay, A. F. Dunlop, A. Raza, Chas. Baillargé, W. E. Doran, J. F. Peachy.

Reception of Drawings Committee—E. Maxwell, R. Findlay, Jos. Venne.

Arts and Crafts Committee—Jas. Nelson, J. Z. Resther, A. C. Hutchison.

Loan Exhibit Committee—A. T. Taylor, W. McLennan, R. Findlay.

Printing, Advertisements and Reception Committee.—A. Raza, J. W. Hopkins, Jos. Perrault, G. W. Wood, R. Findlay, Jos. Venne.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

At a special meeting of the above Association nearly all the members were present. Resolutions of condolence were passed at the death of Mr. J. B. Resther. On motion by Mr. V. Roy, seconded by Mr. W. Hopkins, it was resolved:

That the members of this Association have learned with deep regret of the loss they have sustained in the death of the late Mr. J. B. Resther, one of its most devoted members and founders. That the Association presents to his bereaved family its most sincere sympathies, and that a copy of this resolution be presented to the family and to the newspapers, and that communication of same be given to the members of this Association throughout the Province of Quebec.

THE NOTRE DAME STREET BRIDGE.

The conflict between the city and the C. P. R. regarding the construction of the bridge on Notre Dame street, at the east end station, is far from being settled, the superior court having not yet rendered judgment. It will be remembered that the C. P. R. Company were to have charge of the excavation work, but owing to the different manner of interpreting the contract between the two parties, the City Council resolved to do the work, estimated to cost $35,000, awaiting the decision of the superior court as to the meaning of the terms of the contract. The city solicitor has been consulted on the subject, but refuses to make known his opinion before the court judgment.

ARCHITECTURAL TERMS EXPLAINED.

A recent issue of the Brickbuilder contains the following explanation of the various phrases used by architects and not generally used by the mechanic, which may prove beneficial to many. The front, or facade, made after the ancient models, or any portion of it, may represent three parts, occupying different heights; the pedestal is the lower part, usually supporting a column, and its place supplied by a stylobate; the stylobate is either a platform with steps or a continuous pedestal supporting a row of columns. The lower part of a finished pedestal is called a plinth, the middle part is the die, the upper part the cornice of the pedestal or surbase. The column is the middle part, situated upon the pedestal or stylobate. It is generally detached from the wall, but is sometimes buried in it for half its diameter, and is then said to be engaged. Pilasters are square or flat columns attached to walls. The lower part of the column when detached is called the base; the middle or longest part is the shaft, and the upper or ornamental part is the capital. The swell of the column is called the entasis. The height of columns is measured in diameters of the column itself, taken always at the base. The entablature is the horizontal continuous portion which rests upon the top of a row of columns. The lower part of the entablature is called the architrave, the middle is the frieze, while the upper or projecting part is the cornice. The pediment is the triangular face produced by the extremity of the roof. The middle or flat portion enclosed by the cornice of the pediment is called the tympanum. Pedestals for statues erected on the summit and extremities of the pediment are called acrosteria. An attic is an upper part of a building, terminated at the top by a horizontal line, instead of a pediment.

The different moldings in architecture are described from their sections or from the profile which they present when cut across. Of these the torus is a convex, but its outline is only a quarter of a circle; the scotia is a deep concave molding; the cavetto is also a concave and occupying but quarter of a circle; the cymatium is an undulating molding, of which the upper part is concave and the lower convex; the ogee, or talon, is an inverted cymatium; the fillet is a small square or flat molding. In architectural measurement a diameter means the width of a column at its base. A module is half a diameter, and a minute is a sixtieth part of a diameter.

The effect of sunshine was gained in a living room that only had a north light by having the woodwork painted with white enamel, the upper part of the windows set with panes of pale yellow glass and the windows themselves beneath the glass hung with curtains of pale yellow silk.

When will builders understand that brickwork may very well be painted to great advantage? In some districts the bricks, though hard and durable, are of a poor colour, an insipid variety of salmon being perhaps the most objectionable. Two or three good coats of paint finished flat would greatly improve the appearance of buildings erected in such bricks, and the mortar joints may be painted in white or black.

The following is extracted from specifications for the preparation and use of cement mortar for the Sanitary District of Chicago, natural cement being used:—"(a) Measure sand proportion in dry mixing box. (b) Measure cement on top of sand. (c) Overcast twice with shovel, or more often if necessary. (d) Cast dry mixture of cement and sand through No. 5 sieve or screen. (e) Be sure incorporation is fully accomplished before adding any water. (f) Add water at part of wet mixing box remote from screen. (g) Add water slowly and gradually to prevent washing. (h) Hoe dry mixture slowly into water, avoiding any stirring further than to uniformly wet the mixture. (i) Conform mortar mixing to progress of the work so no mortar goes into the wall after having been wet 15 minutes."

interest in the collection of photographs, examples of colour decoration, sculpture and so on, and occasionally adding thereto, some gift, however small, a great deal would soon be accomplished and the public interest would be aroused. Students certainly cannot complain of lack of subjects to sketch in winter or whenever the weather is bad. There are in the present collection casts of well-known statues and groups and we have no doubt that permission might be obtained for students to go there with their sketch books and spend a few profitable hours. Might not the Architectural Association interest itself in this matter and thereby accomplish a very useful work?

Derrick Marks in Stone.

We should like to call attention to what seems to be an oversight on the part of both architects and engineers as well as contractors. Why should stone cutters or laborers allow the claws of the derrick which is to raise a heavy stone to grip the stone on the face, instead of at the sides? The marks of the iron claw is visible to-day on the surface of stones in many buildings and will be there for all time. It seems a small matter, perhaps, but it creates an eyesore and could easily be avoided. The worst specimen of the kind is the stonework of the King street subway, where nearly every stone has had a small circular sinking cut on its face, to enable the claw to get a firm grip, and every stone so treated is disfigured for life and the general effect is marred.

Penalty for Black-Listing.

For refusing to obey the command of the trades unions to discharge two of their employees, a firm of contractors in London, Eng., were recently black-listed. The unions posted up throughout the city upwards of seven hundred copies of a poster, having a black border, headed "Trollope's Black List," and bearing the names of the two obnoxious workmen. The firm appealed to the courts, and were granted a perpetual injunction restraining the unions from issuing any additional copies of the poster, and £500 damages for injuries sustained as the result of the copies which had been printed and circulated. A few decisions of this character would do much to check the tyrannical practices to which the trades unions are prone to resort for the accomplishment of their purposes.

Sketching by Students.

We wish that it were possible to impress upon students the immense importance of sketching. Too little attention, by far, is given to this, which ought to be a very important feature in the self education of would-be architects. Nothing impresses a detail on the mind so well as to make a sketch of it, and an intricate detail cannot be thoroughly learned unless it is sketched. To say nothing of the facility in the use of the pencil, the lissomeness given to the fingers, the training of the eye acquired by constant sketching, to be able to draw freehand any subject that chance may present is as important to an architect as fluency of speech to a public speaker. We published last month a measured drawing of an old English castle. measuring and drawing from such measurements is the constant practise of students in Europe, to which is added the freehand sketching of the details. This may well serve as an example to our students. A great deal has been said from time to time of the necessity of this kind of thing for students; now is the season when they should put it in practise, and surely one who appreciates his profession will find this work a delightful recreation.

The Omission of Design in Examinations.

The question has been raised as to whether the subject of design should be omitted in examinations of students in architecture, or whether it would not be advisable to curtail examinations on that point for the reason that design cannot be taught. No man who has not "got it in him" by nature, can have it "put into him" by any amount of instruction. The subject occupies an important place in the curriculum of architectural schools, and this argues that it should not be left out in examinations without serious consideration. It is true no one can design unless he has a natural gift, but like all gifts, unless of the very highest order, the "heaven-born spark" requires cultivation, and it is only by study that the gift can be developed. If a man is to pose as an "artist in building" there can be no possible objection to his shewing by examination how far he comprehends the "principles" upon which the art is based, and it is upon the "principles" of the art of design that the examination should be set. A man may, if his genius bends in that direction, design for his pleasure or for the benefit of his clients any kind of conglomerate structure, and if he is a true artist—one who has developed his natural instinct by the study of the art in all ages—the principles of the art will be found in all his work, and there will be in his designs the sense of proportion and the feeling of repose. The questions set or the work asked for at an examination should not be so much a test of artistic ability as for the purpose of ascertaining whether the candidate knows anything of the principles of his art. The scientific or more practical part of an architect's work is getting more and more intricate every year entailing continual study in new methods of construction, new materials and so on, to enable him to keep abreast of the times. Certain new methods or requirements may and probably of necessity must be in the hands of the specialist, but the architect must before long know all about everything that has to be introduced constructionally into his building or that has to appear on the surface and therefore be a matter of design; and in this case it is certain that he needs to have the "principles" of design at his fingers ends for he will certainly spoil his work unless he can apply these principles to every detail.

GURNEY FOUNDRY COMPANY'S EXCURSION.

The fourth annual excursion of the employees of the Gurney Foundry Co., of Toronto, was held on the 27th of June at Lake Erie Park, near Port Colborne. The excursionists, numbering about four hundred, sailed across the lake on the steamer Empress of India to Port Dalhousie, where the train was taken for their destination. At the park an enjoyable afternoon was spent in various games, one of the special features being a baseball match between the Gurney Foundry Company and representatives of the retail stove trade, the latter winning the honors.

Mr. T. B. Alcock represented the company, the president, Mr. Edward Gurney, being unable to be present. Among the architects present were Messrs. Edwards, Brown, Siddall, and Bradley.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

ARCHITECTURAL EXHIBITION.

It has been definitely resolved to hold an architectural and arts and crafts exhibition in connection with the annual meeting of the Province of Quebec Association of Architects.

The principal committees are organized as follows:

General committee—A. C. Hutchison, A. T. Taylor, Jos. Venne, Jas. Nelson, E. Maxwell, J. Z. Resther, E. H. Berlinguet, R. Findlay, A. F. Dunlop, A. Raza, Chas. Baillarge, W. E. Doran, J. F. Peachy.

Reception of Drawings Committee—E. Maxwell, R. Findlay, Jos. Venne.

Arts and Crafts Committee—Jas. Nelson, J. Z. Resther, A. C. Hutchison.

Loan Exhibit Committee—A. T. Taylor, W. McLennan, R. Findlay.

Printing, Advertisements and Reception Committee.—A. Raza, J. W. Hopkins, Jos. Perrault, G. W. Wood, R. Findlay, Jos. Venne.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

At a special meeting of the above Association nearly all the members were present. Resolutions of condolence were passed at the death of Mr. J. B. Resther. On motion by Mr. V. Roy, seconded by Mr. W. Hopkins, it was resolved:

That the members of this Association have learned with deep regret of the loss they have sustained in the death of the late Mr. J. B. Resther, one of its most devoted members and founders. That the Association presents to his bereaved family its most sincere sympathies, and that a copy of this resolution be presented to the family and to the newspapers, and that communication of same be given to the members of this Association throughout the Province of Quebec.

THE NOTRE DAME STREET BRIDGE.

The conflict between the city and the C. P. R. regarding the construction of the bridge on Notre Dame street, at the east end station, is far from being settled, the superior court having not yet rendered judgment. It will be remembered that the C. P. R. Company were to have charge of the excavation work, but owing to the different manner of interpreting the contract between the two parties, the City Council resolved to do the work, estimated to cost $35,000, awaiting the decision of the superior court as to the meaning of the terms of the contract. The city solicitor has been consulted on the subject, but refuses to make known his opinion before the court judgment.

ARCHITECTURAL TERMS EXPLAINED.

A recent issue of the Brickbuilder contains the following explanation of the various phrases used by architects and not generally used by the mechanic, which may prove beneficial to many. The front, or facade, made after the ancient models, or any portion of it, may represent three parts, occupying different heights; the pedestal is the lower part, usually supporting a column, and its place supplied by a stylobate; the stylobate is either a platform with steps or a continuous pedestal supporting a row of columns. The lower part of a finished pedestal is called a plinth, the middle part is the die, the upper part the cornice of the pedestal or surbase. The column is the middle part, situated upon the pedestal or stylobate. It is generally detached from the wall, but is sometimes buried in it for half its diameter, and is then said to be engaged. Pilasters are square or flat columns attached to walls. The lower part of the column when detached is called the base; the middle or longest part is the shaft, and the upper or ornamental part is the capital. The swell of the column is called the entasis. The height of columns is measured in diameters of the column itself, taken always at the base. The entablature is the horizontal continuous portion which rests upon the top of a row of columns. The lower part of the entablature is called the architrave, the middle is the frieze, while the upper or projecting part is the cornice. The pediment is the triangular face produced by the extremity of the roof. The middle or flat portion enclosed by the cornice of the pediment is called the tympanum. Pedestals for statues erected on the summit and extremities of the pediment are called acrosteria. An attic is an upper part of a building, terminated at the top by a horizontal line, instead of a pediment.

The different moldings in architecture are described from their sections or from the profile which they present when cut across. Of these the torus is a convex, but its outline is only a quarter of a circle; the scotia is a deep concave molding; the cavetto is also a concave and occupying but quarter of a circle; the cymatium is an undulating molding, of which the upper part is concave and the lower convex; the ogee, or talon, is an inverted cymatium; the fillet is a small square or flat molding. In architectural measurement a diameter means the width of a column at its base. A module is half a diameter, and a minute is a sixtieth part of a diameter.

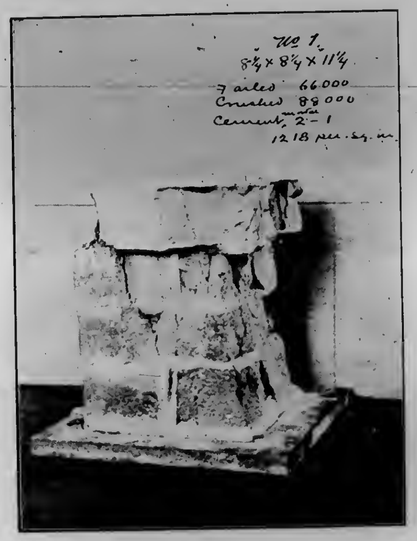
The effect of sunshine was gained in a living room that only had a north light by having the woodwork painted with white enamel, the upper part of the windows set with panes of pale yellow glass and the windows themselves beneath the glass hung with curtains of pale yellow silk.

When will builders understand that brickwork may very well be painted to great advantage? In some districts the bricks, though hard and durable, are of a poor colour, an insipid variety of salmon being perhaps the most objectionable. Two or three good coats of paint finished flat would greatly improve the appearance of buildings erected in such bricks, and the mortar joints may be painted in white or black.

The following is extracted from specifications for the preparation and use of cement mortar for the Sanitary District of Chicago, natural cement being used: "(a) Measure sand proportion in dry mixing box. (b) Measure cement on top of sand. (c) Overcast twice with shovel, or more often if necessary. (d) Cast dry mixture of cement and sand through No. 5 sieve or screen. (e) Be sure incorporation is fully accomplished before adding any water. (f) Add water at part of wet mixing box remote from screen. (g) Add water slowly and gradually to prevent washing. (h) Hoe dry mixture slowly into water, avoiding any stirring further than to uniformly wet the mixture. (i) Conform mortar mixing to progress of the work so no mortar goes into the wall after having been wet 15 minutes."

TESTS OF CANADIAN AND ENGLISH BRICKWORK.

CANADIAN architects and builders in common with manufacturers and dealers, have been placed under obligation to the authorities of the School of Practical Science, Toronto, and the School of Technology in connection with McGill University, Montreal, by the series of tests of native constructive materials which in recent years have been successfully carried out in the laboratories of these institutions. As a result of these tests



there is now available considerable detailed information regarding the variety, character and strength of British Columbia timber, Canadian native and Portland cement and Canadian building stones the tests of the latter having been carried out and the results published under the direction of the Ontario Association of Architects.

In a recent number of this journal was published a table showing results of tests by the Public Works Department of Ontario of the absorbent properties of pressed bricks from the various manufactories throughout Ontario. In this number are given illustrations and some particulars of tests of common brick conducted by Mr. C. H. C. Wright and his assistants at the School of Practical Science, Toronto, at the commencement of the present year. The bricks employed in the tests were procured from four different brick yards in the neighborhood of Toronto, viz., the Kingston road, the Humber, Yorkville and Carleton. Before being built into piers, the bricks were individually tested for absorption by being immersed in water for thirty minutes.

The piers were built by a skilled bricklayer, who also provided the lime mortar, which consisted of 4½ yards of Bloor street coarse sand to ten barrels of lime, this being about the proportion of two parts sand to one part lime. The cement mortar was mixed in the proportion of three parts sand to one part of good Portland cement.

The piers were built and laid aside to harden in the mechanical laboratory of the School of Practical Science, in a temperature which averaged about 60° Fahrenheit, and were prepared for the test as follows: A thin mortar of neat cement was spread on a smooth cast-iron plate, and the pier placed upon the mortar and left until the cement hardened. The bottom bed was then trimmed off flush with the sides, the pier placed on the testing machine, and a layer of neat Portland cement mortar was placed on top, the pier was slid under the head of machine, and the head was brought to its bearing while the mortar was yet soft. This method ensured two parallel beds and gave a uniformly distributed stress on the pier. The load was applied slowly and continuously, until complete failure of the pier occurred.

The results of the tests are as follows:—

Pier No. 1.—Common brick, 4 courses; dimensions, 8½ × 8½ × 11¼" high; ult. strength, 88,000 pounds; cement mortar, 2 to 1.

No. 2.—Common brick, 6 courses; dimensions, 8½ × 8½ × 16¼" high; ult. strength, 78,000 pounds; cement mortar, 2 to 1.

No. 3.—Common brick, second quality, 5 courses; dimensions, 8½ × 8½ × 14¼" high; ult. strength, 70,000 pounds; cement mortar, 2 to 1.

No. 4.—Common brick, first quality, 8 courses; dimensions, 8½ × 8½ × 22" high; ult. strength, 128,000 pounds.

Our knowledge of this important subject is further augmented by an elaborate and carefully conducted

series of tests of English brickwork carried out under the direction of the Science Standing Committee of the Royal Institute of British Architects, the results of which have recently appeared in the British architectural journals. Strange as it may appear these tests are said to afford the only accurate information available upon the subject. The method adopted was similar to the Canadian one, viz., to first test the individual bricks and afterwards test piers 18 inches square and 6 feet in height, composed of similar bricks, some built in mortar and some in cement. A specially designed testing

machine capable of exerting a pressure of 500 tons was employed.

The brick piers to be tested were built upon wrought-iron plates, 2 ft. 6 in. × 2 ft. × ½ in. thick, placed upon temporary lines of rails 140 feet in length, laid to 16 in. guage. The piers, standing on the iron plates, were drawn along the rails by a suitable crab and winch, so that all unnecessary handling of the piers was carefully avoided and risk of fracture thereby entirely obviated.

The following varieties of bricks were used in building the piers:—

1. London stocks from Sittingbourne, Kent.
2. Gault from Burham, Kent.
3. Leicester red from Elliston, near Leicester.
4. Staffordshire blue from Rowley Regis.

Each pier was constructed in duplicate, in lime mortar and cement mortar, so that the total number of

FIG. 3.

piers to be experimented upon was 32, that is to say, 16 for testing at the age of 3 months, and 16 for nine months' tests. The piers were, with one exception, 18 in. × 18 in. and 6 feet high, or as near those dimensions as the particular kind of brick would allow; the exact dimensions are tabulated in the report.

Four bricks of each class were carefully tested by Professor Unwin at the Central Technical College, and the following results were recorded for the respective crushing loads.

Description.	Crushing stress, tons per square foot.	Mean strength, tons per square foot.
London Stocks ..	60·76 — 94·6	84·27
Gault	166·9 — 197·6	182·2
Leicester red ..	311·4 — 391·4	382·4
Blue Stafford ..	564·8 — 788·0	701·0

It is also recorded that some of the bricks were too strong to be crushed as whole bricks in the 100 ton testing machine at Kensington, and, therefore, half bricks were used. With the exception of London stocks, which are roughly made, and, therefore, not capable of being very neatly divided, it appears that bricks tested as half-bricks show about 25 per cent. less resistance per square foot than when tested as whole bricks. A tabulated statement is given in the report to illustrate this point.

The lime and cement mortars used in building the piers were also carefully tested, and the compressive strengths ascertained. The results are summarised as follows:—

Lime briquettes, composed of 2 of sand to 1 of lime by measure:—

Strength at 4 weeks 6·68 tons per square foot.
" " 12 " 8·73 " " "
" " 24 " 15·72 " " "

Cement briquettes, composed of 4 of sand to 1 of cement by measure:—

Mean strength at 4 weeks, 31·45 tons per square foot.
" " 13·7 " 48·52 " " "
" " 24 " 56·15 " " "

The above-named briquettes were formed with the standard sand normally employed in testing cements and other similar materials. It is a pure siliceous sand, obtained from Leighton Buzzard. The actual sand used in building the piers was not so pure in quality, having a rather large proportion of earthy matter, ranging from 0·14 to 0·96 per cent. in the several samples analysed. The mean strength was, therefore, lower, being, for the cement briquettes, 29·00 tons per square foot at the age of 24 weeks.

Analyses of the lime and cement mortars were also made by Mr. W. J. Dibdin, chemist to the London County Council, from material taken from the debris of the piers after they had been experimented upon.

The crushing of the piers was carried on in December last, the first pier being crushed on the 9th of that month as an experimental trial of the testing apparatus. Owing to the large-sized valve on the hydraulic ram, the water pressure was admitted too freely, and the pier was crushed too quickly for accurate results to be obtained. It has consequently been rebuilt for further trial. Before the next piers were experimented upon, careful alterations were made to the ram valve, a fresh pressure gauge was introduced, and a modification was made to the testing frame to obviate a slight concavity in the head girders. The apparatus was then found to be in proper order for testing the remaining piers. Detailed descriptive tables are given of the results obtained by crushing each pier, and they indicate the manner in which the experiments were carried out.

A summary is given of the results obtained on the 16 piers tested, which may be briefly tabulated as under:—

No. of Pier.	Description of Brick.	Age.	Commencement of failure.	Final collapse.
		Weeks.	Tons per square feet.	Tons per sq. foot.
1	London Stocks in Mortar	17·7	—	—
2	" " "	18·3	4·18	10·41
3	Gault .. .. "	18·3	5·00	21·82
4	" .. .. "	18·8	6·16	22·03
5	Leicester Red .. "	19·1	13·20	20·03
6	" " "	18·6	16·11	31·55
7	Staffordshire Blue "	18·6	22·43	66·22
8	" " "	19·4	21·42	79·39
9	London Stocks in Cement	21·1	7·22	16·03
10	" " "	21·0	5·72	13·83
*11	Gault .. .. "	21·0	6·98	17·98
*12	" .. .. "	20·5	7·08	17·51
13	Leicester Red .. "	22·1	17·87	67·36
*14	" " "	21·7	21·82	49·54
*15	Staffordshire Blue "	21·7	20·45	84·47
*16	" " "	22·7	16·91	61·14

The piers marked *, when crushed, were found to have been partly constructed with portions of stock bricks for filling in, instead of the proper material for the respective piers. It has, therefore, been considered desirable to re-construct these piers so that the final results may be absolutely accurate. From a practical point of view, says the British Clayworker, it is, perhaps, not greatly to be regretted that such an "accident" should have happened, for the Institute will be in a better

position to gauge the effect of the introduction of extraneous material in the harder brick piers. It is, unfortunately, not an uncommon experience in dealing with hard bricks, to find that some workmen make no endeavor to cut closers, but substitute bricks which can be more readily manipulated. This defective work would be almost entirely obviated if brickmakers would produce king and queen closers of all the harder varieties of bricks.

An interesting series of photographs was taken of all the piers under different stages of compression, from which some of the most instructive and typical forms of failure may be studied. At early stages of pressure, the mortar and cement joints begin to fail—they squeeze out, and portions drop off. This is followed by the cracking of some of the bricks, and spalling off at the angles. Longitudinal seams, in most instances, were opened out in a line with the

Fig 4.

vertical joints or closers, and finally, in many instances, the piers bulged out on all sides and collapsed.

The differences in the behaviour of the piers while under compression were accurately noted in each case.

It is stated that, "all through the series it was evident that the vertical line of joints formed by the closers was a plane of weakness, and it was generally at this line that the serious cracks first showed themselves." In the discussion which followed the reading of the report, Professor Unwin said: "If the structure is one that has special vertical planes of weakness, like the joints in a pier which has not been built very long, then the crushing load develops vertical fissures, due to the tension acting horizontally." We may point out that in the brick piers experimented upon by the American Institution of Civil Engineers at Watertown Arsenal, the normal type of failure was this vertical splitting of the pier, as in nearly every instance longitudinal cracks and seams were opened up. In the American examples, so far as we can judge from the sketches and diagrams appended to the Official Report, no closers were used, the bricks in all cases being whole bricks, so disposed as to break joint. Various types of bonding were also employed; in some instances as many as five or six courses had the vertical joints in one plane, the alternating five or six courses breaking joint in another plane. Yet, even in these cases, the same vertical fissures appeared, emanating from the vertical planes of weakness. It seems, therefore, fair to infer that there is little evidence to show that the closer method of bonding is more defective than the whole-brick bond. Moreover, as the American piers were much older than any of the piers tested by the Royal Institute of British Architects, the age ranging from 15 to 24 months, the newness of the pier does not, in this respect, appear to be of the importance suggested by Professor Unwin.

TALKS ON HOUSE PAINTING.

It is doubtful whether the average carpenter and builder or general contractor gives the subject of painting the attention it deserves, says Mr. Seymour Jennings, and this is especially the case with those who carry on business in a comparatively small way. If the amount of painting to be done forms a very considerable part of the work, as in the case of repairs, they will, as a rule, either decide not to tender at all, or else will obtain a tender from a painter as sub-contractor. This is all very well for the painter, but the builder, of course, has to make his price somewhat higher, to cover his own trouble, and so he stands but little chance of getting the work.

In new work, as in old, the painting is an important item, and it behooves the contractor to see that it is executed in the most economical manner possible. Now there is no part of work in the building trade that is so easy to "scamp" as the painting. If the brickwork is wrong, or if the woodwork is inferior, it shows itself at once, and besides, as far as the actual structure itself is concerned, the district surveyor or his equivalent will look after that, to say nothing of the architect. But when it comes to the paint the case is very different. The local authority, whoever he may be, doesn't care twopence about it, and in ninety-nine cases out of a hundred the architect himself knows little concerning it—in fact, excepting so far as the actual appearance of the work when finished is concerned, he as a rule has no idea whether it is good or bad.

These facts must be borne in mind by the carpenter who gives his work out to a sub-contracting painter to do. Unless he has made a study of paints and painting, he is in the painter's hands almost entirely. Not that I have a word to say against painters as a class; considering the temptations they have to contend with, they are, I, think, in integrity not a little above some other trades I could mention. The point that I do want to insist upon is, it never pays to scamp the painting. The defects will soon become obvious. Suppose, for instance, that you have some work to do at a low price, and, in order to make it pay, it is impossible to use the best materials. You must economize somewhere. Very well, but don't do it to any extent in the painting. If you use, for instance, a common resin varnish at a few shillings a gallon, and after a few months it cracks in all directions, what sort of a reputation do you think you will get for yourself? I do not mean to say you should use 20s. varnish, but do use fair quality, honest goods.

If I have convinced you that it always pays to let the painting be done as well as possible, within the price to be paid for the work as a whole, it will, of course, follow that if you do give it out, you should, under no circumstances, let it to any one who is not known to you to be an honest, straightforward man of his word. Again, if you decide to do the work yourself, you should for your own protection, only deal with a first-

class house, who will sell you only good materials. By "first-class" I do not mean necessarily a large concern, but one upon which you and others may absolutely rely. The importance of this will become apparent to you if you consider for a minute. If you go to your timber merchant to buy some timber you are very unlikely to be deceived; you know what you are buying. If you are a family man and go to the butcher's to purchase a joint of meat, it is quite unlikely that he'll "have you" isn't it? Unless, indeed, in selling foreign-killed meat as English. But when it comes to paint material, how do you know whether the white lead is not half chalk, the linseed oil largely composed of resin with, perhaps, a little mineral oil added? You don't know, or at least, very few carpenters and builders do. Why, even the turpentine may be largely adulterated with benzine, and as for the colours—I have many times come across so-called vermilion that consisted wholly of red lead toned up to the proper colour with the dye recene; and I have known a green sold containing over ninety per cent. of barytes, an adulterant that is absolutely valueless for staining or colouring purposes, for the very simple reason that it has no colour.

I want to consider some of the methods by which you may economize. One, and perhaps the most important, item is the prevention of waste. Many workmen are allowed to get into slovenly habits and waste a good deal of material; and this is especially the case with dry colours, most of which are quite expensive. The most economical colours to use, by the bye, are those ground in oil. There is very little waste with them and they save time. But the great secret of economy in the paint department is to engage a good, smart foreman, one who will get the men into good habits and keep them so, and who will keep a watchful eye to see that they not only take care of the material, but that they keep their brushes and tools in good order. Pay such a foreman a few shillings more a week, if necessary; it will be money well spent, I assure you.

You have, doubtless, heard of the old story of the New York builder and his hod-carriers. In any case, it will bear repetition. The custom "on the other side," as here, is for the hod carriers to go up and down the ladder in regular order, every man in his proper place. For one man to get before or behind another would be an awful thing. Well, the builder of whom I speak noticed that the carriers were going up and down the ladders very slowly, much to his disgust. He tried all means to make them go faster, including, I am afraid, some not very choice language; but it was no use. Presently an idea occurred to him. He picked out a smart young fellow and took him into his confidence, promised him twenty-five per cent. more wages, and put him at the head of the gang. Of course this leader exerted very nerve to get up and down quickly, and as the whole gang was compelled to follow him, the "boss" got somewhere about twenty-five per cent. more work out of all the men for his expenditure of twenty-five per cent extra on one of them. So take my advice. Have a smart foreman who will look after your interests, not one, though, on any account, who cannot get along well with the men. There is all the difference in the world between getting a fair amount of work out of a man and being a nigger-driver. The clever foreman knows where the line should be drawn.

Another thing do insist upon the men being properly clad. I know a painter who insists upon every workman bringing clean overalls every Monday morning. He told me that the rule was much objected to at first, but he insisted, and now the men go out to a job a credit to their employer and to themselves. And if you do repairing work, do, as you value your future prospects, have everything cleared up after you. Leave the place neat and tidy. It will cost you a shilling or so more, but take my word that it will not be money thrown away. Have you ever considered the bearing that women have on the repairing part of your business? True, it is the gentleman who pays the bill and who assents to the work being done, but it is the lady who has to put up with all the trouble and fuss, and it is she also who you should aim to please in ninety-nine cases out of a hundred. Now, perhaps most likely, in fact—you recognized all this years ago, and always make a practice of having the colours of paper and paintwork suit her taste. Well, you do right. Never mind about the man who pays the bill. She'll know how to deal with him if she's an average wife, because if she is that she will possess a full share of that valuable quality, tact. But don't spoil all your efforts to cultivate her goodwill by leaving a lot of rubbish around.

Now as to materials. Do not use ready mixed paints; they are not made for painters. They are intended for the "everybody-his-own-painter" sort of a man—the man who finds time hang so heavily on his hands that he will cheerfully spend about three times as much on labour (certainly its his own) and bad paint in painting a job than would pay for the work to be properly done by a qualified mechanic. You know the kind of man; he is closely related to the gentleman who builds himself a summer house of a nightmare design, and who uses up about three times the amount of timber required, spoils a complete set of cheap tools (which is not to be regretted), and smashes his thumb half a dozen times or so during the process, and all in order that he may have the pleasure of doing what the carpenter would have done for him at half the cost and then made a handsome profit.

I have said before, use good materials. Of course you know that there are various grades of white lead. There is "Genuine," "No. 1," "No. 2," and so on. The genuine is genuine—that is to say, it is strictly pure hydro-carbonate of lead i.e., white lead proper. The other grades are cheaper and contain more or less whiting, barytes and other materials. For certain work they will do well enough, especially for that which is not exposed to the weather. A friend of mine had some years ago the job of redecorating a large school room. The walls and ceilings were to be painted in lead and oil, and the work was to be finished by a certain date under heavy penalties in case of failure. Work seemed to pour in that week, and, as a consequence, the school work was to be delayed. On the day before the work was to be completed the ceiling had not been touched. In the morning one coat was given it, and my friend calculated that by two o'clock the following morning it would be quite dry enough to take the second coat, so he arranged that some of the men should work all night. About one o'clock he went to the job to take a final look at it before going home, and to his horror found that it had been discovered that there was only enough white lead to do about one-third of the work. There was plenty of oil and plenty of turps. The only thing in the paint material way on the premises was a lot of putty. So he gave orders at once to have this beaten up with the lead, added a liberal amount of oil and turps, and finished the job. He assured me that the work stood as well as any he had ever done. Of course, what he had done, in fact, was to make his paint very similar to, say, No. 2 or No. 3 white lead. Putty, of course, is simply whiting ground in linseed oil, and by adding the whiting to the lead, and giving the mixture a good binder in the shape of pure linseed oil, he had obtained a good paint—that is good for the particular purpose—at a very low cost.

MANUFACTURES AND MATERIALS

"COPPER."

The following is an abstract of a paper read by Mr. Nelson Dawson before the Architectural Association of London, Eng.:

In talking about metal, its uses and design, the metal-worker, unconsciously perhaps, divides the subject in his own mind into three parts—cast, forged, and sheet. Here are the three different treatments to which nearly every metal can be subjected, and the three processes that the designer can take advantage of in thinking out his design. These practically are also the three different trades into which metal workmen are divided.

It is not until we come to look closely into the thing that we see how widely apart these three branches lie. One may not realise at the first glance that under the heading "cast" nearly all statuesque and sculptors' metal-work must be done; and if we do not admit that it "must" be cast, at least we know that it always has been so up to the present, except in very early days.

For wrought work we may take, as an example, the Eleanor grille in Westminster Abbey, that monument of twelfth-century skill in ironwork.

For treatment of metal in sheet we might instance the elaborate figure-compositions of Cellini's time, that have since then been used to cover shields with, or to beat up a dish for an altar, or to put some repousse' ornament on a cup or other plane surface. Here, indeed, are three very different crafts so widely apart that really we should not wonder that they have become so much split up and separated, or that all metals are not capable of receiving all three treatments satisfactorily. Thus, with copper, we find it is practically useless for casting; while in forged work we can with difficulty recall anything in this metal, so we are left with sheet, and here really lies the strong point of copper.

The kindliness of copper under the hammer in practice is a constant surprise; with care one is able to do almost anything with it—to bump it up into relief, and then, if it is wrong, to hammer it all flat and begin again; to take a flat piece, and hammer it first into a cup-shape, afterwards drawing in the top and lengthening it upwards until the original piece of sheet-copper is a vase with oval body and long narrow neck. A metal-spinner of much experience said that in their trade the most difficult thing to do was the ordinary stethoscope that doctors use. But a good coppersmith would not make any difficulty about such a shape if he had a good bit of copper to do it with. Formerly the common jelly mould was the triumph of the craft, and it is easy to understand that to make a shape with many pinnacles and castellations from flat sheet, keeping a fairly even thickness and never tearing open the metal, took some skill (one uses the past tense because, probably, being such a very fine sort of craft, it is by this time obsolete, and put aside in favour of a mechanical process, such as stamping).

Repousse' has come to be the general term for all ornamental work raised on sheet-copper by the hammer. The prefix "re" probably means "back," so that it implies that some part of the metal is beaten back. It really hardly matters if, to gain the relief, one beats up the design from the back, or beats back the background in front—pretty much the same end is reached.

In beating up small ornamental work in copper, especially when it is as small as silversmiths require, it is put down on a cement made of pitch and other ingredients. This is melted every time the copper is put down, and, besides holding the metal tightly, offers a slightly yielding material against which to hammer. If, when the copper is on the pitch, we take a punch and make a straight line—indented of course—that line will come out on the face of the metal as a clean, sharp line. If, however, we do not put the copper on to any cement at all, but make the indented line on it, as it lies on the wooden bench, it produces a very different effect on the face side. Now the line shows indefinitely, and, instead of the metal being raised just where it was struck, the surrounding part is dragged up too. If an effect were desired between these two extremes, one should place the copper on a half-way material, such as stiff clay or modelling wax. The result of the beating would also be half-way—neither too precise a line nor too blurred.

It will be seen that these three courses are likely to give a considerable range, especially where the metal-worker has some artistic capabilities; but the usual way, which is generally the worse way, is to first trace on the face side of the copper the whole design, with what is practically an incised line, and then slightly bump it up here and there from the back. This is the cheapest and readiest way of getting an effect. But to get the best quality out of copper or any other metal with the repousse' treatment, let the face-side have the least possible amount of work—none at all, if it can be helped.

This point is an all-important one architecturally, for this reason: That where ornamental copper would be used in a building as a decorative panel—a tablet with lettering otherwise—it should "carry," as a sculptor says—that is, the design should look clearer at a little distance off than it does close to. A design which is clearly and sharply cut and looks very well close to will not show to advantage at a distance, will not "carry," in other words, while a design that looks somewhat blurred and indistinct close to becomes quite sharp and clear ten yards off it "carries" exceedingly well. This is one very good reason for putting all the work possible on the back of the metal, leaving it somewhat blurred in front, and not "finishing" it, as they say, by chasing and putting a clean hard line around everything.

One objection that is made regarding copper when used for decoration in a house is that it requires cleaning, or it loses its chief beauty. Well, there is some truth in this, but it is not altogether correct. In the first place, if it be required to keep its own colour, it can be lacquered; and this, if judiciously done, will last a very long time, and is both easy and cheap to renew when necessary. But copper that is not lacquered—simply left and dusted in the ordinary way by the housemaid when the rest of the house is dusted—will take a most delightful color in time.

There is a whole range of colours that once produced on the copper are not only themselves permanent, but act as a varnish in preventing an action of the atmosphere.

The importance of this fact showed out recently in the case of a memorial-tablet in a church which was

desired to be of copper, the objection being that when the immediate friends had passed away, it would become uncared for and soon reach the dingy state, a condition that the more familiar marble never reaches. It seems difficult to find a metal that would do any better than copper, which was wanted, but with the aid of such an artificially-produced patina, the difficulty is removed, and there is no reason why copper should not be used. For any case where an inscription or lettering in any form is wanted, it may be said that no other metal opens out such chances as copper, especially if treated in an artistic manner, provided, of course, the design and execution is not left to the tender mercies of the usual commercial person.

One can only refer to the lamentable state that mural brasses have reached in our time, and suggest that the artistically treated copper offers an escape from such terrors, especially if the tablet be within reach of an occasional duster, giving the slight amount of polish that makes the use of lacquer or other preservatives unnecessary.

One other treatment of copper must be noticed before finishing, and as artists we shall feel it to be treading on unholy ground—electrotyping. Sometimes one thinks that this must be a fine process and a nineteenth-century blessing, while the next electro one comes across the whole thing is condemned bag and baggage. A clever mechanic will turn out in electro a copy of a repousse dish that an expert could not tell from the original, unless he looked at the back. This is a thing to be thankful for, this tell-tale back of the electrotype, otherwise there would be no telling at all, so faithfully does it reproduce every mark, even touch of the hammer or chisel. It is interesting to know what is going on around us, and it may not be out of place to relate a little incident that occurred recently. In the workshop of a clever electrotyper a specimen of work was brought in to show. It was a small electric-light table-standard about 9 in. high, of interesting design, and apparently highly chased, in copper, with a good chocolate-brown patina, and mounted on a small oak plinth. "Now this," said he, "is electroed from a fine old Sheffield plate candle-stick in the South Kensington Museum, and we have an order for a quantity. We have acquired the right to reproduce the things in the museum, and, with our skill in this line, there is nothing that we shall not be able to copy."

Now, frankly, if I had seen this piece in a shop I should not have been able to tell how it had been made, because it had been electroed in two halves and soldered up, so that the back could not be seen, and on the face only gave the evidence of highly chased work and most careful finishing.

One may say, if this has exactly the appearance of the correct thing, it must be as good. Most plausible, but most weak! There is often a sorry mind behind a fair face, and the fact that you can mechanically reproduce a good thing a hundred times, makes it a hundred times worse. A good piece of copper or any other metal work, on which an artist has spent time and care, will always be valuable; and equally the most exact reproduction of it, especially by any mechanical means, will always be valueless. Seriously and calmly, this form of copper work is the only one that may be called unlawful, and if we do not leave it altogether alone, it should only be used for the commonest purposes.

We have now considered some of the good points and some of the bad points of copper, and the question naturally arises, To what use can this metal be put with advantage to-day?

Well, externally, and except in the case of roofing, copper is not much used. There has been a mild desire to cover the door of a church or mansion with it occasionally; in the case of the former with repousse work, which we may imagine as capable of having a very rich effect. Sometimes one sees the name of a tradesman in high-relief letters in copper or a name plate by a door, in both of which positions they seem to get well rubbed, and invariably catch the eye as we pass. In one or two cases sheet copper has been largely used, in conjunction with wood-work, in the decoration of big West-end public-houses; and although here it looks applique and cheap, that is not the fault of the copper.

It may be well to take this opportunity of saying how difficult, but how important it is, so to use sheet copper, or any other metal, that it does not look thin and papery, and as if cut out with scissors. Of course sheet-metal, unless of some thickness is frequently cut into shape with shears, but if this is apparent when the work is finished the effect is disastrous. All the durable and hard qualities of the metal seem to disappear, and the thin, fragile undurable character asserts itself unpleasantly. For a glaring instance of this misuse in sheet-metal, though in iron, we have only to turn to the much-vaunted iron railing from Hampton Court Palace, in the South Kensington Museum, reputedly by Huntingdon Shaw.

One would not be understood to mean that sheet-metal must be made to look like cast, or any other form of metal, only equally it must not be made to look like paper. If any metal-work looks thin and poor, not solid and strong and metallic, then the designer is no artist, and the workman no craftsman—both have wasted their time and chance. Beyond these one or two things, then, one does not see copper used externally; though, at least, wherever sheet-brass is used, there also certainly sheet-copper may be used. Indoors it is different, especially in domestic work. For a good, comfortable, homelike, and cheerful appearance in drawing-room, dining-room, or kitchen, one may safely say copper cannot be beaten. Near a fireplace, and kept bright, it has a cherry glow that rivals the fire itself; the mere fact alone of its being kept so bright is a constant and recurring announcement of housewifely attainments.

There is hardly any interior metal-work that, if one desired, might not be done in copper, saving, perhaps, poker and tongs; and even the former of these I once saw made out of a huge copper bolt of some old Navy ship. Hinges, too, one would not use it for, as it would wear too quickly; but we can use the gun-metal alloy where the actual wear and tear comes, and rely on our old friend for the ornamental part.

For finger-plates, a handsome set of door furniture in bright copper will do more to redeem a drawing-room from depression than the most gorgeous wall-paper, and the sparkle of electric lights in copper reflectors and copper stands will be only second to gold itself.

To-day, no lady who had any self-respect could live for a single day if she had not a more or less ancestral copper coal-scuttle, while two or three years ago, to be without any equally ancestral warming-pan hung on the drawing-room wall was almost a punishable matter.

STUDENTS' DEPARTMENT.

C. A. & B. COMPETITION.

We had expected to be able to announce in the present number the decision of the judges in the above competition. Owing, however, to the absence on their holidays of some of the members of the Ontario committee, it has been found impossible to do so.

The report of the committee appointed by the Province of Quebec Association of Architects has been received, but will be held over for publication in our August number simultaneously with the report of the Ontario judges.

MAXIMS FOR DRAFTSMEN.

The power of shading rightly depends mainly on lightness of hand and keenness of sight; but there are other qualities required in drawing dependent not only on lightness, but steadiness of hand; and the eye to be perfect in its power, must be made accurate as well as keen, and not only see shrewdly, but measure justly.

Nearly all expression of form, in drawing, depends on your power of graduating delicately; and the graduation is always most skillful which passes from one tint to another very little paler.

In darkness of ground there is the light of the little pebbles or dust; in darkness or foliage, the glitter of the leaves; in the darkness of flesh, transparency, in that of stone, granulation; in every case there is some mingling of light.

An entire master of the pencil or brush ought, indeed, to be able to draw any form at once as Giotto his circle; but such skill as this is only to be expected of the consummate master, having pencil in hand all his life, all day long, hence, the force of Giotto's proof of his skill.

Ruskin.

COMPETITION CONDITIONS.

The British Architect suggests the following as being lines upon which architectural competitions might be successfully and satisfactorily conducted:

1. There should be two trials. This we still think the better plan in view of the past history of competitions. But we do not see the slightest necessity for the cruel waste of competitors' time and efforts such as usually results.

2. The first competition should be open to everyone over the age of 25.

3. There should be no charge whatever for the conditions of the competition.

4. There should be nothing required beyond plans, one or two sections, one main elevation and two monochrome perspectives, each taken from a given point and of fixed size, and arranged with some reference to the laws of perspective.

5. There should be three fixed premiums, to be paid down outright to the three best of these designs.

6. Out of all the first competitors, six should be selected to compete finally.

7. Each of these should receive a reasonable (not a large) honorarium for preparing elaborated designs, which should follow the lines of their previous ones.

8. The best of these six should be appointed architect.

9. The authorities should agree to leave the decision in the hands of three experts; one to be the city surveyor and the other two artistic practising architects.

EARLY ENGLISH WINDOWS.

Early English glass paintings are remarkable for the intensity, vividness and richness of their colouring, for the strength and boldness of their outlines, for the height, spirited action, and classical air of the figures, and for the form of the foliage used in the patterns. The earliest foliage partakes of the shape of the Greek honeysuckle, like the ornaments of Norman architecture; the latter resembles the trefoil-leaved scrolage so common in Early English sculpture. The richest windows of this style (and which are therefore more rich than any other windows) are the medallation and the Jesse. The medallation window generally has a deep border running entirely round the light. The enclosed space is principally occupied with pictures of simple design, each represented on a panel, having a well-defined border and a stiff coloured ground. The interstices between the panels and the border of the window are filled with ornamental patterns. Very little white glass is used in the windows, and the figures, though strongly shaded, are so little relieved that when seen from a distance the whole window presents the rich, variegated, and somewhat confused appearance of a turkey carpet, to which they have often been likened. The Jesse window, although as rich, is seldom so confused as the medellation window, owing to its design being simpler and better defined. The figure and canopy window, of which there are some splendid remains scattered about Canterbury Cathedral, is less mosaic in its colouring, the figures being much larger than those in the medallation and Jesse windows, which occasions greater breadths of color to be used in the draperies. Yet these windows are as intensely coloured as the others. Their canopy work exactly resembles that in the illuminations and sculpture of the time. The white pattern windows are of a rich sea-green hue. In general their design consists of, as it were, a series of panels laid one over the other, each panel having a separate pattern painted on it. The ground of the pattern is most commonly cross hatched with thin black lines, but this cross hatching is not unfrequently omitted in windows occupying a great height from the floor. Some pattern windows are composed of ornamental quarries. Most of the white pattern windows have deep borders richly coloured like those of medallation windows, and some, as at Stanton Harcourt, are further enriched by the insertion of coloured pictures represented on panels. It is clear that Early English windows owe their magnificent effect to the material of which they are composed. The pot-metal glass is generally deep in hue, but being very irregular in its tint. The white glass, which is usually of a rich sea green colour, is also very irregularly blown, and the ruby glass, except some pieces which seem to have been cut near the extremity of the sheet, is as streaky in its appearance as if the colour had actually been laid on with a brush. It is to these accidental irregularities in hue of the glass that the vivacity of an Early English window is chiefly owing.

In painting buildings that are used to contain articles of an inflammable nature, the painter would do well to suggest the use of a fireproof paint, and while one would think that paint must always burn easily, paints may be obtained that are absolutely uninflammable, one of the best known of these is Asbestos paint, which effectually checks fire in its incipient stage.

THE LATE MR. WILLIAM HASKINS, C. E.

A long and useful life was terminated on the 5th inst., on which date occurred the death of Mr. William Haskins, C. E., the well-known City Engineer and manager of the Waterworks Department of the city of Hamilton. Early in the morning he was afflicted with a stroke of apoplexy, from the effects of which he never regained consciousness, expiring at 5:30 o'clock in the afternoon.

Deceased had been attending to his duties as usual up to the previous Saturday, although for the past two years he had not enjoyed the best of health, and last spring visited a health resort in search of restitution. This he regained in a slight degree only. Of late the affairs of the department over which he had charge have been unusually onerous, necessitating his closest attention.

By his death the city of Hamilton loses an efficient and valuable officer, and one who during his many years

The Late Mr. Wm. Haskins, C. E.

of service exercised his executive ability in an eminently successful manner.

Mr. Haskins was born at Coolkem Hall, County of Wicklow, Ireland, on May 29, 1828, being therefore in his 69th year. He was a son of Abraham Haskins, who came from England and settled in the county of Wicklow. His mother was Margaret Fitzmaurice, daughter of Colonel Fitzmaurice, her father and three brothers being either military or naval officers. He was educated in Dublin, Ireland, where he studied his profession of civil engineer at Trinity College, under Sir John McNeill.

In 1852 deceased came to Canada and obtained a position as assistant engineer on the survey and construction of the Great Western Railway, and afterwards, in 1856, was appointed City Engineer of Hamilton, which position he filled until his death.

In 1861, when the city took over the waterworks from the Board of Commissioners, the duties of manager were entrusted to him. He was not only manager of the engineering, construction and operation of the waterworks system, but financial manager as well, having full charge of the collection and remitting of rates, etc. About 10 years ago these duties were transferred to the tax collector, but Mr. Haskins continued to be city engineer and manager of the waterworks. He was a man of large experience and knowledge, and a thoroughly efficient engineer and public officer. Perhaps his greatest work for the city was the management of the Waterworks Department, which he brought to a high state of efficiency, and with every detail of which he was conversant. Quite recently he prepared a number of plans, minutely describing the whole system, in order that at his death the system might be preserved. His ability was recognized outside of Hamilton by the frequency with which he was called on to advise other corporations contemplating important improvements.

He was a member of the Royal Society of Engineers of England, an Ontario Land Surveyor, and a member of the Society of Civil Engineers of Canada. He was also a member of the Masonic fraternity. In religion he was a member of the Church of England, and in politics a Conservative.

In 1852 Mr. Haskins married Catherine Murray, daughter of Mr. Hugh Murray, of the county of Carlow, Ireland, a gentleman of Scottish ancestry. He leaves a widow and five sons, Messrs. William Fitzmaurice, of Dunnville; Frederick H., of Toronto; Raymond and Gerald, of Hamilton, and Thomas Fitzmaurice, of Dunnville.

His funeral was attended by the mayor and aldermen of the city and the civic employees in a body, and by a very large number of private citizens.

HEATING AND VENTILATING BUILDINGS.

In a work on heating and ventilating buildings, Prof. Carpenter says the most effective location for the air inlet is probably in or near the ceiling of a room, although authorities differ much in this respect. The advantages of introducing warm air at or near the top of the room are: first, the warmer air tends to rise and hence spreads uniformly under the ceiling; second, it gradually displaces other air, and the room becomes filled with pure air without sensible currents or draughts; third, the cooler air sinks to the bottom and can be taken off by a ventilating shaft. So far as the system introduces air at the top of the room it is a forced distribution and produces better results than other methods. When the inlet is placed in the floor or near the bottom part of the walls it is a receptacle for dust from the room and a lodging and breeding place for microbe organisms. In the ventilation of large buildings the inlets can usually be located in the ceiling, especially if the lighting be done by electricity or in some manner not affected by air currents. The outlet for air should be as near the bottom of a room as possible, and it should be connected with a flue of ample size, maintained at a temperature higher than that of the surrounding air, unless forced circulation is in use, in which case the excess of pressure in a room will produce the required circulation. These conditions should lead us to locate vent-flues on the inside walls of a house or a building, and where they will be kept as warm as possible by the surrounding bodies. If for any reason the temperature in the flue becomes lower than that of the surrounding air, the current will move in a reverse direction and the ventilation system will be obstructed. The conditions as to the size of the outlet register are the same as those for the inlet; the register should be of ample size, the opening should be gradually contracted into the flue, and every precaution should be taken to prevent friction losses.

THE BUILDER

Taking Quantities.

In taking measurements where the work is done by the yard, as in painters' work, hardwood finishing, kalsomining and plastering, it is always the best to use a tape-line, then all the breaks, quirks and mouldings can be measured and properly credited. In measuring painting this is very important for running a line around all the corners and quirks of moulded panels adds a large percentage to the total amount, and where the work is piece work, by the yard, the workman is entitled to the full measurement. If the exterior of a house is painted at so much per yard, and the building is a frame one and sided in the ordinary manner, the painter is entitled to payment for the edges of the siding or clapboarding, which, in a building, 24 feet high, would make quite a difference in the result. Twenty-five feet would require forty-eight tiers of siding, and each tier would add one-half inch of surface measurement, or twenty-four inches to the whole height. Let us suppose the building to be fifty feet long, then we should get 100 more surface feet than the face of the building would measure, which would make a little over eleven yards, an item worth looking after. At a meeting of the Master Painters and Decorators of the United States, in Baltimore, some time ago, a schedule of methods of measurements and prices was decided upon, and this, with a number of rules and regulations governing the association, were published in book form for the guidance of painters and decorators throughout the whole United States. The work also gives many hints regarding various styles of work that are valuable and useful. The book, we believe, sells for two dollars to non-members of the association, and something less to members. The art of taking correct measurements is worth acquiring to the workman who does job work, for it is the little kinks in his work that make profit or loss, and he should be able to watch these kinks and turn them to his advantage.

The Plasterer's Measurements.

There has always existed more or less misunderstanding anent the "quantities" claimed by the plasterer, and where these quantities have been a subject of dispute it has always been found impossible for two measurements to agree; indeed, the plasterer himself cannot measure a building of any pretentions twice and get the same result each time. This may seem strange, but it is true, and, of course, there is a cause for it. In some localities the plasterer claims and gets full measure for all openings, in other places he gets half the openings, and in others, again, the openings are counted against him. Then again, the practice in some places is to give the plasterer the full height of a room, base and cornice included, while in others he is allowed the base but not the cornice, while yet in others he is allowed neither base or cornice. Again, it has never been decided what constitutes an opening. Some say an opening is just the space between the jambs of a door or window, while others claim that the opening is over all the wood trimmings, so if the casings were six inches wide, and the door three feet, then the opening would be four feet wide, the same with the windows. The following, however, which is taken from Vogdes, who is an authority on such matters, is generally considered fair and equitable all round. Plastering should be measured by the yard, nine square feet making one yard, and according to custom, no deductions is made for doors, windows and other openings which do not exceed sixty-three square feet. This is the custom that should obtain in Canada, in justice to the plasterer. In measuring closets another author says "it is customary to add half of the contents, and if the shelves and strips are in before plastering, double the contents. Small gables and other tri-angular pieces are counted square. These extra allowances are made to make up for extra labor of lathing and plastering such pieces of work." We can offer no objections to the measurements, as it is well known to workmen that it takes more time to lath and plaster these irregular places than if the walls offered straightforward work. With regard to the cornices and enriched work, Vogdes says "cornices that are plain running members are charged by the running foot, but enriched or carved mouldings are charged by the lineal foot. Paneled work, whether on walls or ceilings, run with a mould, should be rated by the foot superficial." In this case it seems the intention of Mr. Vogdes to charge as for plain work first, where the cornice is placed, and then for the cornice afterwards. This is probably just, as the plasterer has first to lath and then render the wall, before it is in condition to receive the cornice. For circular and elliptical work, two prices should be charged, and for domes or groined ceilings, three prices. He also states that for every twelve feet in height above the first floor, five per cent. should be obtained. These charges may look somewhat formidable on the face, but they are no more than long experience has proved to be just and fair between owner and contractor, and if they were universally adopted and adhered to, there would be less disputes between owners of buildings and their contractors.

Shingled Roofs.

A building that is not "well roofed" is in a serious stage of consumption, and should be placed under treatment at once. If the roof is one covered with shingles, and not old enough to have its timber in a state of decay, there will be but little trouble in making the roof as "tight as a drum," and free from leaks. There is no roof in existence that is so easily kept tight as a shingle

one. By "tight" we mean a roof that does not admit of water or of driven snow finding their way under them. It has become the custom of late years to lay a prepared paper or felt of some sort on the roof boards or sheeting, before the shingles are laid. This is done for a double purpose and is really a good thing to do. One of the purposes is because the paper assists in keeping the roof tight, making it warmer in winter and cooler in summer, another is because the paper or felt is said to be made incombustible and therefore, acts as a fire arrester, and when it can possibly be done, it is always in order to put a layer of some sort of unburnable fabric between the shingles and the sheeting. A shingle roof should always be painted with some oxide paint of suitable color, at least two coats. This painting is a good investment, as two coat work, when the shingles are laid will lengthen the life of the roof seventy-five per cent., and if this painting is followed up and the roof painted every five or six years, the life of it may be extended to almost any limit. Of course, something depends on the original quality of the shingles themselves. If they are made of good white pine, straight grained, the roof may be made to last a long time, and so, also, if the shingles are made of sound white cedar, but if cut from shakey or "dosey" stock, the life of the roof will be short, as they will rot from the underside. The cypress makes the king of shingles, so far as lasting qualities are concerned. There are many old buildings still standing in Southern New Jersey, Pennsylvania, Maryland and Delaware, that were covered with cypress shingles 150 and 175 years ago, that are still protected from the weather by the shingles that were first laid on, and they have not received a single coat of paint either, or any other composition. The life of an ordinary Canadian shingle is well within the limits of twenty-five years, if it is not protected by paint or other saving composition, owing, perhaps, to our rigorous climate and heavy rainstorms. An old roof, if not too far gone, may be greatly benefitted, if given a heavy coat of oxide paint and boiled linseed oil, but, after a roof has seen a half dozen winters or so, unpainted, it is a question whether it is an economy to paint it, as it will eat up an enormous amount of paint and oil to give it justice.

Mortar under Shingles.

Many architects insert a clause in their specifications calling for half an inch of rough mortar to be laid under the shingles. The object of this, of course, is to act as a non-conductor of heat and cold, and as a fire arrester. We have never been quite sure that the mortar has ever accomplished either of the purposes for which it was intended. The lime in the mortar certainly does no good to the shingles, but harm if rain ever gets to where the lime strikes them, and the shrinkage of the roof boards is sure to crack and break the mortar up, if it should escape being shattered by the hammering and pounding while the shingling is being done. The mortar used for the purpose is generally the most miserable stuff the plasterer can concoct, and the laying of it on the roof boards is not by any means done in the best style. On a flat roof it may be effective, but on a steep roof we have our doubts about it, and in the end we are constrained to think it is about as expensive as good roofing paper.

The stock of the Chanteloup Mfg. Co., Montreal, was damaged by fire a couple of weeks ago to the extent of $15,000.

LEGAL DECISIONS.

When Right to Lien is Waived. A mechanic's lien is waived or discharged where the parties enter into a special agreement inconsistent with the existence of the lien: as, for example, by the laborer or material man extending credit to the owner beyond the statutory period for bringing an action to enforce the lien. Flenniken v. Liscoe (Supreme Ct. Minn.), 66 N. Y. W. Rep., 979.

A motion for an injunction was made at Victoria, B.C., before the Chief Justice in Canessa v. Nicol to restrain the defendant from quarrying stone on plaintiff's property on Gabriola island. Plaintiff and defendant last year made an agreement whereby defendant for the sum of $25 was given the right to prospect on plaintiff's land, and for the sum of $300 a year could quarry sandstone there, with a further proviso that defendant had the option of purchasing the land at $10 an acre. Defendant decided to purchase, but plaintiff now alleges that when he signed the agreement he was not aware of the purchase clause in the agreement, and now wishes to eject defendant from the property. An affidavit on behalf of defendant stated that he is engaged in supplying stone from the quarry under contract for the new post office here. The court ordered that defendant be allowed to continue quarrying on payment into court of $300.

PERSONAL.

Mr. James T. Davis, of the firm of Davis & Sons, canal contractors, had one of his shoulders dislocated in a runaway accident recently.

Mr. Andrew Onderdonk, the millionaire contractor, who has lately resided in New York, will take up his residence at Hamilton, Ont. He has leased "Highfield," the Turner homestead, which Lord Aberdeen occupied while a resident of that city.

Mr. Willian McNichol, of St. Catharines, a contractor on the Hamilton Radial Electric Railway, was accidentally killed at Hamilton on the 23rd of June while crossing the Grand Trunk railway tracks, by being struck by a train. Deceased was fifty years of age, and leaves a wife and two children.

Quarter-sawed boards and bastard-sawed boards neither shrink nor wear alike, hence they should not be used side by side for best floors.

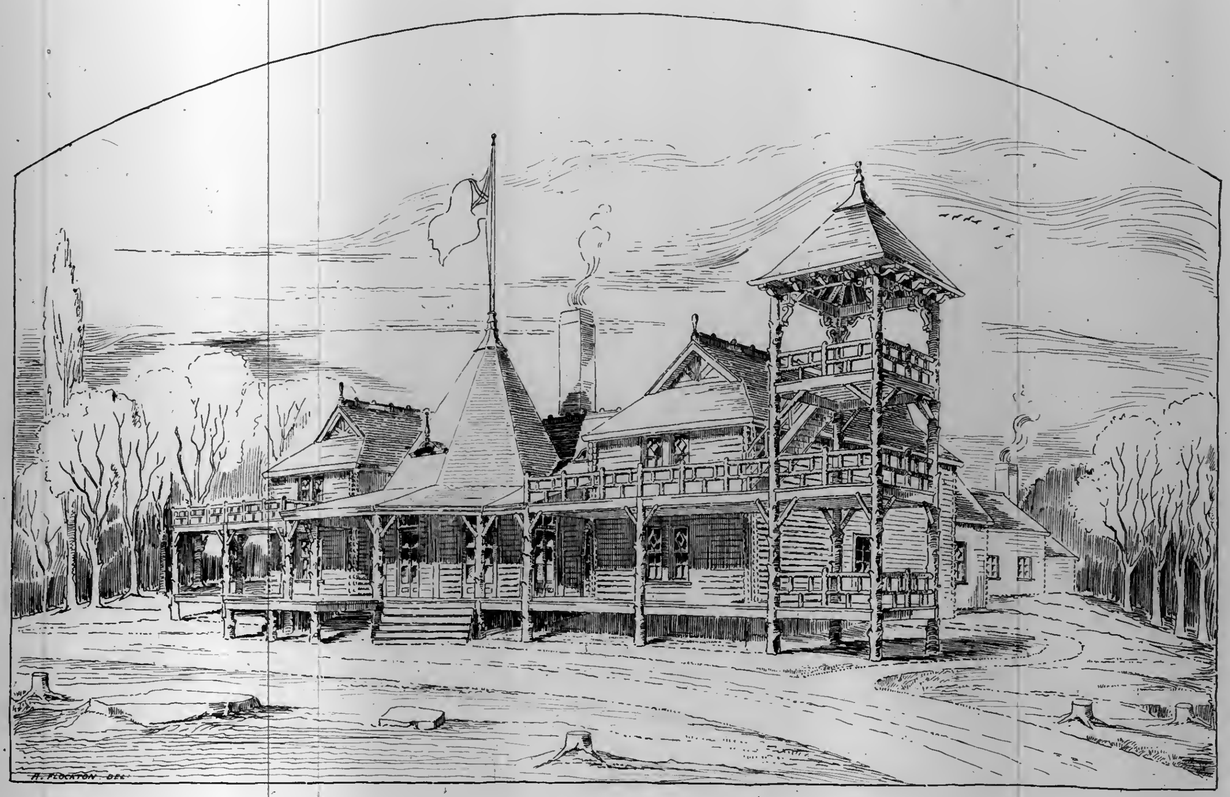
The Ontario Lead and Barb Wire Co., of Toronto, are said to have decided to establish a branch in Hamilton. They have secured the Dalby building on Hughson street for a factory, where they will manufacture plumbers' supplies, and barb wire and nails.

While the workmen were engaged in the construction of the Presbyterian church at Palmerston, Ont., one of the guy ropes slipped from its fastenings, and in an instant the whole of the heavy roof timbers crashed to the ground, killing a workman named John Whitely, about 35 years of age. Several others had very narrow escapes.

At the last regular monthly meeting of the Iron Founders' Association of Montreal, Mr. J. Best, of Messrs. Warden King & Son, who was their representative at the meeting of the National Association of Iron Founders, held recently in Philadelphia, and who was elected a Vice-President of that Association, gave a graphic and interesting account of the proceedings. The Montreal association will discuss the subjects at future meetings.

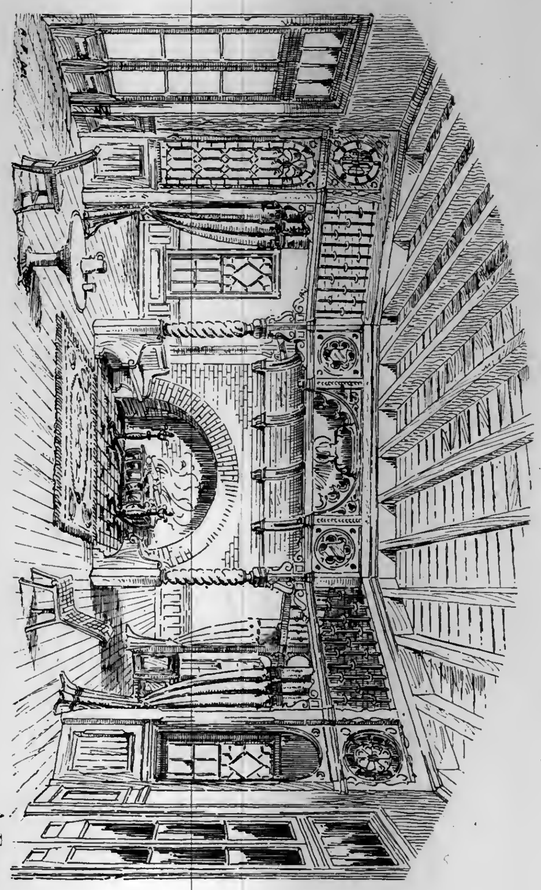
The annual excursion of the Toronto Builders' Exchange was held on Saturday, the 11th inst. The steamer "Tymon" carried over one hundred members of the Exchange and their friends to Wilson Park, N. Y., where an enjoyable day's outing was spent. The programme of sports was prepared mainly for the entertainment of the children, by whom they were thoroughly enjoyed. The weather was almost perfect and the sail across the lake was exceedingly pleasant. The excursionists returned to Toronto about 9 o'clock.

The bricklayers of Ottawa are endeavoring to arrange an eight hour day with the contractors. At present they are working nine hours per day, for which they receive three dollars. A proposition for a reduction has been before the bricklayers' union for some time and has lately been sent to a number of leading contractors. They ask 35 cents an hour for an average of eight hours a day during the week, arranged in such a way as to give a half holiday on Saturday. The contractors are believed to be adverse to the reduction on the above grounds, but are willing to pay wages at the rate of $3 for nine hours, or 33⅓ cents per hour.



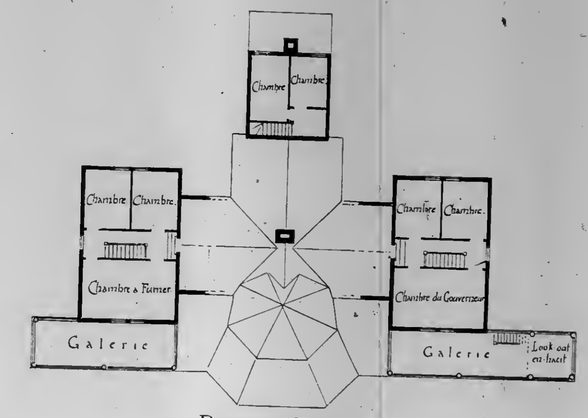
A. Raza.
Architect.

Rendez-vous de Chasse et de Peche
au Lac Chapleau.

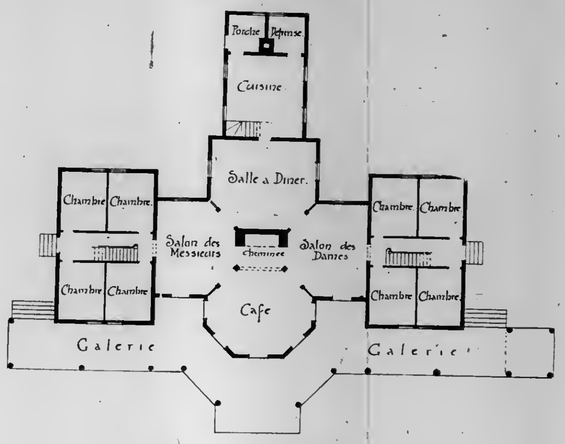


A. Raza
Architect.

Vue Intérieure du Café.



Premier Etage.



Rez de Chaussee.

MASTER PLUMBERS.

ORGANIZATION OF A DOMINION ASSOCIATION.

At the solicitation of the Master Plumbers' Association of Montreal, there convened in that city on the 2nd of July delegates from the different master plumbers' associations of the Dominion. The very desirable object for which the gathering was called together was the formation of a National Plumbers' Association for the Dominion, which would grapple with the many ques-

MR. JOS. LAMARCHE, President, Montreal.

tions of paramount importance to the trade, such as sanitary laws, plumbing licenses and examinations, etc. Letters were sent to each association requesting that a delegate be sent to represent their district, and the hearty response to the invitation indicated that the movement had met with approval.

There were present delegates from a number of the principal cities of the Dominion, as well as representatives from the National Association of the United States.

The representatives were as follows:

Toronto W. J. Burroughes, A. Fiddes, F. W. Armstrong.

Montreal—Joseph Lamarche, E. C. Mount, Alph. Champagne, J. W. Hughes, P. J. Carroll.

Kingston J. J. Jamieson, Robert Elliott.

London R. J. Haslett, Wm. Smith.

Quebec R. Sampson, O. Matte.

Ste. Hyacinthe A. Blondin.

Ottawa John McKinley.

Halifax George Perrior, John Borton.

St. John, N. B. J. H. Doody.

The delegates from the National Association of the United States were Messrs. J. F. Davlin, T. J. Tute and Isaac Riley.

In addition to the delegates there were present the following members of the Montreal association and representatives of supply houses:

S. Martin, Thos. Mott, John Foster, Wm. M. Briggs, C. A. Champagne, J. A. Marier, Jos. King, M. Germain, John Burns, Alf. Demers, John Watson, Lt. S. Stephenson, Fred. Horton, Geo. Henders, E. Lesperance, J. C. Jacotel, H. Baillie, Jas. Ballantyne, P. C. Ogilvie, Griffin Rosser, F. H. Barr, G. A. Berrier and Alf. Blais.

The chair was then taken by Mr. Joseph Lamarche, president of the local association, who addressed the delegates as follows:

GENTLEMEN:—In the name of the Master Plumbers' Association of Montreal, as Chairman, let me thank you most cordially for having accepted our invitation. I may state that we do not want to take all the honor upon ourselves of having convened this convention.

It is a long time since we desired to see the master plumbers united in one body, and we are very glad, therefore, that you come in such representative numbers from different parts of the Dominion. Let me thank especially those representatives who are here to represent the United States. It deserves special mention. They have had experience and are willing to show us the way to success, and let us benefit by their experience which they have derived from fourteen or fifteen years work. I really thank them most sincerely and welcome them to the City of Montreal.

There is another matter worthy of mention, namely, the Master Plumbers Journal, which is especially devoted to plumbing, etc. They have sent from New York Mr. Spiers, one of the staff, to represent their paper, and I thank them very much for the honor done us on this occasion.

There is no need of talking to you about the necessity of organization. We all know the good results to be obtained from it. The master plumbers of Montreal started an Association, as you know, some years ago, and did a great deal of work, but it did not turn out a success. A couple of years ago we united again, and we have done our best in Montreal to promote the success of organization, and I think the members of our Association deserve credit for having encouraged other places to help us in having this great convention to-day. At that time I believe there was only Toronto which had an organization. I do not think there was any organization in any other place in Canada, and to day we have representatives from ocean to ocean, from Toronto, Kingston, Ottawa, Montreal, St. Hyacinthe, Quebec, St. John, N. B., and Halifax, N. S. So gentlemen it says a good deal for the necessity of an organization.

It will not be out of place to mention a few reasons why we really need organization. Many people believe that we organize for the purpose of making dollars and cents. They must put away such an idea and we must make them understand we organize not for the reason they suppose, but in the interest of public health. There are many plumbers who do not know how to do their work, who do not understand the duties which appertain to their situation, or else they do not care to give themselves the trouble of executing them properly. I may say of Montreal, that a by-law was passed some time ago, prohibiting the use of tile pipe inside of buildings, but it was not enforced, and though the by-law was still in existence, bad work was

MR. W. J. BURROUGHES, Vice-President, Toronto.

allowed to be done. It therefore cannot be for dollars and cents that the master plumbers organized, since they can make more money by repairing tile pipes than by putting in iron ones. We organized, as I said before, in the interest of the public health.

Another reason is that a great many men go into this kind of work and know practically nothing about it, because they have served but a short apprenticeship; it is therefore the duty of this organization not only to look to the sanitary condition, but to see that proper workmen are turned out and fitted to do the work in the future. A third reason is that manufacturers and suppliers of all kinds are organizing to protect their own interests, and why should not we? We should not only organize in one particular city, but all through the country, all over the

Dominion, so that if necessary we can act in a body and maintain our rights.

As far as trade relations are concerned we have no other wish, but to live and let live. It is the only wish we have here, and I am certain there is no one who will refuse us the advantage of living as well as themselves.

Gentlemen let me thank you once more for having come here in such numbers, and let me express to you my heartiest feelings on the part of the Montreal Master Plumbers to have the honor of receiving you here for the first convention of the Dominion Master Plumbers of Canada.

Mr. Lamarche then made a short speech in French to those who did not understand English.

MR. J. W. HUGHES, Secretary, Montreal.

Mr. T. J. Tute, of Boston, was called upon to address the meeting. He said: I second Mr. Lamarche in saying that we have labored for fifteen years and have still work before us, not as a matter of making dollars and cents, but to protect the public. In building a school it is not so much the brick, the woodwork, and the painting that should be closely attended to, as the sanitary work. Where your children, my children, and children of the world are to meet it is most necessary that they have pure air to breathe, live and work in. When you go on board a steamer the first thing almost that one notices is a card hanging upon the wall indicating the qualifications of the engineer. It is just as important for our trade to have this same qualification. The world may call us the thieving, robbing plumbers; but, gentlemen, thieves and robbers grow rich, but you can find very few rich plumbers. We want to protect our own interests and to keep out impurity, and let innocence be uppermost, where God-like people may dwell in safety. And how are we to do it? It is by clasping hands with one another, with honorable, upright men throughout the world, to try and protect humanity from the cradle to the grave. We most heartily extend that protection to you to its utmost limit, and will always be pleased to do what we can to help you. We are all brothers of one family. You have my best and hearty sympathy and support.

Mr. F. J. Davlin, of Boston, followed, stating that it gave him much pleasure to extend to Canadian master plumbers the fraternal greetings of the master plumbers of the United States, and assure them of their hearty support at all times. Do not be backward, he said, in calling for aid, assistance or information that our association has in its power to give you.

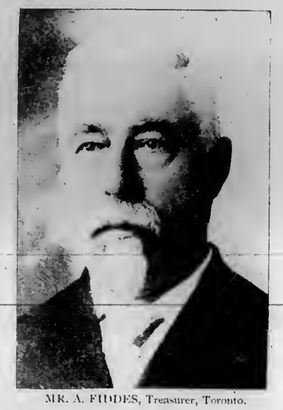
Mr. I. Riley, another delegate from the United States association, was then called upon, and expressed his pleasure at being present, and at seeing such a large number present.

The President stated that he had only taken the chair pro tem, but he was requested to continue in office, and Mr. J. W. Hughes, of Montreal, was appointed temporary secretary.

Messrs. R. F. Elliott, Kingston; F. W. Armstrong, Toronto, and O. Matte, Quebec, were then appointed a committee on credentials.

Mr. Burroughes, President of the Toronto Association, was asked to address the delegates. He related some interesting circumstances in connection with the plumbing business in Toronto, referring particularly to the strike of journeymen plumbers over the apprenticeship question in the year 1888, and which was finally won by the master plumbers, as the result of having an association, which had only been formed a year previous. With regard to association matters, he stated that he had always taken a great interest in them and done his best to further the interests of associations and to organize in adjacent cities. About a year ago he wrote the Montreal association about forming a national society, and it was decided that the Montreal association should look after the eastern provinces, and that Toronto would look after the west. Letters were sent to nearly every city in the Dominion, and in every instance a satisfactory reply was received. These steps had ultimately resulted in the meeting at which they were present. At London and Hamilton they had succeeded this year in forming associations. Adjoining these two cities were a number of towns, the plumbers of which would affiliate with the associations of London and Hamilton.

Mr. Borton, president of the Halifax association, said that as regards their association, it had only been organized about a year ago. At that time they saw that something must be done, as the jobbers down there



MR. A. FIDDES, Treasurer, Toronto.

were making a slaughter house of Halifax. A meeting was called, and after a little hard work the association was formed. There were three plumbers, he said, who did not belong to the association in Halifax, and who at the present time cannot get their goods in Canada, but they were getting them from the United States. This was causing the association some trouble.

Mr. Moody, of St. John, N. B., said that St. John was the first to move in the direction of forming an association in the maritime provinces, and Halifax followed. The latter branch, he admitted, had made

greater progress and had a larger membership than St. John.

The following were appointed as members of the committee on constitution and by-laws: Messrs. J. W. Hughes, Montreal; J. J. Jamieson, Kingston; W. J. Burroughes, Toronto; R. J. Haslett, London; R. Sampson, Quebec; A. Blondin, St. Hyacinthe; J. McKinley, Ottawa; J. Borton, Halifax; J. H. Doody, St. John, N. B., and R. F. Elliott, Kingston.

After a few words from Mr. R. F. Elliott, mayor of Kingston, the convention adjourned for lunch.

On reassembling, Mr. E. C. Mount was appointed sergeant-at-arms, and Mr. Hughes read the constitution and by-laws which the Legislative Committee had adopted, being those governing the National Association of Master Plumbers of the United States, with such amendments as were necessary to make the same conform to Canada. The by-laws were read clause by clause and adopted. They provided that the organization should be known as the National Association of Master Plumbers of the Dominion of Canada. It was organized for sanitary, commercial and social purposes, and had for its special objects the advancement appertaining to sanitary laws; to promote and combine the interests of the trade in the latest discoveries in sanitary science; the protection of the trade against imposition, injustice or encroachment upon their common rights or interests; encouraging inventions or improvements in sanitary appliances, fostering an interchange of thought, and eliciting and communicating for the benefit of each member the best talent and result of the experience and ability of all; to promote amicable relations with employees, on the basis of mutual interest and equitable justice to both journeymen and master plumbers; to encourage Dominion and Provincial legislation for the furtherance of the interest of sanitary laws; to secure for the members of the trade equitable treatment in their dealings with manufacturers and dealers in supplies; to regulate the system of apprenticeship and employment, so as to prevent, as far as practicable, the evils growing out of deficient training in the responsible duties of selecting, arranging, and fitting up materials relating to the hydraulic and sanitary condition of dwellings, public and private institutions; to create and maintain a sanitary code at as high a standard as the progress of science (chemical, philosophical and mechanical knowledge) teaches.

ELECTION OF OFFICERS.

Messrs. R. F. Elliott, Kingston, Alph. Champagne, Montreal, and W. Smith, London, were appointed a Nomination Committee, and reported in favor of the appointment of the following officers: President, Mr. Joseph Lamarche, Montreal; vice-president, Mr. W. J. Burroughes, Toronto; vice-presidents from each province represented, Messrs. William Smith, Ontario, O. Matte, Quebec, J. H. Doody, New Brunswick, and John Borton, Nova Scotia; financial and recording secretary, Mr. J. W. Hughes, Montreal; treasurer, Mr. Fiddes, Toronto; executive committee, to act in conjunction with the officers of the association, Ontario, R. F. Elliott, Quebec, E. C. Mount, New Brunswick, Thos. Campbell, Nova Scotia, Geo. A. Perior.

The report was unanimously adopted, after which the newly-elected officers returned thanks for the honor conferred upon them. Adjournment was then announced until 8 p. m., when the members met in secret session, at which the question of a protective policy was considered and the matter left in the hands of the executive committee.

SECOND DAY.

At 10 o'clock of the following day the convention resumed. In the absence of Mr. E. C. Mount, who was on the previous day appointed sergeant-at-arms, Mr. O. Matte, of Quebec, was appointed to act in his stead during the morning session.

At the request of the President, the delegates from the several associations reported the number of active members on the rolls as follows:—Halifax, 27; Montreal, 75; St. John, N. B., 12; Toronto, 35; London, Ont., 15; Ottawa, 9; Quebec, 37; Kingston, 7; Hamilton, 12; St. Catharines, 2; Toronto Junction, 1; Peterboro, 1; Galt, 2. St. Hyacinthe has no association, but a representative was present. The United States Association was stated to have a membership of 6,000.

The President reported that it had been decided to compose the Legislative Committee as under:—Messrs. J. McKinley, Ottawa, chairman; F. G. Johnson, Ottawa; A. Blondin, St. Hyacinthe; R. Sampson, Quebec; James Farquhar, Halifax.

The President announced that at 2 o'clock an official reception would be given by the mayor at the city hall, after which they would enjoy a drive through the city.

NEXT PLACE OF MEETING.

The selection of the place of meeting for the next convention was then taken up. Motions were offered in favor of Toronto, Kingston and Quebec. A vote was taken, with the result that Toronto was chosen as the meeting place for the second convention, the date to be fixed by the Executive Committee.

Mr. Hughes moved a vote of thanks to the National Association of Master Plumbers of the United States, which was acknowledged by Messrs. Davlin, Tute and Riley.

Mr. Elliott moved that the thanks be hereby tendered to the press for favors received, especially to Hardware and Metal, THE CANADIAN ARCHITECT AND BUILDER, and last, but not the least, to the Plumbers Trade Journal, and the able representatives sent here to assist us.

The President then called upon Lieut.-Col. Massey, of the Gurney-Massey Co., Montreal, to address the meeting.

Mr. Massey: I need scarcely assure you all that I did not expect you to call on me to say address you this morning. I should, however, fall very far short of my duty if I did not at once accede to your request. As a Montrealer in business here I can only assure those gentlemen from a distance who have come to assist you in forming a plumbers' association in the Dominion of Canada, that we are exceedingly glad to have you come to our city. I think the object of your association is very commendable. The duties of the Montreal association have been very carefully carried out heretofore. I have always loved to learn, and find that in going from place to place we can always derive a great benefit. I trust you may all have a very pleasant stay in Montreal.

Mr. Elliott moved, seconded by Mr. Burroughes, that the master plumbers of the Dominion desire to tender their sincere thanks to the Montreal Master Plumbers' Association for the hearty manner in which they have been received.

The motion was carried amid applause.

Votes of thanks were accorded to the president and secretary, which were suitably acknowledged.

The President then announced the adjournment of the convention.

SOCIAL FEATURES.

At 2 p. m. on the second day the delegates were received by His Worship, Mayor Wilson-Smith, at the city hall. A brief address of welcome was delivered by the Mayor, in which he stated that it was a matter for congratulation that so many business men of practical experience had gathered together to exchange ideas and aid the progress of a science which afforded protection, indirectly, to the commercial prosperity of the country. A visit was also made to the Council chamber, after which the delegates enjoyed a drive round the city by the courtesy of the Montreal members. At 5 p. m. the train was taken for Lachine, where a steamer was taken which carried them down the Lachine rapids.

In the evening the members celebrated the organization of a Dominion Association by a banquet at the Richelieu Hotel. About one hundred persons were present, and the chair was filled by the newly-elected president. The toast of the "Queen" was duly honored, and the health of "The Supply Houses" was responded to by Lieut.-Col. Massey, of the Gurney-Massey Co.; Mr. Sullivan, of Warden King & Son; Mr. McConochy, of Thomas Robertson & Co.; Mr. Glassford, of James Morrison, Toronto, and Mr. Anthes, of the Toronto Foundry Co. Other toasts were "The Visiting Delegates," "The Chairman," and "The Press," to which brief responses were made.

A strong effort is being made by the architects of the state of Washington to have congress make an appropriation to provide for the investigation and testing of American timber, with particular reference to Washington fir. The bill as now proposed, provides for an appropriation of $40,000 for the purpose, of which at least thirty per cent. shall be devoted to the testing of timber of the Pacific coast.

A class in bricklaying has been established in San Francisco, Cal., by a resident bricklayer who has been engaged in business for many years. The class is composed of boys from ten years of age upward, who take a lesson every day after school hours, and also on Saturday. An hour is spent in drawing to scale that which they build during the week. The pupils are the sons of the leading contractors of the city, and instruction is given in laying Roman, common and press brick, as well as how to do all kinds of work pertaining to the trade.

THE Gurney Foundry Company, Limited, of Toronto and Montreal, have recently opened large showrooms at 75 Finsbury Pavement, E.C., where they display a quantity of their hot water boilers and radiators (low pressure). After careful inspection their manufactures seem to be of the highest quality, both in materials and workmanship. This system of heating has given great satisfaction where it has been installed, and we may mention the following buildings in which this system may be seen in use:—The Tivoli Music Hall and Restaurant; the Union Bank, Princes Street, E.C.; the Garrick Theatre; Sir Charles Tupper's residence; Peek, Winch & Co., New Buildings, Eastcheap; London and Midland Bank, Peckham; and the New Fish Market, Farringdon Road, E.C.—British Architect.

CREDIT FORKS MINING & MFG. CO.
(FORMERLY CARROLL & VICK.)
84 Adelaide St. W. - TORONTO

Brown Stone Quarries,
Credit Forks, Ont.
Supply the Best . . .
BROWN STONE IN . . CANADA

DIMENSION
RANDOM
HEADS, SILLS
COURSING
SHODDY
RUBBLE
CRUSHED STONE FOR CONCRETE

GREY LIME of Superior Setting Quality shipped in car lots to dealers.
Office: 84 Adelaide St. West, TORONTO
Telephone 208.

"Since we used Mica
to cover our flues the insurance companies have reduced our rate." That is what the Allan Mfg. Co. writes to us. After a series of tests, the Boiler Inspection and Insurance Co., of Canada, says of it: "Its non-conducting property, its durability, and its portability, unite in making it the most effective and convenient boiler covering on the market." The Toronto Dredging and Contracting Co. says: "It has effected a saving of coal of about 25%. The Toronto Ferry Co. found a saving of 20%; the Aylesbury Dairy Co. of 33%.
THE MICA BOILER COVERING CO.
9 Jordan St., TORONTO

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

ILLUSTRATIONS.

POST OFFICE, CUSTOMS, AND INLAND REVENUE OFFICES, VICTORIA, B. C.—THOS. FULLER, OTTAWA, ARCHITECT.

This building is being constructed on a plot of land bounded by Government, Courtney, Wharf and Humboldt streets. The outside walls are to be built of grey cretaceous sandstone from Gabriola Island, on a basement of granite, the partitions of the basement and ground floor to be brick, and the remaining partition, as well as the floors and roof, of wood, the roof covering to be of copper. There is to be a main portion, 136 ft. by 75 ft., having three full storeys, a basement and a mansard, and also an L-shaped annex of one storey and basement, having frontages of 107 feet and 103 feet on Courtney and Wharf streets respectively.

The main building is to be apportioned as follows: The basement to the heating apparatus, fuel, stores, water closets, etc.; the ground floor to the local post office; the first floor to the customs and finance; the second floor to the Inland Revenue and post office inspector's office, and the finished portion of the attic to the caretaker for a residence.

The annex will consist of a portion 75 feet by 26 feet, devoted to stores, a portion 109 ft. by 38 ft. for a bonded warehouse, and, in rear of the warehouse, a one-storey drive-way 30 ft. by 29 ft. The drive-way is 13 ft. wide, paved with granite, and leads from Humboldt street to the yard. Seven fire proof vaults are to be provided for the use of the several departments occupying the building. The building will be heated throughout by hot water direct heating.

Plans, specifications, and details for all the works, including fittings, heating, etc., were prepared by the Chief Architect of the Department of Public Works, Mr. Thos. Fuller, and the work is being carried out under the supervision of F. C. Gamble, departmental resident engineer at Victoria, B. C. The contractors for the construction of the building are Messrs. Elford Smith, Victoria, B. C., the fittings and heating not yet being contracted for.

CEMENT SIDEWALKS.

Repying to a correspondent who has had difficulty in making a cement sidewalk retain a smooth surface, a writer in Paving and Municipal Engineering says:—

"While the top mixture should be thoroughly rammed or beaten and well troweled, yet this treatment should not be continued so long as to bring to the surface a considerable quantity of neat cement, thus leaving the layer of mortar next below without sufficient cement to bind it together. If this is done, the thin layer of neat cement may flake off when set, revealing a layer of almost clear sand below. A similar result obtains if one attempts to retrowel a surface once finished and partially set but afterward defaced. Sprinkling the walk before the cement has thoroughly set may cause blisters which mar the appearance of the work; on the other hand, the walk should be protected from the direct rays of the hot sun, or surface cracks may result."

The following rules for the use of cement in freezing weather will be found useful:—As little water should be used as will permit a thorough incorporation of the materials. The water, sand, and stone may well be heated to about 100 degs. F., and in any case should be above 32 degs. F. Salt may be used in small quantities to delay freezing until the work is in place, or in larger quantities to prevent freezing until the cement has set and hardened sufficiently to resist the destructive tendency of the freezing weather.—Municipal Engineering.

BOOTH'S PATENT

STEEL-CLAD BATH

Here's ..a.. "Pointer"

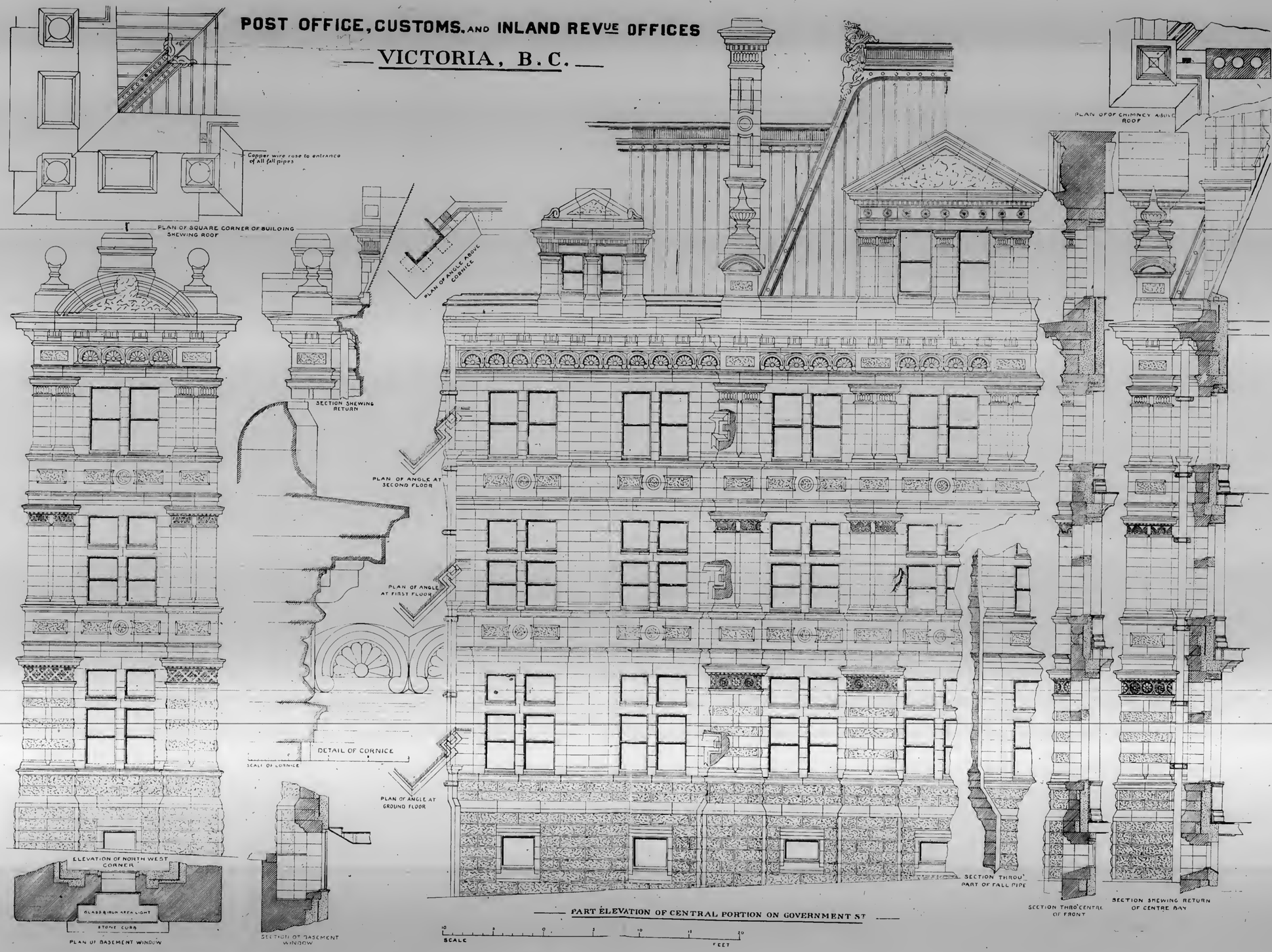
Agencies and Warerooms are maintained at points named in illustration Prices and Samples of our Goods Submitted on Application

Head Office and Factory

THE TORONTO STEEL-CLAD BATH & METAL CO., Ltd.

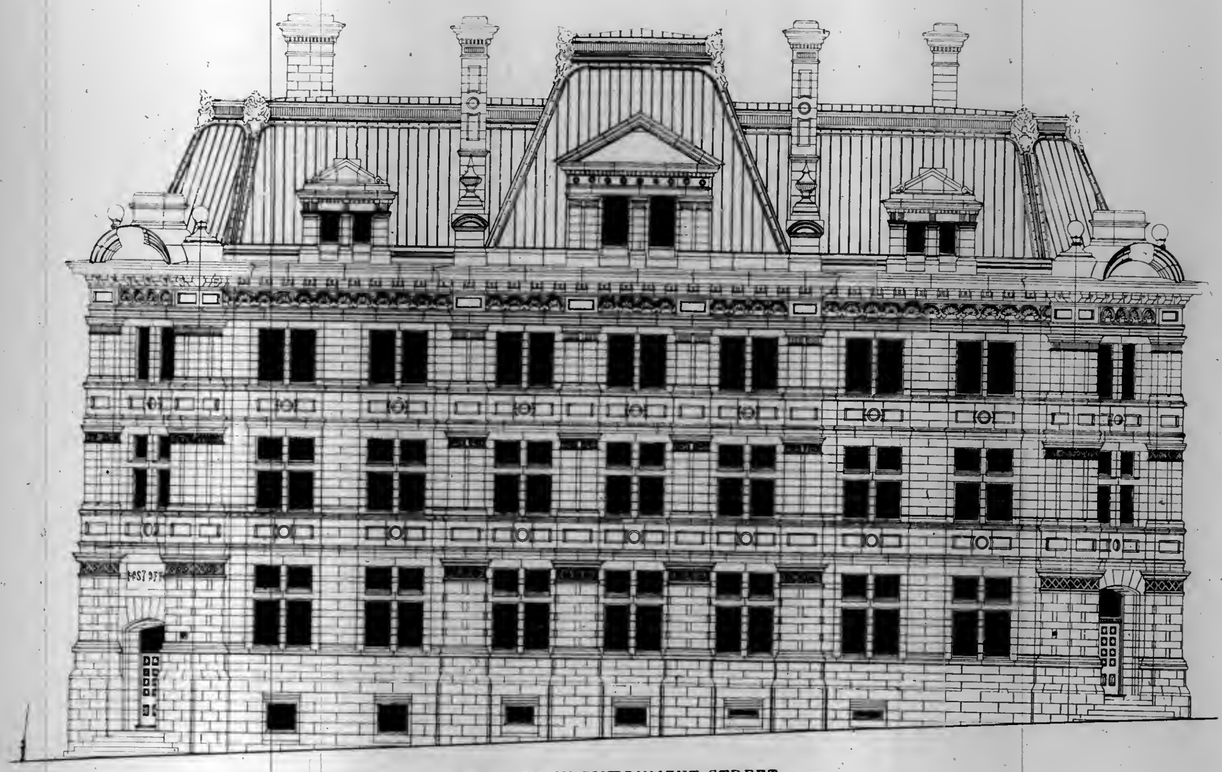
125 and 127 Queen St. E.
TORONTO

POST OFFICE, CUSTOMS, AND INLAND REVUE OFFICES
— VICTORIA, B.C. —



POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES, VICTORIA, B.C.

THOS. FULLER, ARCHITECT, PUBLIC WORKS DEPARTMENT, OTTAWA.



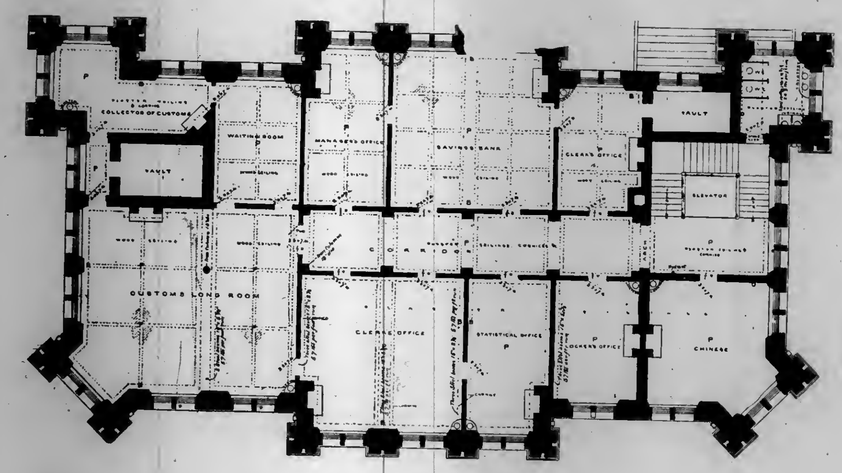
ELEVATION ON GOVERNMENT STREET.

SCALE FEET

POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES, VICTORIA, B.C.

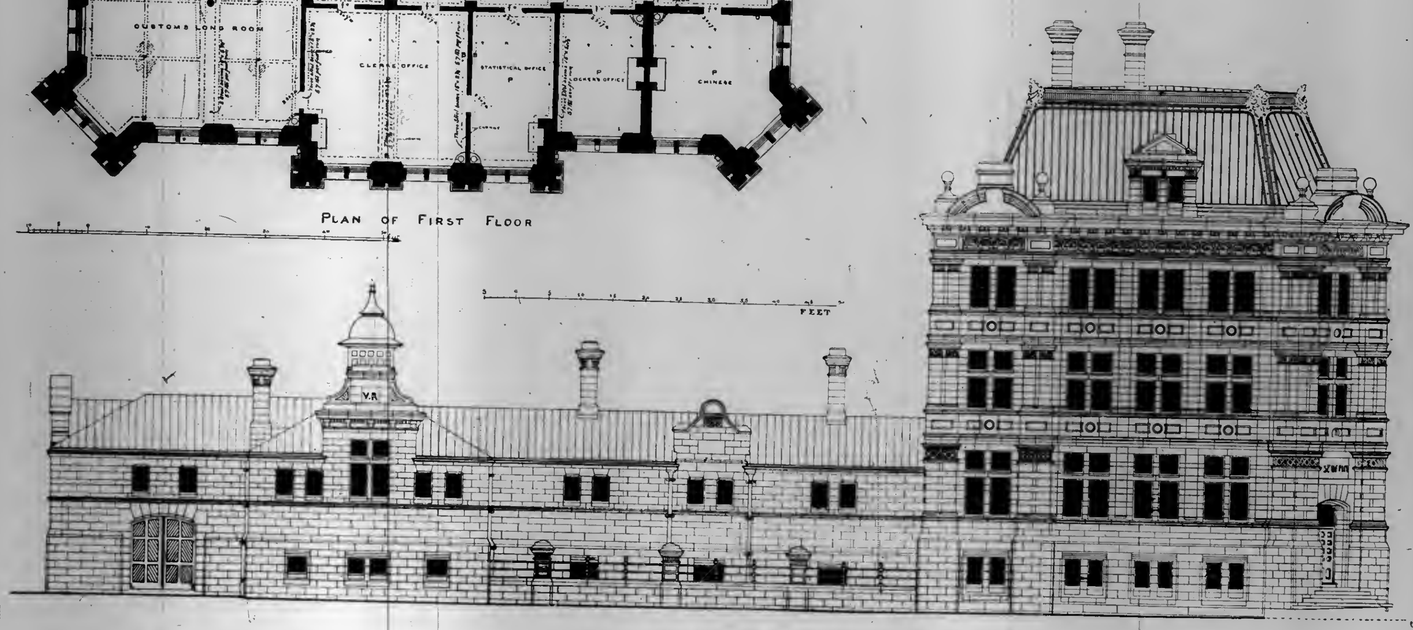
THOS. FULLER, ARCHITECT, PUBLIC WORKS DEPARTMENT, OTTAWA.

VOL. IX.] CANADIAN ARCHITECT AND BUILDER. [No. 7.



PLAN OF FIRST FLOOR

FEET

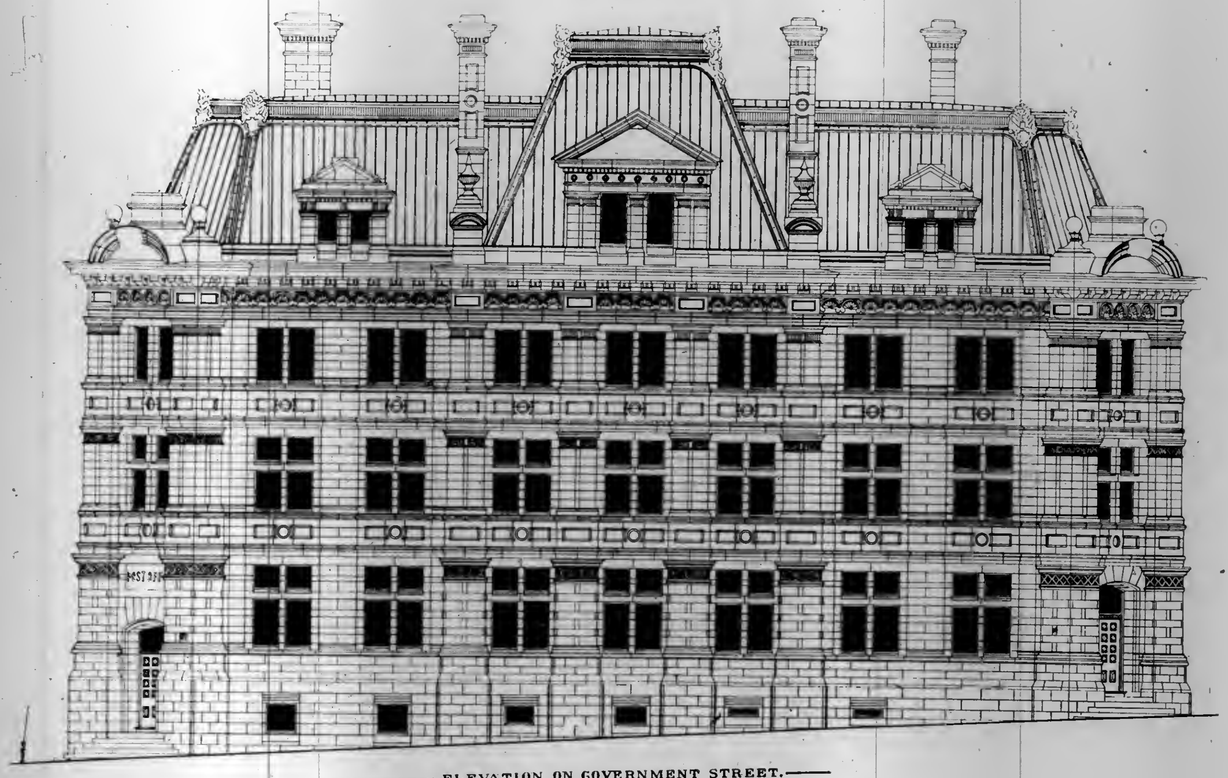


ELEVATION ON HUMBOLT STREET.

POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES, VICTORIA, B.C.

THOS. FULLER, ARCHITECT, PUBLIC WORKS DEPARTMENT, OTTAWA.

VOL. IX.] CANADIAN ARCHITECT AND BUILDER. [No. 7.



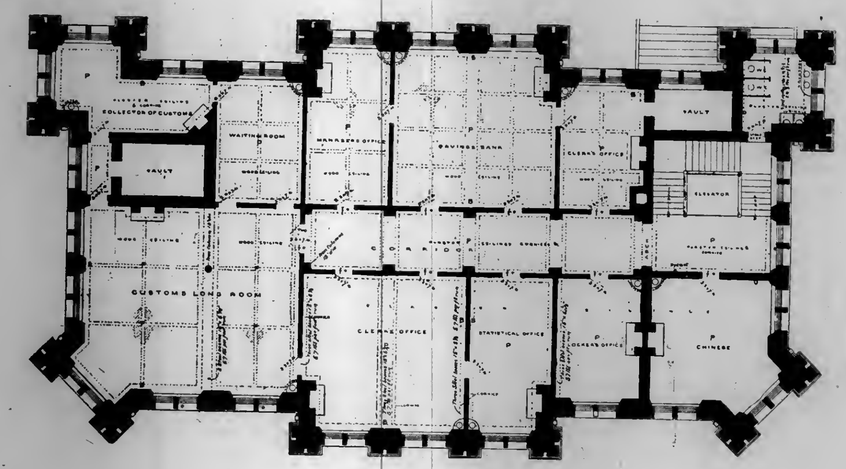
ELEVATION ON GOVERNMENT STREET.

SCALE FEET

POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES, VICTORIA, B.C.

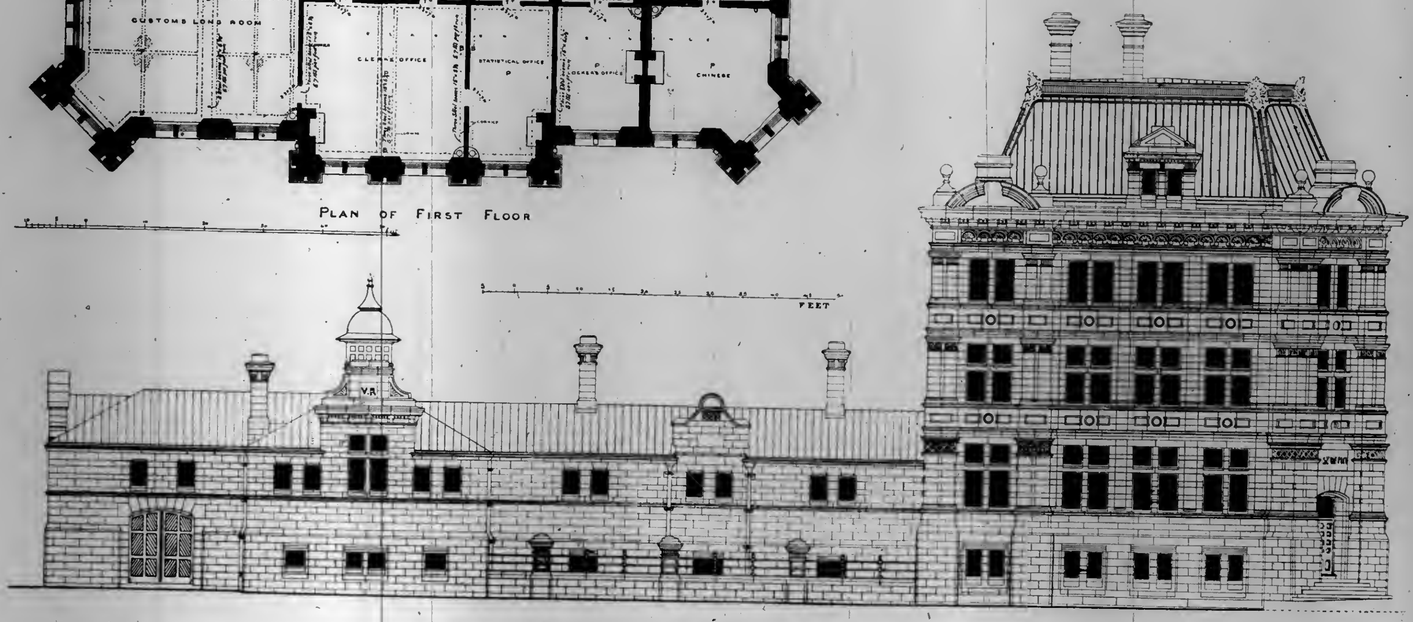
THOS. FULLER, ARCHITECT, PUBLIC WORKS DEPARTMENT, OTTAWA.

V.8-9 Canadian archit



PLAN OF FIRST FLOOR

FEET



ELEVATION ON HUMBOLT STREET.

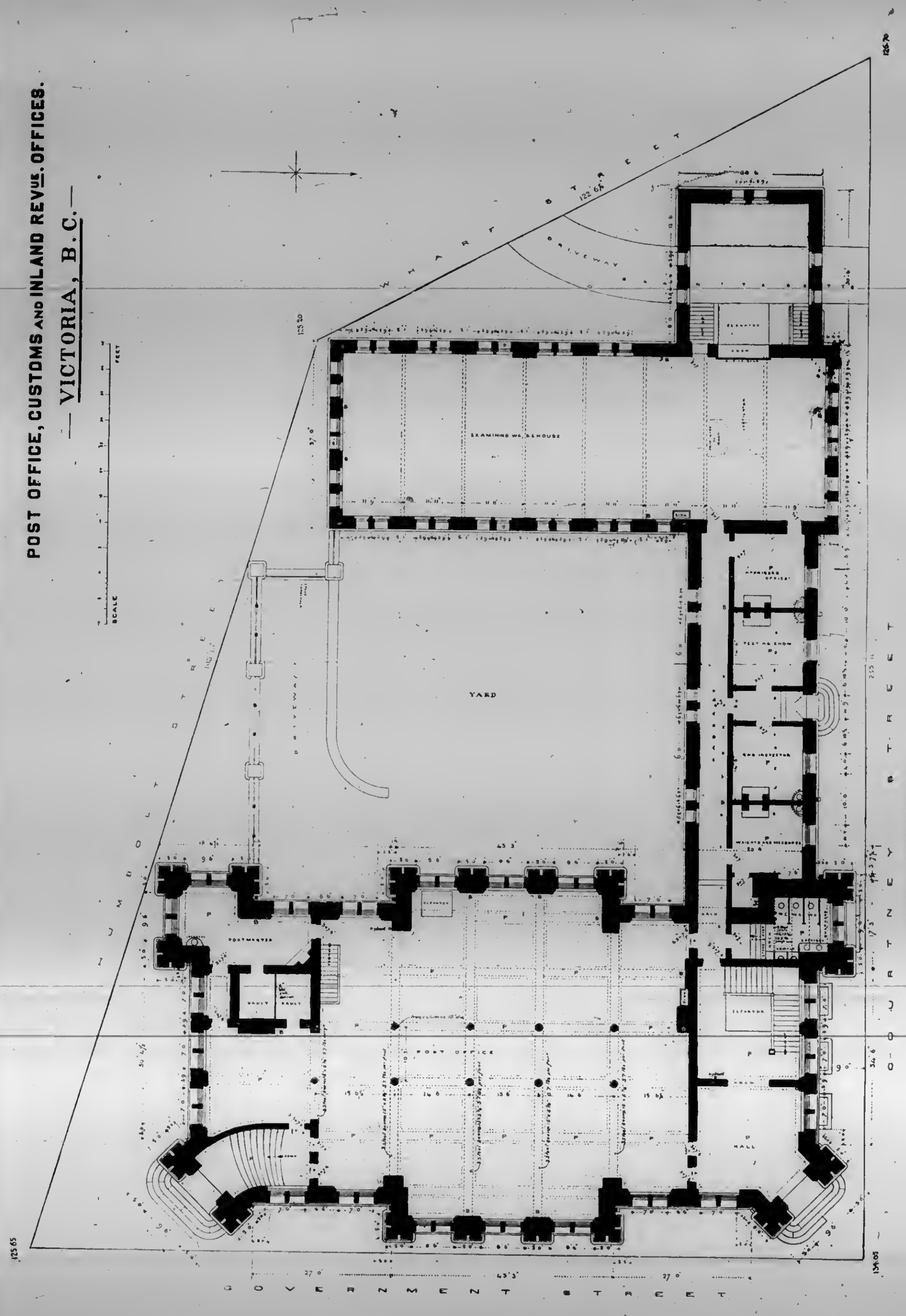
POST OFFICE, CUSTOMS AND INLAND REVENUE OFFICES, VICTORIA, B.C.

THOS. FULLER, ARCHITECT, PUBLIC WORKS DEPARTMENT, OTTAWA.

v.8-9
Canadian
Archi

POST OFFICE, CUSTOMS AND INLAND REVUE OFFICES.

— VICTORIA, B.C. —



— PLAN OF GROUND FLOOR —

v.8-9
Canadian
Archi

CANADIAN ARCHITECT AND BUILDER.

VOL. IX.—No. 8. AUGUST, 1896 PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisemnets should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	H. B. GORDON, Toronto.
1ST VICE-PRESIDENT	J. GEMMELL, Toronto.
2ND VICE-PRESIDENT	JOS. W. POWER, Kingston.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

F. J. ALEXANDER	Ottawa.
THOS. FULLER	Ottawa.
E. J. LENNOX	Toronto.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:
W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. C. HUTCHISON, Montreal.
1ST VICE-PRESIDENT	A. T. TAYLOR, Montreal.
2ND VICE-PRESIDENT	J. P. PEACHY, Quebec.
SECRETARY	J. VENNE, Montreal.
TREASURER	JOSEPH PERRAULT, Montreal.

COUNCIL:

CHAS. BAILLAIRGE	Quebec.
ROBT. FINDLAY	Montreal.
J. Z. RESTHER	Montreal.
A. H. LAPIERRE	Montreal.
G. E. TANGUAY	Quebec.
THEO. DAOUST	Montreal.

AUDITORS—A. J. FOWLER and C. CHAUSEE, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

JOHN ALDRIDGE, President.
THOS. CANNON, Jr., 1st Vice-Pres.
JOHN VICK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. BOOTH.
JOHN WICKETT.
JOHN RUSSELL.
H. LUCAS.
JOHN VOKES.
JAS. CRANG.
JOHN M. GANDER.
GEORGE HENRY.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this Journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Buildings for the Paris Exhibition.

FIFTY-NINE designs have been submitted in competition for the two principal buildings to be erected in connection with the Paris Exhibition of 1900. One of the buildings is to be devoted to the industrial and the other to the fine arts. The latter is to become the art gallery of the city upon the close of the Exhibition. The London Builder sums up a criticism of the leading designs by saying: "The competition is certainly not without interest, and represents an immense amount of work. But one can hardly say that it presents any great or epoch-making qualities of national architecture, though one must recognize that as the competitors have only had two months and a half in which to prepare their designs, the result under those circumstances is somewhat remarkable."

Free Silver Agitation.

THE possibility of the triumph of the advocates of free silver coinage at the approaching presidential election is seriously disturbing business conditions in the United States at the present moment. A clause requiring all payments to be made in gold coin, has become a common feature of business contracts, and the National Association of Builders have under consideration the advisability of embodying such a clause in the "Uniform Contract." Building operations in the large cities are, it is said, being seriously hampered by the refusal of financial institutions to make loans to builders and others, except under agreement for repayment in gold. The tremendous risk which a speculative builder would assume who should consent to such a stipulation is sufficient to deter most from proceeding with contemplated enterprises. The same uncertainty prevails to a greater or less extent throughout every department of business, and is exerting a paralyzing influence upon national enterprise.

The Province of Quebec Association of Architects.

THE Province of Quebec Association of Architects are to be congratulated on the progressive spirit in which they are endeavoring to promote the welfare and usefulness of the organization and advance the interests of architecture and the kindred arts in the Province of Quebec. During the present year meetings of the members resident in Montreal have been held monthly, at which interesting papers were read and discussed. Following these meetings the members have been accustomed to dine together and talk over in a social way

v.8-9
Canadian
archi

matters in which the Association is interested. No doubt as the result of this frequent intercourse and discussion, the Association has determined, with the assistance of the Arts Association of Montreal, to hold an Arts and Crafts Exhibition in the Art Galleries, commencing on the 8th of October, particulars of which are printed in our Montreal correspondence. It is to be hoped that the Ontario Association of Architects and other kindred societies will lend a helping hand to the enterprise. We doubt not the Exhibition will prove a gratifying success and a source of pleasure and instruction to all who may have the opportunity of visiting it.

Competitions.

It is very doubtful, indeed, if the conditions of architectural competitions in Canada are improving. They seem rather to be becoming more unsatisfactory as the years go by. For example, competitive plans were lately invited from architects throughout the Dominion and even in the United States for a public building to be erected in one of the remote parts of the country. When the designs were all in, and a meeting had been called to consider their merits, a member of the committee coolly suggested at the very outset that only the plans submitted by local architects should receive consideration. Fortunately there were on the committee men with clearer perceptions of equity, through whose influence the outside competitors received more considerate treatment. If it is the wish to give work of this character to local architects, the competition should be restricted to these. It is a most despicable proceeding to invite outside architects to submit designs, with the intention of appropriating the fruits of their study and skill for the benefit of a local architect. This, however, is the course which has been followed in more than one competition in this country.

The Good Roads Movement.

It is announced that in connection with the annual convention of the Ontario Good Roads Association to be held simultaneously with the Toronto Industrial Exhibition, there will be given an exhibition of road-making and road-making machinery. The movement for improving the public highways throughout Ontario was started at a most auspicious time, when the bicycle was commencing to achieve its prominence and popularity. The Good Roads Association can count upon the support of the army of bicyclists who have encountered the country road in all its deformity as it exists at present in many parts of the province. As large numbers of bicyclists are now to be found in every town and city in the Dominion, their advocacy should prove an important factor in bringing about the improvement which the Good Roads Association is endeavoring to promote. The appointment by the Ontario Government of Mr. Campbell, late city engineer of St. Thomas, as Provincial Road Instructor, has also been the means of giving strength to the movement. In this connection we notice that Mr. Campbell is not confining himself to giving instruction to the officials of rural municipalities, but is also placing his time and knowledge at the disposal of town and village corporations. In so doing it appears to us he is stepping beyond the legitimate bounds of his position, and is trenching upon work which the professional engineer might reasonably feel himself entitled to, and for which the municipality should feel called upon to pay.

The O. A. A. Conventions.

The Royal Institute of British Architects recently made a departure from their usual custom by holding their annual dinner in the town of Manchester. This action of the Institute has met with approval, its tendency being to encourage a closer intimacy between metropolitan and provincial architects, resulting in advantage to their mutual interests. We submit to the Council of the Ontario Association of Architects that if meetings of the Ontario Association were occasionally to be held in cities like Ottawa, Kingston, London and Hamilton, it might be the means of inducing the architects of those cities to take a deeper interest in the welfare of the Association and the objects which it aims to accomplish. The fact that a large proportion of the membership of the Association resides in Toronto is no reason why the meetings should always be held in that city, as the attendance of outside members is always proportionately as good as of city members. Seeing that many of the city members are so lacking in interest that they do not put in an appearance at the meetings, it is scarcely fair that the outside members should be called upon every year to bear the expense of coming to Toronto. The members have had ample opportunity to become acquainted with the architecture of Toronto. Would it not be advisable to introduce them to the architecture of the other cities of the province and afford the architects of those cities a chance of occasionally doing the honors?

Building Regulations in Toronto.

Immediately subsequent to the great fires which took place in Toronto in the early part of 1895, a committee of members of the Ontario Association of Architects spent much careful effort in the preparation of a building by-law for submission to the City Council. The Council at that time extracted from the proposed by-law a few clauses which were incorporated into the existing by-law. The remainder of the recommendations submitted have since received no attention at the hands of the aldermen, and from present appearance the disinterested labors of the committee will be to a large extent valueless. It is well known to those who have anything to do with building operations in Toronto that the existing by-law is full of imperfections, and furthermore that it is very loosely administered. We have frequently referred to the fact that perhaps in the majority of instances building permits are granted subsequent, instead of previous, to the commencement of the construction of the building; thus it becomes well nigh impossible to enforce compliance with the building regulations if these have been departed from by the designer or builder. The present by-law is noticeably defective in one or two particulars. Persons making application for a building permit are not required to submit with their plans a copy of the specifications, without which it is impossible to fully understand the manner in which the work is to be carried out. Again, no copy of the plans is kept on file in the building department, and there is consequently no means of knowing when changes are made in the original drawings. An instance of the laxity with which the by-law is administered came to light the other day when a scaffold which was being used in connection with some repairs to one of the departmental stores, gave way, resulting in injury to several workmen. On investigation it was found that the work was being carried out without a permit from the building department. It is desirable that the building by-law should be amended and properly administered, and during the present period of dullness, the City Council might profitably turn its attention to the matter.

Cheapening Production.

However much condemnation may be heaped upon "combines" of manufacturers in the same line of business for the purpose of maintaining prices at a point which would insure a fair margin of profit on invested labor and capital, much can be said in favor of such organizations. Overproduction in almost every line has resulted in competition which, if not restrained in some manner, must work disaster to manufacturers and their employees. To illustrate the effect which this striving after cheapness of production has upon the workman, we may cite the case of a manufacturer of a certain class of appliances used in building construction, who recently put in operation mechanical apparatus by means of which, with the assistance of a couple of laborers, he is enabled to do work which formerly required the services of eight skilled mechanics. This method of cheapening production has been forced upon him by the invasion of his territory by several new competitors. By and by these competitors will either be forced out of the field and suffer the loss of their capital, or will have discovered means of reducing the cost of production to a point which will enable them to hold their own in the race. When that time shall have arrived an effort must be made to further cheapen production, and so the struggle to outdo one another continued until the margin of profit is entirely wiped out, and the skilled workman reduced to the level of the laborer, with his chances of employment reduced in like proportion. Do the public want cheap goods at such a sacrifice? Whether they do or not, manufacturers should decline to sacrifice their interests and those of their employees to satisfy so unreasonable a demand. When competition reaches the point where there is no profit with which to pay a fair return to capital and labor, the combine becomes justifiable.

A Brightening Outlook.

It is gratifying to observe indications of a revival of building operations in Toronto, where a stagnation has prevailed for several years past. We are advised that owners of land in the out-lying districts are beginning to erect houses, owing to the fact that the extension of the street railway system, and the widespread use of the bicycle has made it possible for persons engaged in the business part of the city to reach the out-lying districts as conveniently, and in less time, than was required a few years ago to reach points a mile or two nearer the centre. The conditions of residence are certainly more desirable in the out-lying sections, and now that time and distance have to so large an extent been annihilated, it may reasonably be expected that comfortable houses in these districts will find tenants as readily as those in the more populous localities. The steady decline in the rate of interest is also inducing the erection of new buildings. Within the past few weeks, loans have been made on real estate in the city of Montreal at as low a rate as 4½ per cent., and we are informed that English capital is now available at this rate for any legitimate enterprise which gives promise of proving reasonably remunerative. With money available at this low rate of interest, persons who for a number of years have been holding vacant lands, from which they were unable to derive any revenue, and on which they were obliged to pay city taxes, are said to be coming to the conclusion that they might better build thereon a class of houses which would be likely to command a fair rental.

Taking a broader view, there are indications to be seen pointing to a more prosperous condition of affairs in Canada in the near future. The collapse of the South Africa boom, the unsatisfactory conditions prevailing in Australia, together with the unsettled state of affairs in the United States, as the result of which a large amount of British capital has recently been withdrawn from that country, and the possibility of the adoption of a silver coinage, which would lead to a still further withdrawal of British investments, all point to Canada as one of the most desirable fields for the investment of foreign capital in the future.

The recent gold mining developments in British Columbia are certain also to prove a most important factor in our future prosperity. We have the assurance of experts of the highest authority that the gold mines of British Columbia are the richest in the world. At the present time millions of foreign capital is being invested in these mines, and the prophesy is being made that a large influx of population will be received within the next few years. Owing to the disappointing experience of British capitalists who invested so largely in Grand Trunk securities, Canada has hitherto been shunned by the British investor, and other fields which were less promising have benefitted at our expense. It now seems probable that our turn will come in the near future. We have one of the richest countries in point of natural resources upon the face of the globe. We have also a favorable climate, and unrivalled transportation facilities. We lack capital and population, and it seems probable that these necessities are now about to come to us. If so, we may expect to witness improvement in every line, in which event no industry is likely to derive greater benefit than that in which architects, builders, and manufacturers and dealers in building materials are connected.

PERSONAL.

Mr. Anderson, Building Inspector, Hamilton, is recovering from a severe attack of typhoid fever.

Mr. Charles Rose, a well-known Toronto builder, died unexpectedly while visiting friends in Portsmouth, England.

Mr. R. P. LeMay, of the firm of Berlinguet & LeMay, architects, Quebec, is at present in Charlottetown, P. E. I., superintending the construction of the new Catholic cathedral in that city.

The appointment of Mr. E. G. Barrow to the position of city engineer of Hamilton, Ont., rendered vacant by the death of the late Mr. Haskins, has been officially announced. Mr. Barrow was assistant engineer for some time, and is thoroughly familiar with the details of the work. He was born at Clifton, near Bristol, Gloucestershire, England, forty-nine years ago, and educated in the Taunton College School. He served three years under Francis Fox, chief engineer of the Bristol & Exeter Railway of England, and at the expiration of that period his ability was recognized by his appointment as assistant engineer of the branches of the same road. Mr. Barrow came to Canada in 1871, and had charge of the work of locating the line of the Midland Railway, and afterwards that of the Northern & Northwestern from Georgetown to Collingwood. For the latter work the late Mr. Haskins was chief engineer. Thereafter Mr. Barrow worked for the city under Mr. Haskins, although not permanently appointed assistant until 1888. He superintended the construction of waterworks at Teeswater, Paisley and Campbellford, and also the Government waterworks at Mimico.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

ARTS AND CRAFTS EXHIBITION BY THE P. Q. A. A.

As briefly announced in the ARCHITECT AND BUILDER for July, the Province of Quebec Association of Architects will hold an Architectural and Arts and Crafts Exhibition in the Galleries of the Art Association, Phillips Square, commencing on Thursday, 8th October, 1896. This exhibition will consist of: (a) Architectural Drawings; (b) A Loan Collection of Antiques; (c) Modern Industrial Art in its Application to Architecture.

The Art Association of Montreal have kindly granted the use of their fine galleries for the purpose, and are co-operating with the Architects' Association in promoting the Exhibition.

Committees composed of members of the Association of Architects and Art Association have been appointed to select and arrange the exhibits. These Committees will have power to reject any work which in their opinion does not possess sufficient merit to entitle it to a place in the Exhibition.

The Architectural Section to consist of Pen and Ink and Colour Perspectives, Drawings of Original Designs, of Sketches in Ink or Colour of Old Work; all Drawings must be suitably framed.

The Industrial Art Section to consist of Stone and Wood Carvings and Sculpture, Original Architectural Models, Artistic Iron and Metal Work, Ornamental and Figure Glass Work and Original Cartoons for same, Original Designs for Wall Paper, Artistic Book Binding, Coloured Designs for Interior Decoration, Figure Mosaics in Glass, Marble or Tile, Architectural Ceramic Work, Textile Fabrics applicable to Interior Decorations, &c., &c.

As the space in the galleries is limited, articles for exhibition in the Industrial Section must be of reasonable size, and the Committee will exercise their discretion as to the size of articles that can be accepted.

Antiques loaned for exhibition will be sent for and returned to the owners, and will if required be insured on such terms as may be agreed upon.

Drawings and works other than Antiques are to be addressed to the Art Association, Phillips Square, and delivered there not later than the 24th September, and are to be removed immediately after the close of the exhibition, the delivery and removal to be at the risk and expense of the exhibitor.

Every care will be taken of the works while on exhibition, but no liability will be assumed for insurance, damage or loss from any cause whatever.

In connection with my reference last month to the forthcoming Loan Exhibit under the the direction of the P. Q. A. A., by a misprint the name "R. Findlay" appeared for that of Mr. R. Lindsay, of the Art Association, in the list of members of the Committee.

A DESIGN COMMITTEE.

The Committee of the Province of Quebec Association of Architects to consider designs submitted on different occasions is composed of the President, the Vice-Presidents and the Secretary. For this year the Committee is as follows: A. C. Hutchison, President; A. T. Taylor, 1st Vice-President; J. F. Peachy, 2nd Vice-President; Jos. Venne, Secretary.

STREETS OF MONTREAL.

The question of repairing the pavements on several of the streets is under consideration by the city fathers. Although it has been stated that the civic authorities intend to have the contractors make the repairs according to their agreement, nothing has yet been done. But it appears in many cases that the contractors' guarantee has expired, and the city will, in consequence, do the repairs at their own expense.

BY THE WAY.

THE payment by the city of Toronto of $15,000 to Mr. Mansergh, the English engineer, for a report on the best means of obtaining a sufficient and satisfactory water supply, was the subject of considerable comment a few months ago. It may interest our readers to learn that as engineer for the new water-works system of Manchester, England, Mr. Mansergh has received in commissions £102,000, or upwards of half a million dollars.

× × × ×

IN conversation with an architect the other day, I happened to touch on the subject of holidays, and was informed that Toronto Island was the farthest remove from the duties of his office that he had any expectation of reaching. Said he, "Did you ever think how peculiarly situated many architects are with regard to a vacation. If we are so fortunate as to have work on hand, we are obliged to stay at home and give it our attention, while if we haven't the work, we can't afford to take a holiday."

× × × ×

SOME enterprising plumber's apprentice has prompted the reporter of the Toronto World to suggest that master plumbers who wish to secure the largest share of the repair business should furnish their journeyman and helper with a tandem bicycle, thus effecting a saving of time in going to and from work, and a proportionate saving to the customer. There's nothing in it, either for the master plumber or his customer, but a great deal for the journeyman and apprentice, who, instead of being obliged to spend a few monotonous hours in the park, would have the opportunity of exploring the beauties of the various pleasure resorts adjacent to the city.

× × × ×

DURING the four or five years of business depression through which we have been passing, all classes have been on the lookout for indications of returning prosperity. As a rule they have seen little of an encouraging character, while with some things have been going from bad to worse. I met a man thus situated recently, to whom I propounded the oft-put question: "What is the business outlook?" The answer I received is worthy of preservation. Said he, "Two or three years ago you and I were living on our Faith that the times would improve. Last year we thought we could discern signs of promise and we lived on Hope. This year I am living on Charity."

CHIPS.

George Nelson, contractor, Rossland, B. C., was recently burned out.

The corner stone of the new Knox church at Woodstock, Ont., was laid a fortnight ago. The cost will be upwards of $45,000.

The Privy Council of England has confirmed the decision of the Supreme Court of Canada awarding Emanuel St. Louis, contractor, a balance of $63,642 on the Curran bridge, which the government had refused to pay.

The Pacific Coast Cement Company has been incorporated by J. C. Ferguson, C. W. Robson, H. J. Warsnap and T. R. Hardiman, of Vancouver. The object of the company is to acquire the Canadian Pacific Railway Company's cement works at Vancouver, and also the Saanich Lime Company's location on Tod Inlet, Saanich Arm. The capital is $500,000.

At the last meeting of master plumbers and steamfitters of Toronto, a communication was read from the City Council with reference to the lowering of the license fee. After a lengthy discussion it was resolved that a high license, and thorough examination, before allowing apprentices to work at the trade, were necessary to protect the master plumbers against unjust competition, and to insure good sanitary arrangements for citizens.

ILLUSTRATIONS.

DESIGN FOR A PRIVATE RESIDENCE, SUBMITTED IN THE FINAL EXAMINATION OF THE PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS, 1896, BY JOS. FORGET DESPATIE, MONTREAL.

DESIGN FOR CLUB HOUSE FOR ROYAL CANADIAN YACHT CLUB, TORONTO. DICK & WICKSON, ARCHITECTS.

This building was recently destroyed by fire. It was not an entirely new building, the original structure being a large square frame building, the towers and verandah being added to it, the shape and size making the improvements a rather difficult problem to deal with.

DESIGN FOR BROADVIEW AVE. CONGREGATIONAL CHURCH, TORONTO. DICK & WICKSON, ARCHITECTS.

The plan of this church is arranged with a slope in the floor towards the pulpit corner, and the choir was so placed that they could be both seen and heard without being obtrusibly near the preacher. The Sunday School room was to have been built with an auditorium several feet below the ground level. The roof is shown to have been constructed with three steel trusses over the entire span, the ceiling forming a shallow dome between them. The exterior was to have been of dark red brick and clear plaster in the timber work.

BRIDGE AT ISLAND PARK, TORONTO.

This bridge is an ornamental one of three arch spans, the centre one being 60 feet in the clear, and the two outer spans 30 feet in the clear; the roadway is 22 feet wide between parapets. The whole structure is of steel and cast iron, no woodwork being used except for bridge deck. The design for the bridge and all working drawings of the cast iron parapet, galvanized iron columns and other ornamental work were made at the office of the City Engineer, Toronto.

The masonry, piers and abutments were constructed by Mr. A. J. Brown, of Toronto, and the superstructure executed by the Central Bridge and Engineering Company, of Peterborough.

COMPETITIVE DESIGN FOR PROPOSED HIGH SCHOOL BUILDING, ST. JOHN, N. B.—CURRY, BAKER & CO., ARCHITECTS, TORONTO.

This design was submitted in competition in the ordinary way, that is to say, the School Board advertised for sketch plans for a twelve-room school, class rooms to be 28 ft. x 32 ft., 14 ft. high. Total cost not to exceed $45,000. No premiums were offered, but it was intimated that the design most approved would be adopted and the author appointed architect of the building. Before taking these steps the board sent a commission to Boston and other parts of the Eastern States to examine school buildings there, and an exhaustive report was returned, showing the buildings visited to be very costly for the amount of space provided.

The authors of this design proposed to heat and ventilate the building on the "blast fan" or "plenum" system, heat being provided from two steam boilers.

It was proposed to use buff pressed brick, with light green stone trimming, the roofs to be of red tile.

The Dominion Glass Company, of Montreal, has been incorporated, with a capital stock of $100,000.

Mr. W. H. Carrick, vice-president of the Gurney Foundry Co., Toronto, has returned from Great Britain, and appears to be well pleased with the prospects for the extension of the company's business in Europe.

THE LARGEST ARCHED ROOF RINK IN AMERICA.

DEY BROS., of Ottawa, are building the largest rink in America of the arch style, without posts. It is to be 246ft. long by 100ft. wide, and 58ft. 6in. high. The disadvantage of arched roofs is the settling of snow on the top. This is overcome by jack rafters, giving a pitch from 30 to 40 degrees.

To the front is built a two-storey structure. On the lower floor are two entrances into the parlors. Each parlor will be 22ft. x 42ft., and a long double-backed upholstered seat runs down the centre of each room. Above the main entrance is the Vice Regal box, sacred to the use of the Government party. On one side is a large banquet hall, and on the other three club-rooms. A gallery at front end and a promenade along the sides and rear afford accommodation for spectators.

The ice space will be 81x201 ft. The roof will be covered with 2,320 squares of shingles down to within 15 feet from the ground, from where it will be covered with iron sheeting.

OTTAWA LETTER.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

THERE are several buildings going up in this city, but not as many as last year. The Canada Atlantic coming into the heart of the city has necessitated the removal of some buildings, among them being Dey Bros.' rink. They are building another at corner Ann and Bay streets. The old military stores are used as a temporary station. It is the intention of the railway company to run the line right down to Brigham's ferry, at which place the bridge across to Hull is to be built.

The McLeod street Methodist church, on the corner of Bank street, is constructed of grey stone, and is to cost in the neighborhood of $30,000.

Grant's music hall, corner of Bank and Sparks streets, has been overhauled, the floor raised, and a gallery put in, under the superintendence of G. M. Bayley, architect.

The Contractors' Association of this city had at one time a prosperous association, but the meetings have been neglected and the rooms almost permanently closed.

Ottawa should have a master plumbers' association to keep up with the other cities of the province, but as there is no plumbing inspector, any person can call himself a plumber. We know of instances where ⅜-inch pipe has been used for service pipe.

The plumbers' supply houses seem to be busy. Law Bros. have large orders ahead. Thos. Lauson is recovering from the fire in which he lost many of his patterns, and F. G. Johnson & Co. have developed into a supply house.

The city authorities are helping the working man by the extensive improvements of the streets and sidewalks. As many as 250 men have been working on Sussex street day and night. $50,000 is being expended on granolithic sidewalks.

Wadsworth & McWhinney have opened up on Bank street under the name of the Ottawa Roofing and Cornice Works.

Douglas Bros. having withdrawn their branch from here, Mr. J. R. Douglas has formed a company under the name of J. R. Douglas & Co., to carry on business as roofers, heating engineers and cornice workers.

The Gas Company have recently completed a large building, containing 600,000 bricks. The building is 83 feet long and has a radius of 30 feet.

Orme & Sons' new block contains 800,000 bricks, is four storeys high, and faced with light colored pressed brick.

The Toronto Brass Company, Toronto, have commenced the manufacture of builders' hardware, gas and electric fixtures.

The Bras d'Or Marble Company, of West Bay, N. S., have recently received orders for the supply of large quantities of marble for building purposes. They are said to possess fourteen varieties of marble in the immense deposit at Marble Mountain, some of which are exceedingly beautiful. The company are taking steps to extend their trade, and as the bulk of granite used in Ontario and Quebec is imported from Italy, it is quite probable that a portion of this trade at least can be secured by Canadian companies.

TESTS OF PAVING BRICKS.

The accompanying table shows the results of tests of several kinds of paving bricks conducted under the direction of Mr. E. H. Keating, City Engineer of Toronto. The following particulars of the method of conducting the experiments are furnished in his annual report:

For the abrasion tests, the bricks, after being measured and weighed, are placed in a tumbler with 200 lbs. of foundry shot. The machine is then run for 2,000 revolutions at 30 revolutions to the minute. The bricks are then taken out and weighed, the percentage of loss estimated and returned to the tumbler, which is given another 2,000 revolutions at the same rate.

Upon the completion of the second 2,000 revolutions the percentage of loss from the original weight is again determined, and the loss in cubic inches for each square inch of surface can be calculated. The tumbler in use measures 24×37 inches, inside measurement. A good paving brick under this treatment should not lose more than 9 per cent. in 2,000 revolutions, and not more than 12.5 per cent. in 4,000 revolutions, nor should the loss in cubic inches per square inch of surface exceed 0.09.

The absorption test should be made with the whole brick and also with broken pieces after being thoroughly dried and allowed to cool. The length of time the bricks should be immersed is 3 days, during which time the brick must not absorb more than 2¼ per cent. of its weight. Most of this absorption appears to take place during the first day.

TESTS OF PAVING BRICKS.

No. of Specimen	Size.	Specific Gravity.	Abrasion: Original Weight.	Abrasion: Weight after 2,000 Revolutions.	Abrasion: Weight after 4,000 Revolutions.	Abrasion: Percentage of Loss from Original Weight after 2,000 Revolutions.	Abrasion: Percentage of Loss from Original Weight after 4,000 Revolutions.	Absorption: Loss in cub. inches per sq. in. of surface after 2,000 Revolutions.	Absorption: Weight before Immersion.	Absorption: Weight after Immersion.	Absorption: Percent. of Increase by Weight.	Length of Time Immersed.	Source or Brick.	Remarks.
46	inches.		lbs. oz.	lbs. oz.	lbs. oz.			.0140	86.74 grms.	86.990 grms.	1.74	days. 3	Pyrogranite	
47	8½x4½	2.31	8 7½	8 2	7 14½	3.30	4.50	.0501	8 lbs. 7½ oz.	8 lbs. 10½ oz.	2.21	3	Massillon Shale and Fire Brick Co.	Bevelled edges
48	8½x4½	2.24	8 13	8 12	8 12	3.30	14.67	.0965	10 4	10 6	1.22	3	"	4 bricks.
49	8½x4½		6 8	6 4½	6 3	6.19	20.0	.102	6.144	6.6	2.8	3	Dr. Parsall, Bronte	Dark brick.
50	8½x4½	2.43	6 15	6 9	6 8	6.8	16.5	.1055	6.8	7.2	4.85	3	J. H. New, 90 Colborne St.	Light red brick.
51	8½x4½		6 14	5 9	5 11	6.18	14.0	.0830	76.174	76.800	0.80	3		Hamilton brick
			(5 12½	(5 4½	(5 2½	4.0	10.8		5.784	5.154	2.84			
			5 13	5 5	5 4	6.7	16.2	.0830 avr'ge of two.						
			lbs.	lbs.	lbs.	lbs.			6.19	6.14	2.17	3	Don Valley P. B. Co.	2 bricks.
52			10 19	10 13½									Toronto Paving Brick Co.	3 bricks.
53	8½x4½	2.35	10	10	10	14.50	20.4	0.1518	5.47	5.50	0.54	3	Burlington P. B. Co.	Repressed
54	8½x4½	2.12	10 31	10 27	10 26	16.50	17.60	0.1360	6.81	6.94	9.70	3	Don Valley P. B. Co.	White.
									5.47	5.84	18.00	3		Red.
55									5.66	5.69	1.06	3	Burlington P. B. Co.	
56	8½x4½		10 31	10 21	10 20	16.5	21.3	0.139						(a) Common brick; 2 bricks marked B.
57	8½x4½	2.22	11 4	10 29	10 28	7.5	9.35	0.0958	7.09	7.23	1.83	3	Canton Shale	(b) Impressed.
	8½x4½		9 14	9 7	9 6	6.50	8.4	0.0824						(c) Block similar to (a) in appearance
	8½x4½		9 15	7 15	7 14	6.55	6.87	0.0672					Massillon Shale and Fire Brick Co.	
58	8½x4½	2.21	9 15	9 12	9 9	9.07	11.50	.0665	7.90	7.91	1.54	3	"	
59	8½x4½	2.23	15.75	15.37	15.25	10.46	11.31	0.1825	5.31	5.48	3.48	3	Standard Massillon	
60	8½x4½		30.44	15.2	15.17	15.38	19.94	19.09	0.1248	5.53	5.81	2.50	Standard Canton	
61	8½x4½		30.69	17.75	15.38	17.31	13.34	0.1548	6.67	6.90	3.31	3	Penn Canton	
62	8½x4½		31.58	18.25	17.37	11.44	18.85	0.1250	6.15	6.37	3.41	3	Nolloway Canton	
63	8½x4½		14.75	13.05	11.37	11.05	15.86	0.1050	5.23	5.37	2.61	3	Franklin Shale, Penn.	
64	8½x4½		7.37	6.56	6.33	6.98	8.25	0.0544	5.66	6.68	None	3	Harris Paver	
65	8½x4½	2.30	20.37	20.41	20.08	6.80	10.30	0.0756	6.38	6.44	1.10	3	Harris Holwood	
66	8½x4½		19.06	17.94	17.66	5.90	10.30	0.0784	8.65	8.71	0.90	3	Temple, Toronto	No absorption on whole brick in 5 days.
67	8½x4½		9.71	9.37	8.65	7.76	10.90	0.0454	71.426 grms.	71.995 grms.	0.75	3	Dr. Farwell, Burlington	Marked No. 4
68	8½x4½	2.47	16.00	14.95	14.71	6.50	8.08	0.135						No. 1.
69	8½x4½		13.63	10.40	10.06	17.80	26.40	0.1430					(a) Canton Shale	
70	8½x4½		13.125	12.85	10.00	21.90	23.10	0.0737					(b) Dr. Farwell, Burlington (Light)	These four bricks were all tested in rattler at same time.
	8½x4½		7.125	6.50	6.35	8.72	12.3	.1248					(c) Temple	
	8½x4½		6.44	5.41	4.90	16.00	19.2	0.1575					(d) Dr. Farwell, Burlington (No. 8)	2 bricks.
	8½x4½		6.25	4.90	4.78	8.05	8.8	0.1575					Burlington Repressed, No. 1	2 bricks.
	8½x4½		6.56	5.44	5.30	17.07	20.7	1.143					Burlington, No. 2	
	8½x4½		13.06	9.54	8.78	26.40	32.7	.2070					No. 8	
71	8½x4½		13.31	9.84	8.59	31.00	35.4	0.2200	68.945	69.49	0.93	3	Standard Canton Shale Holloway Block	Absorption in one day same as in four days
72	8½x4½		6.44	5.30	5.44	14.40	16.3	0.1037		7.20	1.54	4	Holloway Canton Repressed	
73	8½x4½	2.23	21.65	19.58	18.75	9.10	13.4	0.087	7.16	6.72	1.97	4	Don Valley	The whole absorption was taken in in 24 hours
74	8½x4½	2.36	20.31	16.81	16.31	17.50	22.1	0.1434	6.36	6.88	1.11	4	Carrollton Repressed Standard Brick	
75	8½x4½		30.31	15.81	14.25	15.80	21.9	0.1235	5.94	5.98	0.78	3	" " Standard	
76	8½x4½	2.21	14.30	10.71	15.65	24.8	0.1125	5.24	6.06	0.50	3	Don Valley	Used on Ossington Ave., Dundas to Colle.	
77	8½x4½		22.37	18.87	17.09	11.95	17.70	0.1150	6.06	57.92	1.05	3	Standard Canton	
78	8½x4½		23.15	20.89	20.40	27.00	32.70	0.1995	57.185	100.303	101.01	3	Dr. Farwell, Burlington	
79	8½x4½	2.21	30.31	22.125	20.75	19.90	14.60	0.0996	100.303				Standard Canton	
80	8½x4½	2.37	28.76	20.62	20.31	22.08	31.60	0.2014					Don Valley	
81	8½x4½		20.31	20.31	20.31	12.50	6.5	13.10	0.043				" "	
			14.44	13.70	13.50	5.12	19.5	24.90	0.1443		8.80	3	Ontario Paving Brick Co.	Repressed brick
82			12.00	10.50	9.12	11.6	18.10	0.1070	8.09	8.18	1.25	3	" "	
			84.135	20.56	19.71	2.5	13.00	0.0921	8.56	8.63	1.78	01	Don Valley	
83	8½x4½	2.31	25.81	23.87	22.41	7.5	13.24	0.0670	96.703	98.57			Ontario P. B. Co.	These were culls from Selby Street.
84	8½x4½	2.31	25.47	23.44	22.31	9.1	12.40	0.1170					Standard Shale Brick Exchange	A main Street work.
85	8½x4½		11.94	10.10	9.56	15.5	15.7	0.093					Don Valley	
86	8½x4½	2.31	12.09	11.31	10.56	9.9	6.5	0.042	7.295	7.24	0.38		Ontario Paving Brick Co., Selby Street	These were tested in rattler at same time
87	8½x4½		21.94	21.00	20.50	4.00	20.34							
88	8½x4½		19.53	15.91	14.75	16.5	24.5	.0604						
89	8½x4½	2.31	6.31	5.78	5.51	8.4								

Size of Tumbler, 24 x 37 inches inside; 200 lbs. foundry shot; 30 revolutions per minute.

The biggest association of master painters in the world, considering the area of ground covered, is that of Pennsylvania. This consists of nearly fifty different local associations, in as many cities, towns and villages, so that practically every master painter in the state is a member. The association exists by no means to "put down" the working man; on the contrary, delegates from the journeymen's unions are invited to be present at some of the meetings, while great efforts are made in fostering technical education and the interests of the apprentices.

AN INTERESTING SUIT.

Koksilah Quarry Co. vs. the Queen, a case of much general interest and involving a large sum of money, was commenced before Mr. Justice Walkem at Victoria, B. C., recently. This was an action brought by the Koksilah Quarry Co. to recover $12,500 damages by reason of alleged breach of contract in connection with the supply of stone for the Provincial Parliament buildings. The petition recites that in 1893 the government approved of a quality of stone quarried by the company and asked them for tenders for the delivery of stone from their quarry, to be used in the erection of the said buildings, and the company accordingly sent in a tender. In reply the deputy commissioner wrote the company that their stone had been selected and urged them to proceed with all necessary quarry work so that there might be no delay when the stone was wanted.

Afterwards, in February, 1894, some stone was delivered at the site of the said buildings, and the company allege was accepted as a part performance of the contract and actually used, but about this time the contractor refused to accept any more stone, although suppliants were always ready and willing to go on and complete their part of the contract. The company further say that stone has been used and is still being used, which, under the terms of the agreement, could have been supplied by them.

The defence contended that they never contracted with the company for the stone, but that the contractor for the buildings, the late Frederick Adams, was the party who made the contract for the stone. It is further stated that the stone was condemned by the architect of the building as unfit for the purpose required.

A dispute has arisen between Mr. Borque, the contractor for the Dominion reformatory at Alexandria, Ont., and the government architect, regarding the foundation which is being laid, and the contractor has asked that an outside authority be called in. Mr. Perrault, of Montreal, has been asked by the Department of Public Works to report in the matter, and has consented.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

EFFECT OF THE CHICAGO CANAL ON CANADIAN WATER LEVELS.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR:—Anent your query as to Mr. O'Hanley's remarks on the effect on our Canadian waters of the so-called Chicago Drainage Canal—but which has merely been called so to disarm suspicion, by conveying the impression of it's being a very trifling affair, while in reality intended as a maritime canal for commercial purposes, and which the Government at Ottawa must have been blind indeed to Canada's interests to have allowed to proceed without even a protest of any kind on the part of the Dominion—I have not seen anything of Mr. O'Hanley's report on the subject, but if, as I am told, this gentleman was, when too late, "appointed by the then Dominion Government to report upon the probable effect of the Chicago Drainage Canal upon the water levels in Canada," I fail to see why he should have limited his conclusions to Lakes Michigan and Huron, while it is evident that Lakes Erie and Ontario must be correspondingly affected, since these lakes are naturally made up not only of their own particular watersheds, but of the outflow of the upper lakes into them by the St. Clair and Niagara rivers; and while it is, moreover, doubly evident that the whole of the St. Lawrence river between Ontario and tide waters at Quebec or Three Rivers must be ten or a hundred fold more affected in its levels than are the great lakes, or in the ratio of the narrowness of the latter to the immense expanse of the former.

There is no doubt that every inch less in depth of water in the lakes must diminish by so much the draught to be given to every vessel frequenting these inland seas, to allow of their reaching to the same distances up rivers, into bays and creeks and other inland waters.

The effect of the drawing off of some 600,000 cubic feet of water from Lake Michigan has been variously stated at from one to seven inches, and this shallowing of the water has been correctly figured at millions of dollars loss on the combined lake trade.

But the difficulty and damage or loss, as far as the lakes are concerned, is not an irremediable factor, for it can be conjured and avoided by damming and locking the St. Clair and Niagara rivers and the outlets of Lake Ontario at Kingston, or preferably, and at less expense, below the Thousand Islands, and the waters thus raised again and kept up to any required level as in a reservoir; while, where the injury will admit of no remedy, and which does not appear to have as yet struck any one not even a professional engineer—notwithstanding that I was the very first in Canada or elsewhere to point out the evil and sound the note of warning as early as in January, 1895, (now more than 20 months ago) in an article then published in this journal, though written during the preceding December, 1894, and subsequently by letters to our Quebec papers, the Montreal Star of March 6, 1895, the Canadian Engineer, the New York Engineering Record, and my conclusions reproduced also by the Montreal Herald; I say, sir, that where the evil will not admit of any compensatory process, and must forever remain unremedied, is, or will be, when the "canal" is completed along the shores of the St. Lawrence between Kingston and tidal waters at Quebec or Three Rivers.

An inch of water less upon the lakes may be comparatively of no moment, and it is absolutely indifferent to lake traffic whether the lakes drain south towards the Gulf of Mexico or eastward to the Atlantic, towards the Mississippi or the St. Lawrence; but while the quantity of water illegally diverted from the St. Lawrence may be most trifling in its depth when minimized by being spread over such an area as that of our great lakes, not so, by any means, on the narrower waters of the rivers of which these lakes are feeders.

The flow of water over Niagara is hardly more than 18 million cubic feet per minute, so the quantity we are being robbed of by our "American Cousins" (600,000 cubic ft. per minute, as already stated), is not less than one-thirtieth, or 3⅓ per cent. of the whole, and without going into mathematical formulae to ferret out the exact number of inches by which the depth of flow must be effected, after allowing for the thereby slightly diminished velocity and slightly increased friction due to diminished depth, our people, unprofessional and all, will not be slow to see that, in the same way as in a sluice of any kind, a diminished quantity of water must be productive of less depth on the floor or bottom thereof, so must a diminished quantity of water flowing through the St. Lawrence, as of any other river, resolve itself into a lesser depth of water over the floor or bed of the river.

In Lake St. Peter, for instance, where the present depth of channel, as dredged out, at a cost of so many millions to the country, is still but 27½ feet or thereabout, and Montreal clamoring for the expenditure of another $5,000,000.00 to increase the depth to 30 feet, such depth, even if attained, would be reduced by some eleven inches, or say a foot in round numbers, the moment the Chicago canal were open; and then more millions would have to be thrown away in making up the deficit, while, so soon as deficit No. 1 were made up, the projected enlargement of the canal in question (and which is already provided for in the purchase of the right of way) would decrease the flow of the St. Lawrence by another 3½ per cent.; and the carrying off of the other projected ship canals from the great lakes towards New York and the Atlantic by way of the Hudson river successively another and still another and further or additional deficit of 5 and 10 per cent.; or a total of from 12 to 17 per cent., equivalent to a loss of depth and draught of one-eighth to one-sixth of the present flow through the St. Lawrence.

Nor would this decreased draught for all species of river craft affect the St. Lawrence only between Kingston and Quebec; but, though in a less degree, be prejudicial, retardatory of navigation far below Quebec, where, at the "Traverse," so-called, vessels would have to wait an additional hour for their full complement of water, both on their journey up and down, and thus lose two hours or more, which at present can be improved in loading or unloading, or in other useful ways.

Again, this dearth of water would in no way be confined to the St. Lawrence, but affect also its tributaries, as the Ottawa, the Richelieu, the St. Maurice and other feeders, where all river craft must henceforth forego the advantage of ascending these tributaries to anything like the wonted distance as of yore.

Sir, to me, the most outrageous feature of this whole concern is the daring and unfriendly spirit in which this work has been conceived, and by Congress sanctioned and proceeded with, in absolute disdain and mockery, so to say, of Canada and our people; for it cannot but strike everyone, as it struck myself the moment I read of it for the first time in December, 1894, and while glancing behind me at my map, that though Chicago be, it is true, some 500 miles within the northern frontier of United States territory, still are the waters of Michigan, as well as those of Superior, Huron, Erie and Ontario, and as much as these, the feeders of the St. Lawrence, and that, if anything, Canada has the best right to them, as they are mostly of northern watershed, and that the taking possession of any portion thereof, without agreement or without compensation to Canada, can therefore be looked upon solely as the grossest, the most outrageous spoilation of our national rights—a most pertinent lesson too—while our solons at Ottawa were during the interval fooling away their time in squabbling over the Manitoba school question, making it a subject of discord and disunion between us all, while the Pope of Rome is and has been long endeavoring to create peace and harmony between French and English, Protestants and Catholics, by his attempts at christian-like union and forbearance.

CHAS. BAILLAIRGE,
City and Civil Engineer.

Quebec, July 23, 1896.

CHIPS.

A piece of rapid construction has been that of the roadbed of the Moncton, N. B., street railway. The whole length of the main line is over 12,000 feet, or 2¼ miles. The work of construction occupied 47 days.

Charles Thompson, an employee of the Owen Sound Stone Company, was killed in the quarries at Orangeville on the 24th of July. He was standing on a coil of rope which was attached to a derrick, when the workmen on the derrick commenced to hoist it. Thompson endeavored to get off the rope and became entangled in it. He was carried up into the air and then fell with terrific force between two large rocks.

The privy council of England has dismissed the appeal from the judgment of the supreme court of Canada of December 9, 1895, affirming a decision of Mr. Justice Burbidge in the case of Ross and others against the Queen. The appellants brought an action in the court of exchequer of Canada by petition of right to recover from the Dominion government the sum of $231,806, which they claimed to be due on two contracts for the construction of sections 9 and 15 of the Intercolonial railway.

MANUFACTURES AND MATERIALS

ASBESTOS.

To the question, "What is asbestos?" it is not altogether easy to find an answer. Geologists classify it among the hornblends. In itself, asbestos is a physical paradox, a mineralogical vegetable, both fibrous and crystalline, elastic yet brittle, a floating stone, but as capable of being carded, spun and woven as flax, cotton or silk. It is apparently a connecting link between the vegetable and the mineral kingdom, possessing some of the characteristics of both. In appearance it is light, buoyant and feathery as thistledown; yet, in its crude state, it is dense and heavy as the solid rock in which it is found. Apparently as perishable as grass, it is yet older than any order of animal or vegetable life on earth. The dissolving influences of time seem to have no effect upon it. The action of unnumbered centuries, by which the hardest rocks known to geologists are worn away, has left no perceptible imprint on the asbestos found embedded in them. While much of its bulk is of the roughest and most gritty materials known, it is really as smooth to the touch as soap or oil. Seemingly as combustible as tow, the fiercest heat cannot consume it, and no known combination of acids will destructively affect the appearance and strength of its fibre, even after days of its action. It is, in fact, practically indestructible. Its incombustible nature renders it a complete protection from flames, but beyond this most valuable quality, its industrial value is greatly augmented by its non-conduction of heat and electricity, as well as by its important property of practical insolubility in acids.

Asbestos has been found in all quarters of the globe. It comes from Italy, China, Japan, Australia, Spain, Portugal, Hungary, Germany, Russia, The Cape, Central Africa, Canada (Fig. 1), Newfoundland, this country, and from Southern and Central America.

Notwithstanding this wide distribution of asbestos, the only varieties which at present appear to demand serious consideration, from a commercial point of view, are the Russian, the South African, the Italian and the Canadian.

Before the development of the Canadian fields, the Italian asbestos was supreme in the market. For nearly twenty years Italy has been looked to for the best grades of the fibre. From a point on the northern mountain slope of the Susa valley is taken the floss asbestos fibre, the appearance of which in gas stoves is so familiar. In the same locality is found a fine white powder of asbestos, which serves for paint and other purposes. The mining is carried on at a height of from 6,000 to 10,000 feet above sea level.

But the Italian asbestos industry, once so important, is already on the down grade. The difficulties of mining are very great, and unduly increase the cost of production. The asbestos itself, judged by the latest standards, is of inferior quality; it is not easy to spin, and it does not pulp well in the making of paper. The best grade is extremely rare, and its cost of mining and

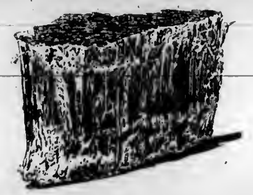


FIG. 1.—CANADIAN ASBESTOS.

transportation is prohibitive. The supply from the Italian mines is rapidly falling off. As a matter of fact, Canada contains the great asbestos region of the world, in the sense that while its mines are practically unlimited in productive capacity, the product is of a quality which fully meets the requirements of the newest and most exacting of the innumerable uses that are daily being found for it.

The process of manufacture is intensely interesting, more especially from the fact that as the industry is constantly entering upon novel phases, new methods of treatment and special machinery have to be devised. One of its special uses is for wall paper. This is a new application which will have a distinct effect in modifying the practice of indoor plastering. Instead of the ordinary tedious and elaborate preparation of studs and strips, and the use of inferior and dust creating mortar, with its after-scoring, which is necessary to give cohesion to the final coat of plaster of Paris, a single coating of the asbestos is laid on. It has a glossy surface that will not crack, as, while firm, it is perfectly flexible. It can be put on the raw brick; and a room of which the walls have been built in the morning can, before night, have a smoothly finished interior surface, shining like glass and as hard as a rock. A kindred application of asbestos is now coming into vogue in the shape of inflammable decorations for walls and ceilings. These are used a great deal for the saloons of steamships. They are embossed in very beautiful designs, and can be treated with gold, varnish, lacquers, or any other substance, for the enhancement of their ornamental effect.

Firemen clad in asbestos clothing and masks, as are those of London and Paris, can walk through the hottest flame with comparative impunity. Asbestos fireproof curtains have reduced the mortality of theatre fires in a very appreciable degree.

Probably one of the first applications of asbestos in this country

FIG. 2.—ASBESTOS MINING.

was to roofing. To buildings covered with this material, the shower of sparks from a neighboring conflagration involves no danger. The fact that woodwork can, by its use, be made uninflammable has come to be an important factor in the insurance of buildings.

One of the largest branches of asbestos manufacture is that of sectional cylinders for pipe coverings, for retaining the heat of steam and other pipes, felt protective coverings for boilers, frost-proof protections for gas or water pipes, and cement filling, which can be laid on with a trowel, for the covering of steam pipes, boilers or sills. In some of these cases, where it is only necessary to retain the heat, the asbestos is mixed with other substances; but where the protection must be fireproof as well, only asbestos is used.

Another very extensive department in asbestos manufacture is that of packings. Of these there are an infinite number of forms.

The making of asbestos paper varies from the building up of the thickest millboard to the production of a writing paper which, from its indestructibility, is valuable in case of fire for preserving charters, policies, agreements and other important documents.—George Heli Guy, in New York Evening Post.

Some twenty cars of stone, from the Tilsonburg quarries, have arrived at London for the construction of the Grand Trunk shops.

It is reported that Mr. Thomas Parker, proprietor of the Port Credit Pressed Brick & Terra Cotta Co., is negotiating for the purchase of the works of the Toronto Pressed Brick Company at Milton, Ont.

The French syndicate which recently purchased the St. John Stone Chinaware Co.'s potteries at St. Johns, Que., has completed its organization in Paris, and Messrs. Graves, Aube and Vannier, the promoters, sailed for Canada on the 15th inst. Mr. Adrian Vannier has been appointed manager.

CHARACTERISTICS AND PROPERTIES OF WOOD.

FROM a comprehensive discussion of the characteristics and properties of wood, prepared by Mr. B. E. Fernow, Chief of the Division of Forestry of the United States, the following valuable information for architects and engineers is obtained:

WEIGHT OF WOOD.

The two main factors of weight in wood are: The amount of cell wall, or wood substance, constant for any given piece, and the amount of water contained in the wood, variable even in the standing tree, and only in part eliminated in drying.

In general, it may be said that none of the native woods in common use in this country are, when dry, as heavy as water, i. e., 62 pounds to the cubic foot. Few exceed 50 pounds, while most of them fall below 40 pounds, and much of the pine and other coniferous wood weighs less than 30 pounds per cubic foot.

The weight of the wood is, in itself, an important quality. Weight assists in distinguishing maple from

WEIGHT OF KILN-DRIED WOOD OF DIFFERENT SPECIES.

	Specific weight.	Approximate. Weight of 1 cubic foot.	Approximate. Weight of 1,000 feet of lumber.
(a) Very heavy woods: Hickory, oak, persimmon, osage orange, black locust, hackberry, blue beech, best of elm, and ash	0.70-0.80	Pounds. 42-48	Pounds. 3,700
(b) Heavy woods: Ash, elm, cherry, birch, maple, beech, walnut, sour gum, coffee tree, honey locust, best of Southern pine, and tamarack	.60-.70	36-42	3,200
(c) Woods of medium weight: Southern pine, pitch pine, tamarack, Douglas spruce, western hemlock, sweet gum, soft maple, sycamore, sassafras, mulberry, light grades of birch and cherry	.50-.60	30-36	2,700
(d) Light woods: Norway and bull pine, red cedar, cypress, hemlock, the heavier spruce and fir, redwood, basswood, chestnut, butternut, tulip, catalpa, buckeye, heavier grades of poplar	.40-.50	24-30	2,200
(e) Very light woods: White pine, spruce, fir, white cedar, poplar	.30-.40	18-24	1,800

poplar. Lightness, coupled with great strength and stiffness, recommends wood for a thousand different uses. To a large extent weight predicates the strength of the wood, at least in the same species, so that a heavy piece of oak will exceed in strength a light piece of the same species, and in pine it appears probable that, weight for weight, the strength of the wood of various pines is nearly equal.

Since ordinary lumber contains knots and also more water than is here assumed, and also since its dimensions either exceed or fall short of perfect measurement, the figures in the table are only approximate.

Thus, 1,000 feet, B. M., of longleaf pine weighs:

	Pounds.
Rough and green	4,500
Boards, rough but seasoned	3,500
Boards, dressed and seasoned	3,000
Flooring, matched, dressed and seasoned	2,500
Weatherboarding beveled and dressed	1,500

The rapidity with which water is evaporated, that is, the rate of drying, depends on the size and shape of the piece and on the structure of the wood. An inch board dries more than four times as fast as a 4-inch plank and more than twenty times as fast as a 10-inch timber. White pine dries faster than oak. A very moist piece of pine or oak will, during one hour, lose more than four times as much water per square inch from the cross section, but only one-half as much from the tangential, as from the radial section.

In a long timber, where the end or cross sections form but a small part of the drying surface, this difference is not so evident. Nevertheless, the ends dry and shrink first, and being opposed in this shrinking by the more moist adjoining parts, they check, the cracks largely disappearing as seasoning progresses.

In thin boards all parts soon attain the same degree of dryness; in heavy timbers the interior remains moister for many months, and even years, than the exterior parts. Finally an equilibrium is reached, and then only the outer parts change with the weather.

With kiln-dried wood all parts are equally dry, and when exposed the moisture coming from the air must pass in through the outer parts, and thus the order is reversed. Ordinary timber requires months before it is at its best; kiln-dried timber, if properly handled, is prime at once.

Steaming the lumber is commonly resorted to in order to prevent checking and "case-hardening," but not, as has frequently been asserted, to enable the board to dry. Yard-dried lumber is not dry, and its moisture is too unevenly distributed to insure good behavior after manufacture. Careful piling of the lumber, both in the yard and kiln, is essential to good drying. Piling boards on edge or standing them on end is believed to hasten drying. This is true only because in either case the air can circulate more freely around them than when they are piled in the ordinary way. Boards on end dry unequally; the upper half dries much faster than the lower half, and horizontal piling is, therefore, preferable.

SHRINKAGE OF WOOD.

Shrinkage of wood is due to the fact that the cell walls grow thinner on drying. The thicker cell walls and therefore the heavier wood shrinks most, while the water in the cell cavities does not influence the volume of the wood. Owing to the great difference of cells in shape, size, and thickness of walls and still more in their arrangement, shrinkage is not uniform in any kind of wood. This irregularity produces strains, which grow with the difference between adjoining cells and are greatest at the pith rays. These strains cause warping and checking, but exist even where no outward signs are visible; they are greater if the wood is dried rapidly than if dried slowly, but can never be entirely avoided.

Temporary checks are caused by the more rapid drying of the outer parts of any stick; permanent checks are due to the greater shrinkage, tangentially, along the rings than that along the radius. This, too, is the cause of most of the ordinary phenomena of shrinkage, such as the difference in behavior of entire and quartered logs, "bastard" (tangent) and "rift" (radial) boards, etc., and explains many of the phenomena erroneously attributed to the influence of bark, or of the greater shrinkage of outer and inner parts of any log.

Rapidly dried in the kiln, the wood of oak and other hard woods "case-harden," that is, the outer part dries and shrinks before the interior has a chance to do the same, and thus forms a firm shell or case of shrunken, commonly checked wood around the interior. This shell does not prevent the interior from drying, but when this drying occurs, the interior is commonly checked along the medullary rays, as shown in fig. 1. In practice this occurrence can be prevented by steaming the lumber in the kiln, and still better by drying the wood

in the open air or in a shed before placing in the kiln. Since only the first shrinking is apt to check the wood, any kind of lumber which has once been air dried (three to six months for 1-inch stuff) may be subjected to kiln heat without any danger. Kept in a bent or warped condition during the first shrinking, the wood retains the shape to which it was bent and firmly opposes any attempt at subsequent straightening.

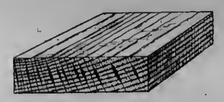


FIG. 1.—"Honeycombed" board. The checks or cracks form along the pith rays

To avoid "working," or warping and checking, all high-grade stock is carefully seasoned, preferably in a kiln, before manufacture. Thicker pieces may be made of several parts glued together; larger surfaces are made in panels or of smaller pieces covered with veneer. Boring is sometimes resorted to to prevent the checking of wooden columns.

Since repeated swelling increases the injuries due to seasoning, wood should be protected against moisture when once it is dry.

Since the shrinkage of our woods has never been carefully studied, and since wood, even from the same tree, varies within considerable limits, the figures given in the following table are to be regarded as mere approximations. The shrinkage along the radius and that along the tangent (parallel to the rings) are not stated separately in the following table, and the figures represent an average of the shrinkage in the two directions. Thus, if the shrinkage of soft pine is given at 3 inches per hundred, it means that the sum of radial and tangential shrinkage is about 6 inches, of which about 4 inches fall to the tangent and 2 inches to the radius, the ratio between these varying from 3 to 2, a ratio which practically prevails in most of our woods.

Since only an insignificant logitudinal shrinkage takes place (being commonly less than 0.1 inch per hundred), the change in volume during drying is about equal to the sum of the radial and tangential shrinkage, or twice the amount of linear shrinkage indicated in the table.

Thus, if the linear average shrinkage of soft pine is 3 inches per hundred, the shrinkage in volume is about 6 cubic inches for each 100 cubic inches of fresh wood.

APPROXIMATE SHRINKAGE OF A BOARD, OR SET OF BOARDS, 100 INCHES WIDE, DRYING IN THE OPEN AIR.

	Shrinkage.
	Inches.
(1) All light conifers (soft pine, spruce, cedar, cypress)	3
(2) Heavy conifers (hard pine, tamarack, yew), honey locust, box elder, wood of old oaks	4
(3) Ash, elm, walnut, poplar, maple, beech, sycamore, cherry black locust	5
(4) Basswood, birch, chestnut, horse chestnut, blue beech, young board	6
(5) Hickory, young oak, especially red oak	Up to 16

INFLUENCE OF WEIGHT AND MOISTURE ON STRENGTH.

It has been stated that heavy wood is stronger than lighter wood of the same kind, and that seasoning increases all forms of resistance. Let us examine why this is so.

Since the weight of dry wood depends on the number of fibers and the thickness of their walls, there must be more fibers per square inch of cross section in the heavy than in the light piece of the same kind,* and it is but natural that the greater number of fibers should also offer greater resistance, i. e., have the greater strength.

The beneficial influence of drying and consequent shrinking is two-fold: (1) In dry wood a greater number of fibers occur per square inch, and (2) the wood substance itself, i. e., the cell walls, become firmer. A piece of green longleaf pine, 1 by 1 inch and 2 inches long, is only about 0.94 by 0.96 inch and 2 inches long when dry; its cross section is 10 per cent. smaller than before, but it still contains the same number of fibers. A dry piece 1 by 1 inch, therefore, contains 10 per cent. more fibers than a green piece of the same size, and it is but fair to suppose that its resistance or strength is also about 10 per cent. greater.

The influence of the second factor, though unquestionably the more important one, is less readily measured. In 100 cubic inches of wood substance the material of the cell walls takes up about 50 cubic inches of water and thereby swells up, becoming about 150 cubic inches in volume. In keeping with this swelling the substance becomes softer and less resistant. In pine wood this dimunition of resistance, according to experiments, seems to be about 50 per cent., and the strength of the substance, therefore, is inversely as the degree of saturation or solution.

SOME PRACTICAL CONCLUSIONS.

In framing, where light and stiff timber is wanted, the conifers excel; where heavy but steady loads are to be supported, the heavier conifers, hard pine, spruce, Douglas spruce, etc., answer as well as hardwoods, which are costlier and heavier for the same amount of stiffness. On the other hand, if small dimensions must be used, and especially if moving loads are to be sustained, hardwoods are safest, and in all cases where the load is applied in form of "shocks" or jars, only the tougher hardwoods should be employed. The heavier wood surpasses the lighter of the same species in all kinds of strength, so that the weight of dry wood and the structural features indicative of weight may be used as safe signs in selecting timber for strength.

In shaping wood it is better, though more wasteful, to split than to saw, because it insures straight grain and enables a more perfect seasoning.

For sawed stock the method of "rift" or "quarter" sawing, which has so rapidly gained favor during the last decade, deserves every encouragement. It permits of better selection and of more advantageous disposition of the wood; rift-sawed lumber is stronger, wears better, seasons well, and is less subject to warping.

All hardwood material which checks or warps badly during seasoning should be reduced to the smallest practicable size before drying, to avoid the injuries involved in this process; and wood once seasoned should never again be exposed to the weather, since all injuries due to seasoning are thereby aggravated. Seasoning increases the strength of wood in every respect, and it is therefore of great importance to protect wooden structures, bearing heavy weights, against moisture.

Knots, like crossgrain and other defects, reduce the strength of timber. Where choice exists, the knotty side of the joist should be placed uppermost, i. e., should be used in compression.

Season checks in timber are always a source of weakness; they are more injurious on the vertical than on the horizontal faces of a stringer or joist, and their effect continues even when they have closed up, as many do, and are no longer visible.

DURABILITY AND DECAY.

All wood is equally durable under certain conditions. Kept dry or submerged, it lasts indefinitely. Pieces of

* This imperfect assumption is used only for comparison.

pine have been unearthed in Illinois which have lain buried 60 or more feet deep for many centuries. Deposits of sound logs of oak, buried for unknown ages, have been unearthed in Bavaria; parts of the piles of the lake dwellers, driven more than two thousand years ago, are still intact.

FIG. 2.—"Shelf" fungus on the stem of a pine. (Hartig.) a, sound wood; b, resinous "light" wood; c, partly decayed wood or punk; d, layer of living spore tubes; e, old filled up spore tubes; f, fluted upper surface of the fruiting body of the fungus, which gets its food through a great number of fine threads (the mycelium), its vegetative tissue penetrating the wood and causing its decay.

On the radial section of a piece of pine timber, with one of the shelf-like fungus growths, as shown in fig. 2, both bark and wood are seen to be affected. A small particle of the half-decayed wood presents pictures like that of fig. 3. Slender, branching threads are seen to attach themselves closely to the walls of the cells, and to pierce these in all directions. Thus these little threads of fungus mycelium soon form a perfect network in the wood, and as they increase in number they dissolve the walls, and convert the wood substance and cell contents into sugar-like food for their own consumption. In some cases it is the woody cell wall alone that is attacked. In other cases they confine themselves to eating up the starch found in the cells, and merely leave a stain (bluing of lumber). In all cases of decay we find the vegetative bodies, these slender threads of fungi, responsible for the mischief. These fine threads are the vegetative body of the fungus, the little shelf is its fruiting body, on which it produces myriads of little spores (the seeds of fungi). Some fungi attack only conifers, others hardwoods; many are confined to one species of tree, and perhaps no one attacks all kinds of wood. One kind produces "red rot," others "bluing." In one case the decayed tracts are tubular, and in the direction of the fibers the wood is "peggy." In other cases no particular shapes are discernible.

FIG. 3.—Fungus threads in pine wood. (Hartig.) a, cell wall of the wood fibers; b, bordered pits of these fibers; c, thread of mycelium of the fungus; d, holes in the cell walls made by the fungus threads, which gradually dissolve the walls as shown at e, and thus break down the wood structure.

It appears that warmth, preferably between 60° and 100° F., combined with abundance of moisture (but not immersion), is the most important condition favoring decay, and that the defence lies in the proper regulation or avoidance of these conditions, or else in the use of poisonous salts, which prevent the propagation of fungi.

STIFFNESS.

If 100 pounds placed in the middle of a stick 2 by 2 inches and 4 feet long, supported at both ends, bend or "deflect" this stick one eighth of an inch (in the middle), then 200 pounds will bend it about one-fourth inch, 300 pounds three-eighths inch, the deflection varying directly as the load. Soon, however, a point is reached where an additional 100 pounds adds more than one eighth inch to the deflection—the limit of elasticity has been reached. Taking another piece from the straight grained and perfectly clear plank of the same depth and width, but 8 feet long, the load of 100 pounds will cause it to bend one eighth inch, but will deflect it by about 1 inch. Doubling the length reduces the stiffness eightfold. Stiffness then decreases as the cube of the length.

Cutting out a piece 2 by 4 and 4 feet long, placing it flatwise, so that it is double the width of the former stick and loading it with 100 pounds, we find it bending only one-sixteenth inch; doubling the width doubles the stiffness.

Setting the same 2 by 4 inch piece on edge, so that it is 2 inches wide and 4 inches deep, the load of 100 pounds bends it only about one sixty-fourth inch; doubling the thickness increases the stiffness about eightfold.

It follows that if we double the length and wish to retain the same stiffness we must also double the thickness of the piece.

A piece of wood is usually stiffer with the annual rings set vertically than if the rings are placed horizontally to the load.

Cross grained and knotty wood, to be sure, is not as stiff as clear lumber; a knot on the upper side of a joist, which must resist in compression, is, however, not so detrimental as a knot on the lower side, where it is tried in tension.

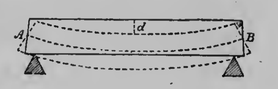


FIG. 4.—BENDING A BEAM.

Every large timber which comes from the central part of the tree contains knots, and much of its wood is cut more or less obliquely across the grain, both conditions rendering such material comparatively less stiff than small clear pieces.

The same stick of pine, green or wet, is only about two-thirds as stiff as when dry. A heavy piece of long leaf pine is stiffer than a light piece; heavy pine in general is stiffer than light pine, but a piece of hickory, although heavier than the pine, may not be as stiff as the piece of longleaf pine, and a good piece of larch exceeds in stiffness any oak of the same weight.

Since it is desirable, and for many purposes essential, to know beforehand that a given piece with a given load will bend only a given amount, the stiffness of wood is usually stated in a uniform manner and under the term "modulus (measure) of elasticity."

If AB, fig. 4, is a piece of wood, and d the deflection produced by a weight or load, the elasticity of the wood, as usually stated, is found the formula:

$$\text{Modulus of elasticity} = \frac{W\,l^3}{4\,D\,b\,d^3}$$

where W is the weight, l the length, b and d the breadth and depth of the stick, and D the deflection for the load W. In the following table the woods are grouped according to their stiffness. The figures are only rough approximations which are based on the data given in Vol. IX of the Tenth Census. The first column contains the above modulus, the second shows how many pounds will produce a deflection of 1 inch in a stick 1 by 1 by 12 inches, assuming that it could endure such bending within the limits of elasticity, and the third column gives the number of pounds which will bend a stick 2 by 3 inches and 10 feet long through 1 inch.

The stick is assumed to rest on both ends; if it is a

cantilever, i.e., fastened at one end and loaded at the other, it bears but half as much load at its end for the same deflection.

From the third column it is easy to find how many pounds would bend a piece of the same kind of other dimensions. A 2 by 4 inch bears eight, a 2 by 6 inch twenty-seven times as much as the 2 by 2 inch; a piece eight feet long is about twice as stiff as a 10 foot piece; a piece 12 feet, only about three-fifths, 14 feet one-third, 16 feet two-ninths, 18 feet one-sixth, and 20 feet one-eighth as stiff.

The number of pounds which will bend any piece of sawed timber by 1 inch may be found by using the formula:

$$\text{Necessary weight} = \frac{4\ E\ bd^3}{l^3}$$

where E is the figure in the first column, b, d, l, breadth, depth and length of the timber in inches. If the deflection is not to exceed one-half inch, only one-half the load, and if one-fourth inch, only one-fourth the load is permissible.

To allow for normal irregularities in the structure of wood itself, as well as in the aggregate structure of timbers, an allowance is made on the numbers which have been found by experiment; this allowance is called the "factor of safety." Where the selection of the wood is not very perfect, the load is a variable one, and the safety of human life depends on the structure; the factor is usually taken quite high, as much as 6 or 10, i. e., only one-sixth or one-tenth of the figures given in the tables is considered safe, and the beam is made six to ten times as heavy as the calculation requires

TABLE OF STIFFNESS (MODULUS OF ELASTICITY) OF DRY WOOD. GENERAL AVERAGES.

SPECIES.	Modulus of elasticity W. E. 4 D lbf per square inch.	Approximate weight which deflects by 1 inch a piece— 1 by 1 inch and 12 inches long.	2 by 2 inches and 10 feet long.
	Pounds.	Pounds.	Pounds.
(1) Live oak, good tamarack, longleaf, Cuban and shortleaf pine, good Douglas spruce, western hemlock, yellow and cherry birch, hard maple, beech, locust and the best of oak and hickory	1,768,000	4,000	62
(2) Birch, common oak, hickory, white and black spruce, loblolly and red pine, cypress, best of ash, elm and poplar and black walnut	1,552,000	3,200	51
(3) Maples, cherry, ash, elm, sycamore, sweet gum, butternut, poplar, basswood, white, sugar and bull pine, cedars, scrub pine, hemlock and fir...	1,109,000	2,500	40
(4) Box elder, horse chestnut, a number of western soft pines, inferior grades of hardwood	341,000	1,500	30

[1] Less than.

THE VALUE OF ADVERTISING.

ONE of the largest advertisers in London says: "We once hit upon a novel expedient for ascertaining over what area our advertisements were read. We published a couple of half-column ads, in which we purposely misstated half a dozen historical facts. In less than a week we received between 300 and 400 letters from all parts of the country, from people wishing to know why on earth we kept such a consummate idiot, who knew so little about English history. The letters kept pouring in for three or four weeks. It was one of the best paying ads. we ever printed, but we did not repeat our experiment, because the one I refer to served its purpose. Our letters came from school-boys, girls, professors, clergymen, school-teachers and, in two instances, from eminent men who have a world-wide reputation. I was more impressed with the value of advertising from those two advertisements than I should have been by volumes of theories." Exchange.

Large quantities of asbestos are now being shipped from the Thedford mine in Quebec to England.

Allister McKay, contractor, Chatham, has succeeded in perfecting a mammoth steam plow, which is now in successful operation on his Point Pelee farm. The plow is propelled by a steam engine at each end of the field, and performs its work fast and effectively.

STUDENTS' DEPARTMENT.

AN IRISH COMPETITION.

THE corporation of Belfast, Ireland, invite sketch designs for a new city hall, to cost £150,000. Mr. Alfred Waterhouse, R. A., and Mr. Bretland, City Surveyor, are the assessors. The authors of the three selected designs will be required to engage in a final competition, and among these the sum of £300 will be equally divided. The City Surveyor will furnish a copy of the conditions on payment of one guinea. The competition will close on the 25th of October.

"CANADIAN ARCHITECT AND BUILDER" STUDENTS' AND DRAUGHTMEN'S COMPETITION.

THE reports of the committees, composed of members of the Province of Quebec Association of Architects and of the Ontario Association of Architects, who kindly undertook to judge the merits of the designs submitted in the above competition, have been received, and are printed in full as follows:

"The Committee of the Province of Quebec Association of Architects appointed to consider the designs submitted in the CANADIAN ARCHITECT AND BUILDER competition for a frontispiece for the New Year Number, 1897, herewith beg to present their report.

Seven designs were submitted. Of these the one sent in under the motto of "Dix" we ruled out of the competition, for the reason that it is an exact copy of a drawing published in the American Architect of October 22, 1892, by W. M. Maccafferty, being one of a series of sketches made by him as American Architect Travelling Scholar, 1892.

"Ich Dien" we were also compelled to rule out of the competition as not complying with the published conditions as to size.

"Wilmot" we also ruled out as being in pencil and not complying with the conditions as to size.

Of the others we consider that none are of sufficient merit to be awarded a prize, nor do we consider them suitable for the object sought.

ALEX. C. HUTCHISON, President.
ANDREW T. TAYLOR, Vice-President.
JOS. VENNE, Secretary.

TORONTO, Aug. 3rd, 1896.

The problem to be solved by this competition, viz: "a front cover for the New Year Number of the CANADIAN ARCHITECT AND BUILDER, was by no means an easy one, and in the committee's opinion it is not surprising that the result should not be satisfactory. The subject is outside the ordinary scope of architecture. It called for a superior quality of draughtsmanship, and most of all for considerable designing ability, and therefore rather beyond the capabilities of the average student. Moreover, the problem was not merely to design an ordinary journal frontispiece, but one that should be distinctively architectural and which should present the ideal rather than the practical side of architecture. For example, if the design was intended to depict some notable architectural monument either in whole or in part such representation should either be conventionalized or it should form a portion only of the whole composition, being supplemented by something more idealistic. At the same time simplicity of design is of first importance, and a crowded or complex composition is to be avoided. This defect is forcibly illustrated in the design submitted by "Wilmot." Here both the real and the ideal are presented (and for this it is to be commended,) but so many insignificant and feeble details are introduced as to completely mar the whole effect. On the other hand the design by "Dix," who selects an entrance doorway, is lacking in ideal qualities, it being solely a representation of an old doorway in Siena, Italy.

The committee, after an examination of the various designs, would award the first place to "Ich Dien" and the second to "Confident."

The design under motto of "Dix," before referred to, while being an excellent example of artistic draughtsmanship, and under proper conditions worthy of a high place, we must decline to consider, as it is an exact copy even to the most minute detail (the original draughtsman's initials only excepted) of a drawing by Mr. W. M. Maccafferty, as published in the American Architect of October 22nd, 1892.

As to the other designs the committee would make the following comments and criticisms:

"Ich Dien" easily occupies the first place. The subject chosen is a domestic doorway in the Renaissance style, the steps with side parapets of stone surmounted by ornamental lamp standards in wrot iron or other metal. The composition is quite artistic, it is well drawn and the lettering is good and well arranged. Its chief fault is a certain smallness and prettiness suggestive of the decorative accessories of architecture rather than of architecture itself.

"Confident" submits a well drawn design in many respects, suitable and appropriate. It is, however, devoid of artistic feeling and very commonplace in design. The brackets under the cornice and the outline of the parapet or pediment over cornice are particularly objectionable. The figures and the Ionic capital in the pediment are good.

"Lion" sends a carefully drawn design, devoid of architectural character. It would be quite as appropriate for a journal devoted to the interests of agriculture.

"Wilmot's" design has already been criticised. It, moreover, has the disadvantage of being in pencil only.

In the case of "Le chat noir" the criticism applied to "Lion" would be equally applicable, with the further defect of extreme paucity of ideas.

"Heman's" design is commonplace and badly proportioned, while the drawing of the ornamental or freehand portions is very indifferently rendered.

GRANT HELLIWELL,
F. S. BAKER,
J. FRANCIS BROWN,
Committee.

In view of the fact that none of the designs submitted possess standard of merit which would justify their use for the purpose intended, we regret to be obliged to withhold the awards, as in the conditions we reserved our right to do. As we feared at the outset, the subject of the competition proved to be somewhat unfamiliar to and beyond the scope of the students and draughtsmen in a young country such as Canada, but we are pleased that so many were to be found willing to make the attempt to meet the requirements. We exceedingly regret that one of the competitors a clever draughtsman should have had so little ambition and such small sense of honor as to attempt to palm off upon the judges as the product of his own brain an exact copy of a formerly published illustration of a well-known existing piece of architecture.

A CHAPTER FROM THE BOOK OF COMPETITIONS.

PERHAPS the following amusing skit may enable those interested to fully realize the difficulties of a competition, and the very natural dissatisfaction of competitors with awkward conditions which are not after all taken as binding conditions in settlement:

2. In the beginning was a certain place, named Seadrain, and great was the dirt around it.

2. And certain of the people shouted, saying, "We would wash, but baths there are none."

3. And others that were in it said, "We would read, but books there are none."

4. Then those in authority spake unto the people saying, "Will ye be rated therefor?"

5. And the people shouted "Yea," and the law went out.

6. And the head men of the parish wrote to Cautious street, where is the Society for the Protection of Young Ideas and Gray Hairs, saying,

7. "Name, we pray thee, an adviser, one of exceeding good judgment and cunning, that we walk in the paths of Wisdom."

8. And the wise man named one of exceeding great respectability, whose works none knew nor could cavil at.

9. And the accessor shut him in a secret place, and communed with his own spirit, and the understanding which was in him.

10. But he walked not in the ways of Damp-cottage, whose wisdom is always most evident.

11. For the papers he drew up contained those things which they ought not to have contained, and left unsaid many things that ought to have been said, and there were many words and little common sense in them.

12. And they laid burdens grevious and impossible to carry out on the backs of the competitors, while the assessor smiled to himself, saying,

13. "Many printed pages have I written that the Building Committee may laud and magnify me for all time."

14. "For they will say, careful is he and of exceeding cunning; these fellows of architects we have chastised with whips, but he breaketh their backs with scorpions."

15. Then certain of the profession murmured and raised an outcry, saying,

16. "Hard and impossible are our conditions; how can a market be a town hall, or a fish be a serpent in aspect?"

17. "And why should we of the profession make details useless and unnecessary to thy judgment?"

18. "How can we judge of old lights, knowing not what existed of old time?"

19. But the assessor hardened his heart and laughed in his sleeve, saying,

20. "It is practice most excellent for ye, and in no way will I save ye the trouble."

21. And he finally gave judgment in this wise, pronouncing,

22. "Rabbit place 1 first, and others second and third in merit."

23. And certain of the competitors muttered and murmured aloud, saying,

24. "Thou regardest not thy own conditions, nor givest judgment by thy printed provisions."

25. But he was exceeding merry and laughed again, and told them,

26. "No man hath kept the conditions to the letter, for the conditions were impossible and in many ways utterly needless."

27. "Lo, I could have thrown all ye aside, saying,

28. "Fools and idiots were ye, not to see you were trapped, and but sheep for the slaughter."

29. "No one will believe ye or listen to your cries, but will only speak thus and thus,

30. "He envieth one Rabbit, and his soul is utterly filled up with blackness."

31. Thus it took place that men might write in after time, saying,

32. Easier is it for a camel to gallop through the eye of a needle, than for justice and wisdom to be evident in the conduct of a competition. W. W. H., in the British Architect.

In filling up a cracked ceiling, use a plaster putty to which some glue size has been added, but take care to cut out the cracks in a V shape so as to form a key.

To make a tint stand well we must have at least two good coats of the same colour, on a good, firm, even foundation; and it is better still if the prime coat is tinted with the same colour.

STRENGTH OF STEEL. An experiment with a view to ascertain the relative resistance, under pressure, of the hardest steel and the hardest stone, was recently made at Vienna. Small cubes, measuring 1 centimeter of corundum and of the finest steel, were subjected to the test. The corundum broke under the weight of six tons, but the steel resisted up to forty-two tons. The steel split up with a noise like the report of a gun, breaking into a powder, and sending sparks in every direction, which bored their way into the machine like shot.

THE BUILDER

The National Association of Builders.

The tenth annual convention of the National Association of Builders of the United States will open at Buffalo on September 15th. In view of the recent change of methods on the part of the labor unions in substituting for strikes a united effort to wrest from the governing bodies such legislation as will secure to them advantages over the employers, the National Association propose at their approaching convention to discuss thoroughly the reasons for and against the Association of Builders. It is felt that if the master builders are not to be placed at the mercy of the unions they must seek by as perfect organization as possible to protect their rights and interests. Some of our Canadian master builders might profitably attend the Buffalo convention, get thoroughly imbued with the ideas of their American contreres, and on their return to Canada set the ball rolling in favor of a Provincial or Dominion Builders' and Contractors' Association. In view of the beneficial work which lies before such an organization, it is most surprising that nothing of the kind exists in this country.

Reading Drawings.

As a rule country builders know very little about draughtsmanship, and care less. Very few farm buildings are put on paper before the work of erection begins, unless the farm is pretty close by a city or town; then the house assumes a somewhat pretentious character, and, when this is the case, the country builder generally fights shy of the contract and the work falls into the hands of the city or town contractor. We see no reason why country builders should not be able to read an architect's drawing just as well as his city rival, and there is no cause for fear on his part of a trained architect exacting more from the countryman than the owner of the building would. Indeed, under the supervision of an architect, the builder stands a much better chance of being fairly dealt with and of giving better satisfaction than would otherwise obtain. If builders in the rural districts would master the art of plan reading, which they can readily do, we fancy they would not have so much prejudice against them or against architects, and they would thereby be in a better position to successfully compete with the town or city contractor on work in their own neighborhood a condition worth striving for.

Damp Courses.

If proper steps are taken when a foundation is laid which is intended to carry a brick or stone superstructure, there will never be any dampness in the walls above the lower joists. A "damp course" of slate should be laid in the wall across the whole thickness, under the first tier of joists, and should be well bedded in with neat Portland cement. If slates can not be obtained a thick coat of asphalt mortar may be used on top of the stone work on which the brickwork may start; if well done, the asphalt will prevent dampness from rising in the walls. If neither slates or asphalt is obtainable then it will be well to finish the top of the wall with a coat of "neat" Portland cement, and to lay the first two or three courses of bricks in cement mortar. This latter method is by no means a sure success, but, if adopted, it will do much towards keeping the upper walls dry. We have known sheet lead to be used on walls as a damp arrester and it was a decided success, but costly, and not by any means lasting. It is said that just below the line of earth around the base of the Cathedral of Cologne, sheet copper was laid on the walls for the purpose it is supposed of preventing dampness ascending the walls, which it has effectually done, and in the joints under the massive towers of the Cathedral where the copper was placed, the weight above has settled on the copper with such a pressure that the metal has actually oozed out of the joints and formed a solid copper bead which runs all round the foot of the towers, inside and out. No brick or stone building should be erected, particularly in the rural districts, without being fully protected by a "damp course."

Laying Base.

There are many places where it is the height of folly to put down base or wainscotting after the floors are laid. Take kitchens for instance: Here a floor is scarcely ever carpeted, and it is more used perhaps than any other floor in a house, and, this being the case, it is only a matter of time, and a very short time at that, before the floor will be so badly worn that a new floor will be absolutely necessary. Now, if the old floor is to be taken up and in nine cases out of ten such will be the result then the base or the lower member of the wainscot must be taken off the wall, a process that is difficult and fraught with danger to the wall and to the wood-work removed, as if is likely to be split, broken, or so badly shattered as to be unfit for use again. To avoid all this, in rooms in which the floors are likely to be much used and quickly worn out, a rough floor should be laid down first, and then the base or wainscotting should be put down, the lowest member fitting down to the rough flooring; then the top or finishing floor should be put down tight between the base boards. In the angle where the floor adjoins the base, an ovolo or quarter-round should be nailed well on the floor, which will have a tendency to keep the floor warm. When it becomes necessary to take the floor up, it may readily be done by removing the ovolo moulding which may be used again when the old flooring can be torn up without removing or injuring the base boards in the slightest. It is an awkward job to tear up an old floor and put down a new one, if all the base boards have to

be taken down and put in place again when the new floor is completed, and often the plasterer has to be called in to mend and patch the broken walls after the carpenter is through, and following in the heels of the plasterer comes the painter, who is obliged to repaint the whole base or wainscot, in order to cover over the splits, cracks and patches the carpenter left behind, and all because the base had been laid after the floors were down instead of being laid down before the finishing floor went down.

Painting Floors.

It is not an uncommon thing for a painter to be asked to paint a floor, and generally he is instructed as to the color and other little matters. If the floor is one that will be subject to much wear and is to be painted with oil paint, the workman should select such coloring substances of certain earthy matters only, for the use of white lead for this purpose is a mistake that should be avoided. Most people advocate the use of lead in painting floors because of its supreme density and body, under the mistaken idea that density adds to its wearing quality. As a matter of fact, no oil paint will stand less wear than white lead, or colors composed largely of white lead. It simply covers the surface, and is one of the best paints employed to protect wood-work, where there is no great wear. Ochres make the best wearing paints, and they may be applied in several ways. They may be mixed with the oil and applied with a brush in the usual way, or they may be applied when mixed with hot stale beer and glue water, and when dry two coats of oil may be laid on thinly with a good strong brush, and if properly done the work will be lasting and satisfactory. In every case the floor should be perfectly clean and dry, before the color is applied, and if the latter is mixed with the oil, the floor should receive two coats, both of which should be well brushed in. If it is desired that the floor should present a varnish-like lustre, the following may be employed, which answers the double purpose of making the paint more durable and adding the polish: Dissolve two parts of shellac in eight parts of alcohol of about eighty per cent., and add to it one quarter of a part of camphor. When the whole is completely dissolved, it can be filtered or strained through a cloth in order to separate the suspended impurities. Paint the floor with this composition once or twice as may be required, and it may then be rubbed over with a soft cloth on which a little sweet oil has been applied, when a surface will be obtained that will be hard and glossy. When this top coating has been partly worn off, another application of the shellac mixture will restore it to its shiny condition.

Sham Competition.

There is a species of competition practised by owners, and often winked at by architects, which, while not exactly dishonest, is somewhat fishy, and it would be better for all parties concerned if the practice was "stamped out" entirely. Estimates are called for on certain work from a member engaged in the calling pertaining to it, but the particular friend of the owner, or of someone deeply interested, is given a sly glance at the figures of his rivals, with the suggestion that the lowest bidder is to get the work. The favorite always understands what this means, and generally so modifies his original demand that he gets the contract. All really honest men will deprecate this form of confidencing the unsuspecting tenderers out of the contracts which they have justly earned by the recognized rules governing fair competitions. A favorite may have a certain claim for preference so long as his bid is as low as the lowest; but by what law of selection can he be chosen over those who put in lower original tenders for the same work with the implied understanding that all the contestants stood on an equal footing. This sort of sham competition is done every day by men who consider themselves as good and as honest as the best, and who would instantly resent any insinuations that reflected on what the world would term their honesty. True, there is generally a clause inserted in the advertisement asking for tenders which states, "that the lowest or any tender not necessarily accepted." But this clause is inserted in order to protect the owner against incompetent and irresponsible contractors, not for the purpose of "cheese-paring" the tenders, and therefore has no force in cases similar to those under notice. Aside from the injury to the party rightfully entitled to the contract, the parties to the deception are placed in such relations to each other that the letter of the specifications cannot be rigidly enforced as when the competition has been fair and open. The contractor feels that, as his own price was not given him, little slights in the execution of the work should not be complained of, and the owner, recognizing the force of this agreement, lets the matter pass. There is another thing in connection with this "sham contracting" that has a baleful effect. It has the effect of reducing the wages of the workmen, and of rushing the work through by driving the men at a steam engine pace, and it generally results in unsatisfactory workmanship and the introduction of inferior materials.

SETTLEMENT OF THE LONDON STRIKE.

The great strike in the building trades in London, Eng., in which 10,000 workmen were engaged, has been settled, as the result of a conference between representatives of the unions and the Central Association of Master Builders. An advance of ½d. per hour for plasterers, bricklayers, carpenters, mill-sawyers, and wood-cutting machinists, and a code of working rules for the future, has been agreed upon. The laborers refused an advance of ¼d. on the same terms, but returned to work at the old rate of wages. The agreement provides that unionists and non-unionists shall work amicably together, and that no dispute shall be undertaken until it has been referred to a joint committee of employers and workmen.

MASTER PLUMBERS' OUTING.

The union pic-nic of master plumbers and their friends held at Mountain View Park, Hamilton, on the 31st ultimo, was a most enjoyable affair. The representation from Toronto and Hamilton was quite large, the plumbers of the latter place having closed their places of business for the day. London, Sarnia, St. Catharines, Brantford and Guelph were also well represented, and in all over three hundred enjoyed the day's recreation. Among the usual sports was a baseball match between Toronto and Hamilton master plumbers, in which the Toronto contingent suffered defeat.

Mr. W. J. Burroughes, president of the Toronto Master Plumbers' Association, reports a steady increase in the membership thereof. At the last meeting no less than twelve new members were added to the roll, several being from adjacent towns.

v.8-9
Canadian
archi

STONE CRUSHER OPERATED BY ELECTRICITY.

THERE has recently been installed at Peterboro, by the Royal Electric Company, an electric motor for operating a stone crusher, used by Messrs. Corry & Laverdure, contractors for the construction of the Trent Valley Canal, to crush all stone required for that section of the canal. The plant is said to be the first of the kind and the only one in commercial operation in Canada.

The current to operate the stone crusher is transmitted from the station of the Peterboro Light and Power Company, a mile distant. The motor plant consists of a fifty kilowatt alternating current synchronous motor, with its exciter, and a five horse power starting motor. The alternating current is taken by the motor directly from the transmission line at 1,000 volts. The stone crusher is belted to one end of the shaft of the synchronous motor, to the other end being belted in tandem the exciter and starting motor.

To indicate to the attendant on the stone-crushing plant the proper time to connect the synchronous motor with the alternating current transmission line from the station, a synchronizer is used, which consists simply of two transformers, so connected that when the synchronous motor is at the required speed and in step with the generator, a mile away, a lamp connected with these transformers goes out, giving positive indication to the attendant when to connect the motor with the transmission line.

The plant was started June 17th and the stone crusher has been successfully doing its work every day. It has been put to the utmost test; the greatest possible loads have been put on; the crusher has been jammed full of the hardest stones obtainable; the greatest variations possible in load, from nothing to the extreme capacity of the crusher, have taken place rapidly, but no variation in speed occurred, the synchronous motor meeting every demand upon it without change.

Messrs. Corry & Laverdure express themselves as pleased with the operation of the plant.

THE USE OF QUANTITY SHEETS IN PLUMBING.

MR. F. HORTON, contractor, of Montreal, writes as follows to the Plumbers' Trade Journal advising the use of quantity sheets in figuring on plumbing, heating, and electric lighting:

I enclose you a copy of plumbing, heating and electric and gas fitting quantities, which you may make public in your valuable paper, and which I claim has been much needed in the contracting business. The cost of the quantity sheets is very little more than ordinary paper. It takes less room in your pocket than a book would, and is also a memory refresher, by the notes being printed on the sheets, which leads you to examine the specification more closely. Also, you can tear one of the sheets from the pad which you carry, hand it to your bookkeeper, who needs no further explanations, thereby leaving you more time for other business.

I wish to say there have been many contracts taken below cost in Montreal by mistakes being made in taking quantities of the plans and specifications. I know of instances when the brother contractors have assembled and discussed about the successful contractor taking the contract below cost of their tenders, and the successful contractor at the same time felt sure he had made a good living profit on his price tendered to the architect. But on the completion of job, all charges being in for labor and material against the contract, he found that he was a loser of some hundreds of articles through leaving out by mistake things specified by not having a quantity sheet or memory refresher, which is, no doubt, the cause of so many jobs taken low.

I can scarcely understand that any sane contractor will take a job below cost. There is nothing in my estimation for a contractor to gain by doing ten thousand dollars worth of business which has cost him ten thousand five hundred. He has lost one year of his life and five hundred dollars in cash. He is a sadder and a wiser man than before he signed his contract, and may have to make arrangements with his creditors, and lose his honorable name, by not paying a hundred cents on the dollar.

F. HORTON, Contractor.

MONTREAL, 189

Heater No.	.....
Mains.	.....
	.....
Bronzing.	.....
	.....
Boiler Foundation.	.....
	.....
Expansion Tank.	.....
Peet Valves.	.....
Air Tap and Valves of Drain Tap.	.....
Drip Taps.	.....
Smoke Pipe.	.....
Labor.	.....
Cartage.	.....
	.....
Radiator.	.....
Coils.	.....
Rooms over.	.....

F. HORTON, Contractor.

MONTREAL, 189

Kitchen Boiler.	Couplings..... Stand.....
Bath.	Taps..... Overflow, N. P.....
Water Closet.	Tank....Seat.....N. P. Flush.....
Wash Basin.	N. P. Traps..... Taps, N. P.....
Marble Slab.	And..... Back .....
N. P. Shower.	Hot and Cold.....
Laundry Tub.	Waste..... Stand..... Taps.....
Kitchen Sink.	Trap..... H. C. Taps.....
Pantry Sink.	Trap..... H. C. Taps.....
Urinals.	Taps..... Tank.....
City Drain.	.....
Hot Water Pipe.	.....
Cold Water Pipe.	Stop Taps.....
Lead Waste.	Thimbles.....
W. C. Ventilator.	.....
Soil Pipe.	.....
Labor.	.....
Gas Lights.	Gasaliers.....
Electric Lights.	& Switches.....
Electric Bells.	Annunciator.....
Mechanical Bells.	& Pull.....

The Master Plumbers' Association of St. John, N. B., and vicinity held a meeting on the 7th inst., at which the following officers were elected for the ensuing year: President, Thomas Campbell, St. John; 1st vice-president, J. H. Doody; 2nd vice-president, Hamilton Kitchen, Fredericton; secretary-treasurer, Peter Campbell, St. John.

THE CAUSE OF INSANITARY DWELLINGS.

A COMMISSION appointed by the London Lancet to inquire into the cause of the prevalence of insanitary arrangements and bad plumbing in dwellings, assigns for these three principal reasons, viz.: (1) The prevailing indifference and consequent ignorance of all classes as to the various sanitary appliances by which they are surrounded; (2) the bad work and cheap materials put in many houses by either unqualified or unscrupulous men, encouraged by a dangerous practice of putting such work up to tender, and (3) the cost of rectifying insanitary work. The first of these causes is, we believe, the foundation one. The majority of people will not take the trouble to study the principles of sanitation to the degree necessary to reveal to them its important bearing upon health and life. Knowing nothing about the subject, they do not trouble themselves about dangers which are not visible to the naked eye, but rather concern themselves with the outward and inward appointments of the house, and accept by faith the assurance that the drains are all right. If the public would wake up on this question, and be as particular about the sanitary as about the other appointments of the houses they live in, there would be seen an immediate improvement in the character of plumbing work. Great advancement has been made within the past decade as the result of efforts of local boards of health and municipal enactments. It is to the credit of the leading plumbers in Canada that they have always shown themselves eager to assist the public bodies in bringing about improved conditions, and the recently organized Dominion Master Plumbers' Association has avowed this to be the principal object of its existence.

PIC-NIC OF LONDON BUILDERS.

THE fifth annual pic-nic of the builders of London, Ont., was held at Port Stanley on Saturday, the 8th inst., and proved quite as enjoyable as any of its predecessors. There were present nearly 2,000 persons who were connected with the several trades in the building line. The games and sports were a feature of the day. The judges appointed were Messrs. W. Skelly, E. Fitzgerald, Geo. Tambling, Geo. Riddle, J. G. Pritchett and H. C. McBride. Races were arranged for the members of the several trades, and lively contests were witnessed. A baseball match was also played between two picked teams. The general committee in charge of the arrangements comprised:—Chairman, Wm. Smith; treasurer, John Nicol; secretary, Walter Toll, and Messrs. R. Lewis, N. Graham, J. Quick, H. Boyer, J. Eggett, Thomas Rich, W. Pring, W. Burleigh, J. Boon, L. Stevenson, B. Sage, J. Walker, T. Irwin, G. Rougley, W. Bennett, J. Pritchart, W. Stone, and Ed. Hunter.

MODERN PRACTICE IN INTERIOR WIRING.

IN the course of his paper on the "Evolution of Interior Conduits from the Electrical Standpoint," before the National Electric Light Association at New York, Luther Stieringer made the following statement:

The best experience in the past fifteen years in interior wiring has demonstrated the following facts:

First—Indiscriminate wiring with staples is universally condemned.

Second—Cleat wiring is admissible in exposed work where the circumstances admit, but not in concealed work.

Third—Wires imbedded in plaster, depending on the insulation only for protection, are condemned.

Fourth—Lead-covered wires are also condemned, except where protected in a conduit.

Fifth—Wires in mouldings do not afford mechanical or chemical protection, and are only admissible in surface work.

Sixth—Wires carried in plaster, and covered with split or zinc tubes to prevent injury by trowels, are condemned.

Seventh—Glass or porcelain insulators can only be utilized in special cases of exposed work.

Eighth—Paper tubes do not afford absolute mechanical and chemical protection.

Ninth—Insulated tubes covered with a thin coating of brass or other metals do not afford absolute mechanical and chemical protection, but in exposed work they are to a certain extent admissible.

Tenth—Woven fabric conduit does not afford absolute chemical protection.

Eleventh.—Heavy insulating covering, integral with the insulation, offers no absolute protection against mechanical and chemical injury, and is analagous to rubber tubing for gas distribution installed throughout a building.

Twelfth—Concentric wiring is practiced in England with satisfactory results, but it is not in use in the United States. It offers many possibilities in the direction of a solid and fixed system.

Thirteenth—Paper-lined iron or steel pipes, known as "iron-armored conduit," "builders' tube," "armorite," "Clifton," and plain iron or steel pipe, are the only conduits that can afford absolute security against mechanical and chemical injury and assure permanence.

"TIPS" FOR BUILDERS.

NEVER compete with a "botch" if you know he is favored by the person about to build. He will undercut and beat you every time. Old material should never be destroyed simply because it is old.

When putting away old stuff see that it is protected from rain and atmosphere.

It costs about 15 per cent. extra to work up old material, and this fact should be borne in mind, as I have known several contractors who paid dearly for their "whistle" in estimating on working up second-hand material.

These remarks apply to woodwork only. In using old brick, stone, slate, and other miscellaneous materials it is well to add double price for working up.

Workmen do not care to handle old material, and justly so. It is ruinous to tools, painful to handle, and very destructive to clothing.

In my experience I always found it paid to advance the wages of workmen—skilled mechanics—while working up old material. This encouraged the men and spurred them to better efforts.

Sash frames, with sash weights, locks and trim complete, may be taken out of old buildings that are being taken down and preserved just as good as new by screwing slats and braces on them, which not only keeps the frame square, but prevents the glass from being broken.

Doors, frames and trims may also be kept in good

STONE CRUSHER OPERATED BY ELECTRICITY.

THERE has recently been installed at Peterboro, by the Royal Electric Company, an electric motor for operating a stone crusher, used by Messrs. Corry & Laverdure, contractors for the construction of the Trent Valley Canal, to crush all stone required for that section of the canal. The plant is said to be the first of the kind and the only one in commercial operation in Canada.

The current to operate the stone crusher is transmitted from the station of the Peterboro Light and Power Company, a mile distant. The motor plant consists of a fifty kilowatt alternating current synchronous motor, with its exciter, and a five horse power starting motor. The alternating current is taken by the motor directly from the transmission line at 1,000 volts. The stone crusher is belted to one end of the shaft of the synchronous motor, to the other end being belted in tandem the exciter and starting motor.

To indicate to the attendant on the stone-crushing plant the proper time to connect the synchronous motor with the alternating current transmission line from the station, a synchronizer is used, which consists simply of two transformers, so connected that when the synchronous motor is at the required speed and in step with the generator, a mile away, a lamp connected with these transformers goes out, giving positive indication to the attendant when to connect the motor with the transmission line.

The plant was started June 17th and the stone crusher has been successfully doing its work every day. It has been put to the utmost test; the greatest possible loads have been put on; the crusher has been jammed full of the hardest stones obtainable; the greatest variations possible in load, from nothing to the extreme capacity of the crusher, have taken place rapidly, but no variation in speed occurred, the synchronous motor meeting every demand upon it without change.

Messrs. Corry & Laverdure express themselves as pleased with the operation of the plant.

THE USE OF QUANTITY SHEETS IN PLUMBING.

MR. F. HORTON, contractor, of Montreal, writes as follows to the Plumbers' Trade Journal advising the use of quantity sheets in figuring on plumbing, heating, and electric lighting:

I enclose you a copy of plumbing, heating and electric and gas fitting quantities, which you may make public in your valuable paper, and which I claim has been much needed in the contracting business. The cost of the quantity sheets is very little more than ordinary paper. It takes less room in your pocket than a book would, and is also a memory refresher, by the notes being printed on the sheets, which leads you to examine the specification more closely. Also, you can tear one of the sheets from the pad which you carry, hand it to your bookkeeper, who needs no further explanations, thereby leaving you more time for other business.

I wish to say there have been many contracts taken below cost in Montreal by mistakes being made in taking quantities of the plans and specifications. I know of instances when the brother contractors have assembled and discussed about the successful contractor taking the contract below cost of their tenders, and the successful contractor at the same time felt sure he had made a good living profit on his price tendered to the architect. But on the completion of job, all charges being in for labor and material against the contract, he found that he was a loser of some hundreds of articles through leaving out by mistake things specified by not having a quantity sheet or memory refresher, which is, no doubt, the cause of so many jobs taken low.

I can scarcely understand that any sane contractor will take a job below cost. There is nothing in my estimation for a contractor to gain by doing ten thousand dollars worth of business which has cost him ten thousand five hundred. He has lost one year of his life and five hundred dollars in cash. He is a sadder and a wiser man than before he signed his contract, and may have to make arrangements with his creditors, and lose his honorable name, by not paying a hundred cents on the dollar.

F. HORTON, Contractor.

MONTREAL, 189.

Heater No.	.....
Mains.	.....
	.....
Bronzing.	.....
	.....
Boiler Foundation.	.....
	.....
Expansion Tank.	.....
Peet Valves.	.....
Air Tap and Valves	.....
of Drain Tap.	.....
Drip Taps.	.....
Smoke Pipe.	.....
Labor.	.....
Cartage.	.....
	.....
Radiator.	.....
Coils.	.....
Rooms over.	.....

F. HORTON, Contractor.

MONTREAL, 189

Kitchen Boiler.	Couplings..... Stand.....
Bath.	Taps..... Overflow, N. P.....
Water Closet.	Tank....Seat.....N. P. Flush.....
Wash Basin.	N. P. Traps..... Taps, N. P.....
Marble Slab.	And..... Back .....
N. P. Shower.	Hot and Cold.....
Laundry Tub.	Waste.....Stand..... Taps.....
Kitchen Sink.	Trap.....H. C. Taps.....
Pantry Sink.	Trap.....H. C. Taps.....
Urinals.	Taps..... Tank .....
City Drain.	.....
Hot Water Pipe.	.....
Cold Water Pipe.	Stop Taps.....
Lead Waste.	Thimbles.....
W. C. Ventilator.	.....
Soil Pipe.	.....
Labor.	.....
Gas Lights.	Gasaliers.....
Electric Lights.	& Switches.....
Electric Bells.	Annunciator.....
Mechanical Bells.	& Pull.....

The Master Plumbers' Association of St. John, N. B., and vicinity held a meeting on the 7th inst., at which the following officers were elected for the ensuing year: President, Thomas Campbell, St. John; 1st vice-president, J. H. Doody; 2nd vice-president, Hamilton Kitchen, Fredericton; secretary-treasurer, Peter Campbell, St. John.

THE CAUSE OF INSANITARY DWELLINGS.

A COMMISSION appointed by the London Lancet to inquire into the cause of the prevalence of insanitary arrangements and bad plumbing in dwellings, assigns for these three principal reasons, viz.: (1) The prevailing indifference and consequent ignorance of all classes as to the various sanitary appliances by which they are surrounded; (2) the bad work and cheap materials put in many houses by either unqualified or unscrupulous men, encouraged by a dangerous practice of putting such work up to tender, and (3) the cost of rectifying insanitary work. The first of these causes is, we believe, the foundation one. The majority of people will not take the trouble to study the principles of sanitation to the degree necessary to reveal to them its important bearing upon health and life. Knowing nothing about the subject, they do not trouble themselves about dangers which are not visible to the naked eye, but rather concern themselves with the outward and inward appointments of the house, and accept by faith the assurance that the drains are all right. If the public would wake up on this question, and be as particular about the sanitary as about the other appointments of the houses they live in, there would be seen an immediate improvement in the character of plumbing work. Great advancement has been made within the past decade as the result of efforts of local boards of health and municipal enactments. It is to the credit of the leading plumbers in Canada that they have always shown themselves eager to assist the public bodies in bringing about improved conditions, and the recently organized Dominion Master Plumbers' Association has avowed this to be the principal object of its existence.

PIC-NIC OF LONDON BUILDERS.

THE fifth annual pic-nic of the builders of London, Ont., was held at Port Stanley on Saturday, the 8th inst., and proved quite as enjoyable as any of its predecessors. There were present nearly 2,000 persons who were connected with the several trades in the building line. The games and sports were a feature of the day. The judges appointed were Messrs. W. Skelly, E. Fitzgerald, Geo. Tambling, Geo. Riddle, J. G. Pritchett and H. C. McBride. Races were arranged for the members of the several trades, and lively contests were witnessed. A baseball match was also played between two picked teams. The general committee in charge of the arrangements comprised: Chairman; Wm. Smith; treasurer, John Nicol; secretary, Walter Toll, and Messrs. R. Lewis, N. Graham, J. Quick, H. Boyer, J. Eggett, Thomas Rich, W. Pring, W. Burleigh, J. Boon, L. Stevenson, B. Sage, J. Walker, T. Irwin, G. Rougley, W. Bennett, J. Pritchart, W. Stone, and Ed. Hunter.

MODERN PRACTICE IN INTERIOR WIRING.

IN the course of his paper on the "Evolution of Interior Conduits from the Electrical Standpoint," before the National Electric Light Association at New York, Luther Stieringer made the following statement:

The best experience in the past fifteen years in interior wiring has demonstrated the following facts:

First—Indiscriminate wiring with staples is universally condemned.

Second—Cleat wiring is admissible in exposed work where the circumstances admit, but not in concealed work.

Third—Wires imbedded in plaster, depending on the insulation only for protection, are condemned.

Fourth—Lead-covered wires are also condemned, except where protected in a conduit.

Fifth—Wires in mouldings do not afford mechanical or chemical protection, and are only admissible in surface work.

Sixth—Wires carried in plaster, and covered with split or zinc tubes to prevent injury by trowels, are condemned.

Seventh—Glass or porcelain insulators can only be utilized in special cases of exposed work.

Eighth—Paper tubes do not afford absolute mechanical and chemical protection.

Ninth—Insulated tubes covered with a thin coating of brass or other metals do not afford absolute mechanical and chemical protection, but in exposed work they are to a certain extent admissible.

Tenth—Woven fabric conduit does not afford absolute chemical protection.

Eleventh.—Heavy insulating covering, integral with the insulation offers no absolute protection against mechanical and chemical injury, and is analagous to rubber tubing for gas distribution installed throughout a building.

Twelfth—Concentric wiring is practiced in England with satisfactory results, but it is not in use in the United States. It offers many possibilities in the direction of a solid and fixed system.

Thirteenth—Paper-lined iron or steel pipes, known as "iron-armored conduit," "builders' tube," "armorite," "Clifton," and plain iron or steel pipe, are the only conduits that can afford absolute security against mechanical and chemical injury and assure permanence.

"TIPS" FOR BUILDERS.

NEVER compete with a "botch" if you know he is favored by the person about to build. He will undercut and beat you every time. Old material should never be destroyed simply because it is old.

When putting away old stuff see that it is protected from rain and atmosphere.

It costs about 15 per cent. extra to work up old material, and this fact should be borne in mind, as I have known several contractors who paid dearly for their "whistle" in estimating on working up second-hand material.

These remarks apply to woodwork only. In using old brick, stone, slate, and other miscellaneous materials it is well to add double price for working up.

Workmen do not care to handle old material, and justly so. It is ruinous to tools, painful to handle, and very destructive to clothing.

In my experience I always found it paid to advance the wages of workmen—skilled mechanics—while working up old material. This encouraged the men and spurred them to better efforts.

Sash frames, with sash-weights, locks and trim complete, may be taken out of old buildings that are being taken down and preserved just as good as new by screwing slats and braces on them, which not only keeps the frame square, but prevents the glass from being broken.

Doors, frames and trims may also be kept in good

v.8-9
Canadian
archi

order until used, by taking the same precautions as in window frames.

Old scantlings and joists may have all nails drawn or hammered in before piling away.

Counters, shelving, drawers and other store fittings should be kindly dealt with. They will be wanted sooner or later.

Take care of the locks, hinges, bolts, keys, and other hardware. Each individual piece represents money in a greater or lesser sum.

Old flooring can seldom be utilized, though I have seen it used for temporary purposes, such as fencing, covering of veranda floors while finishing work on plastering, etc. As a rule, however, it does not pay to take it up carefully and preserve it. Conductor pipes, metallic cornices, and sheet metal work generally, can seldom be made available a second time, though all is worth caring for, as some parties may use it for repairs.

Sinks, wash-basins, bath-tubs, traps, heating appliances, grates, mantels and hearth-stones should be moved with care. They are always worth money and may be used in many places as substitutes for more inferior fixings.

Marble mantels require the most careful handling.

Perhaps the most difficult fixings about a house to adapt a second time are the stairs. Yet I have known where a man has so managed to put up new buildings that the old stairs taken from another building just suited. This may have been a "favorite accident," but the initiated reader will understand him. Seldom such accidents can occur.

Rails, balusters and newels may be utilized much readier than stairs, as the rails may be lengthened or shortened to suit variable conditions.

Gas fixtures should be cared for and stowed away in some dry place. They can often be made available, and are not easily renovated if soiled or tarnished.

It is not wise to employ men who have nothing but their strength to recommend them. As a rule they are like bears—have more strength than knowledge, and lack of the latter is often an expensive desideration. Employ for taking down the work good careful mechanics, and do not have the work "rushed through." Rushers of this sort are expensive.

Never send old material to a mill to be sawed or planed, no matter how carefully nails, pebbles and sand have been hunted for; the saw or planer knives will most assuredly find some you overlooked; then there will be trouble at the mill.

Have some mercy for the workman's tools. If it can be avoided do not work up old stuff into fine work. If not avoidable pay the workman something extra because of injury to tools.

Don't grumble if you do not get as good results from the use of old material as from new. The workman has much to contend with while working up old nail-speckeled, sand-covered material.

WHEN CARVING SHOULD BE EXECUTED.

It would be interesting to learn, says the Scientific American, just why so many stone carvers prefer to work on the material after it has been built into a structure rather than on the block before placing. When interrogated as to this preference the usual answer is that it is thus easier to match the cutting on adjoining blocks, or that one gets a better idea of the effect in this way. Or perhaps it may be argued that there is danger of damage to delicate reliefs in handling the blocks and getting them into position. Yet neither or all of these appear to be sufficient reasons—sufficient, that is, to offset the disadvantage of working in awkward positions, of not having spare tools handy, and of the danger of mutilation of a placed stone by a slip. As to the latter, which would apparently be a very serious and expensive matter usually, one carver, whose specialty is scroll and leaf cutting, medallions, pilaster and column capitals, etc., says that he can generally get over or conceal small breaks by slightly altering the design. But, after all, the practice does not seem reasonable, and none of the explanations are quite satisfying. Of course, there are cases where there is no choice, but for the most part the ornamental work could, it would seem, be done to better advantage in the yard or under cover than when the workman is slung up on a staging. All the delicate reliefs, even in limestone and sandstone, or soft material in general, could be crated and otherwise protected for handling in setting up.

Both systems seem to have been followed by the ancient Egyptian and Greek cutters, though it is not always easy to determine the method. From what is known of the skill of the old constructors in getting heavy material into place, making close joints and perfect matching, it may be concluded that a large part of the carving was done before erection. We degenerate moderns, too, have some tricks of our own, going so far now in good practice as to have pressed and ornamental bricks snugly packed in crates at the brickyards, transported in these crates, and finally swung up in them to the level where the bricks are to be set, and not for convenience in handling merely, but to avoid chipping of corners and edges, thus effecting quite a little saving. Finished stone also can be protected against rough usage in transportation, as is being done daily everywhere.

It was suggested to an expert carver who favored the plan of working on the building rather than on the unassembled parts of it, that his preference was perhaps only the outcome of convention and habit, and it was delicately intimated that possibly he had not even considered the matter seriously. But he would not have it that way at all, though he could not make the meddlesome outsider understand why he liked to work lying down or doubled up rather than in the normal posture of other artisans.

PERSONAL.

The death is announced of Mr. Wm. Cain, a prominent contractor of St. John, N. B.

Mr. Charles Crane, contractor, formerly of St. Thomas, Ont., met his death at Sault Ste. Marie by falling from a building.

Hamilton Kitchen, of the firm of Kitchen & Shea, plumbers, Fredericton, N. B., had his arm dislocated recently in a collision while riding his bicycle.

Mr. August Prestien, contractor, of Hespeler, was accidentally killed while stepping from the motor car to the trailer on the Galt, Preston and Hespeler electric railway. Deceased was a prominent citizen of the town, and had also served as municipal councillor.

Mr. Frank H. Doty, of the Doty Engineering Works, and President of the Toronto Dredging & Contracting Co., Toronto, was accidentally killed while engaged on a dredge at the island. He was standing on the platform of the dredge directing the movements of the scoop, when the big wheel slipped a cog and the iron bar swung suddenly around, striking him on the head.

BUILDER'S ESTIMATES.*

STONE-WORK is estimated by the perch; 24¾ cubic feet making one perch. An 18-inch wall, 1 foot high, and 16½ feet long, contains one perch.

BRICK-WORK.—Bricks are usually estimated at 25 to the cubic foot. They usually lay 5 courses to each foot in height.

For an 8-inch wall, allow 17 bricks for each square foot of surface. For a 12-inch wall, allow 25 bricks for each square foot of surface. For a 16-inch wall, allow 34 bricks for each square foot of surface.

CHIMNEYS.

Size of Chimney.	No. of Flues.	Size of Flues.	No. of Bricks per foot in Height
16 × 16 inches	1	8 × 8 inches	30
16 × 24 "	1	8 × 16 "	40
16 × 28 "	2	8 × 8 "	50
16 × 40 "	3	8 × 8 "	70
16 × 52 "	4	8 × 8 "	90
20 × 20 "	1	12 × 12 "	40
20 × 24 "	1	12 × 16 "	45

The above does not include waste, which must be allowed.

MORTAR FOR BRICK-WORK. One cask of good lime to a load (about 20 bushels) of sand is sufficient for 1,000 or 1,100 bricks.

CEMENT FOR CELLAR BOTTOMS should be mixed in the proportion of 1 of cement to 3 of gravel, and should be laid 3 inches thick. One cask of cement will cover five or 6 square yards.

PLASTERERS' MORTAR. One cask of lime to a load (20 bushels) of sand, and 2 bushels of hair, will cover about 50 square yards of surface; and ½ cask of lime will skim the same. In estimating the surface to be covered, plasterers deduct only half the area of openings, such as doors and windows, from the square yards in the walls.

TIMBERS.

TIMBERS FOR A LIGHT FRAME. Sills, 4 x 6 or 6 x 6 inches. Flooring-timbers, 2 x 6 inches, put from 16 to 22 inches apart. Posts, 3 x 5 inches. Ledger-boards, 1 x 6 inches, well fitted and nailed. Studding, 2 x 3 inches, put 16 inches to centres. Plates, 3 x 4 inches. Rafters, 2 x 5 inches, put 2 feet apart. Partition studding, 2 x 3 and strapping 1 x 3 inches, put 16 inches to centres.

TIMBERS FOR A MEDIUM FRAME. Sills, 6 x 7, 7 x 8, or 8 x 8 inches. Flooring-timbers, 2 x 8, 9, or 10 inches, put 16 or 18 inches apart, and bridged. Posts, 4 x 6 or 4 x 8 inches. Studding, 2 x 4 inches, put 16 inches to centres. Window and door studs, 3 x 4, or 4 x 4 inches. Ledger-boards, 1 x 7 or 8 inches, well fitted and nailed, or girts, 4 or 5 x 7 or 8 inches. Plates, 3 x 4 inches. Rafters, 2 x 6 inches, put 2 feet apart. Main partition studs 2 x 4 inches; other partitions, 2 x 3 inches, put 12 or 16 inches to centres.

TIMBERS FOR A GOOD HEAVY FRAME FOR DWELLING-HOUSE. Sills, 8 x 8 or 8 x 10 inches. Flooring-timbers, first story, 2 x 12 inches; second story, 2 x 10 inches; third story, 2 x 8 inches, put 16 or 18 inches apart, and well bridged. Side girts, 5 x 8 inches. End girts, 6 x 8 inches. Outside studding, 2 x 5 inches, put 12 or 16 inches to centres. Window and door studs, 3 x 5 inches. Rafters, 2 x 8 inches, put 20 or 24 inches apart. Main partitions, 2 x 5 inches; other partitions, 2 x 4 inches, put 12 or 16 inches to centres.

To square the sills of a house, make a mark on the upper outside edge of the side sill 8 feet from the corner of the house, and 6 feet from the corner of the house on the end sill; when the sills are square, a 10-foot pole will just reach across from point to point.

FRAMING AND BOARDING. To estimate the number of square feet of boards required to board a building, and lay the under floors, double the length, and also the width of the building; add these amounts, which gives the length around the building; multiply this by the length of the outside studding, which gives the square feet in the walls of the house. If the house has a pitch roof, multiply the width of the house by the rise of the roof: the result will be the square feet in 2 gables. Then, to find the square feet in the roof: to the length of the house, add the amount of projection at both ends (generally about 18 inches at each end, which makes 3 feet to be added), which amount multiply by twice the total length of the rafters, which gives the square feet in the roof. Then for the floors, multiply the length of the building by the width, and multiply this by the number of floors, which gives the square feet in all of the floors. Add together these different amounts, and add ⅛ for waste, which will give the number of square feet required. In estimating the labor in framing and boarding, some builders reckon eight or ten dollars per thousand feet.

*From "Modern Carpentry and Building," by Allen Sylvester.

WIRE AND CUT NAILS.

SOME experiments were recently made to determine the comparative holding power of wire and cut nails. The tests were made on pieces of white pine, joined with simple lap joints fastened by the nails. These were subject to transverse stresses, in some cases parallel to the axes of the nails, in others at right angles. When the load was applied perpendicular to the nails, the wood was often split and the cut nails were often broken, while the wire nail joints were broken by bending and drawing the nails. When the load was applied in the direction in which the nails were driven, the joints were broken by nails being drawn almost without being bent. Under this same manner of loading, the wire nails were started by smaller loads than the cut nails, yet when the cut nails were started they yielded rapidly, while the wire nails held nearly as well as at first. In all the cases tried the cut nails were found superior in strength and rigidity, while in one-half the cases wire nails gave the joints greater resistance than cut nails.

CREDIT FORKS MINING & MFG. CO.
(FORMERLY CARROLL & VICK.)
84 Adelaide St. W. - TORONTO
Brown Stone Quarries, Credit Forks, Ont.
Supply the Best . . . BROWN STONE IN . . CANADA
DIMENSION COURSING
RANDOM SHODDY
HEADS, SILLS RUBBLE
CRUSHED STONE FOR CONCRETE
GREY LIME of Superior Setting Quality shipped in car lots to dealers.
Office: 84 Adelaide St. West, TORONTO
Telephone 208.
Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

USEFUL HINTS.

All dark colour pigments, being but slightly basic in their nature, require more oil in their preparation than light colours. It is noticed in picture and portrait paintings that the cracks in the paint are far more numerous in the dark colours (not blacks) than in the white or light colours.

PAINT FOR IRONWORK.—Professor J. Spennrath gives in the Deutsches Bauzeitung an account of some interesting researches which he has made relative to the value of paints for ironwork. As one result of these, the professor concludes that none of the metallic oxides commonly used combine chemically with linseed oil. The drying process depends exclusively on an absorption of oxygen in a purely mechanical way. The value of the different pigments used varies. Thus zinc white, when used for outside work, rapidly swells to double its previous volume, owing to the absorption of carbonic acid gas and water. Sulphuretted hydrogen will cause red or white lead to act in a similar way, but, when pure, Professor Spennrath considers these two latter pigments satisfactory. Carbon paints are very stable, as is heavy spar, but the covering power of the latter is small. In order to test the relative durability of various paints, sheets of zinc were coated with a number of different kinds. The zinc was then dissolved away by acid, leaving a film of paint. All these films, it was found, could be destroyed by the action of dilute nitric or hydrochloric acids, while the vapours of sulphuric and acetic acids acted similarly. Alkaline fluids and gases also destroyed the paints rapidly. Pure water was found to be more injurious than salt water, and hence the destructive action of sea water is to be attributed mainly to the mechanical effects of wash. Hot water was found to act more rapidly than cold. The most important discovery made was, however, the great influence of temperature. Films, similar to those already described, completely lost their elasticity and became brittle when exposed to a temperature of 203 degrees Fahrenheit. There was, at the same time, a large contraction.

Mr. W. A. Sylvester, of Boston, Mass., has published under the title "Modern Carpentry and Building," a revised edition of his "Carpenter's Companion." It treats of framing and stair building, builders' estimates, sizes, weights and strength of materials, house planning, etc. We are indebted to Messrs. Damrell & Upham, 283 Washington street, Boston, for a copy of the work.

Mica . . . Boiler . . Coverings

ALL Steam Users should see the **NEW MICA BOILER and PIPE COVERING.** It is FLEXIBLE, DURABLE and a MAGNIFICENT NON-CONDUCTOR OF HEAT.

Tested by Mechanical Experts of the Canadian Pacific Ry. Co., Grand Trunk Ry. Co., Michigan Central Ry. Co., Boiler Inspection and Insurance Co., and proved to be the

BEST OF ALL NON-CONDUCTORS

Full Particulars, Reports of Trials, Prices, Testimonials, &c., from

Mica Boiler Covering Co., Ltd.

9 Jordan Street, TORONTO, ONTARIO

STEEL-CLAD BATHS

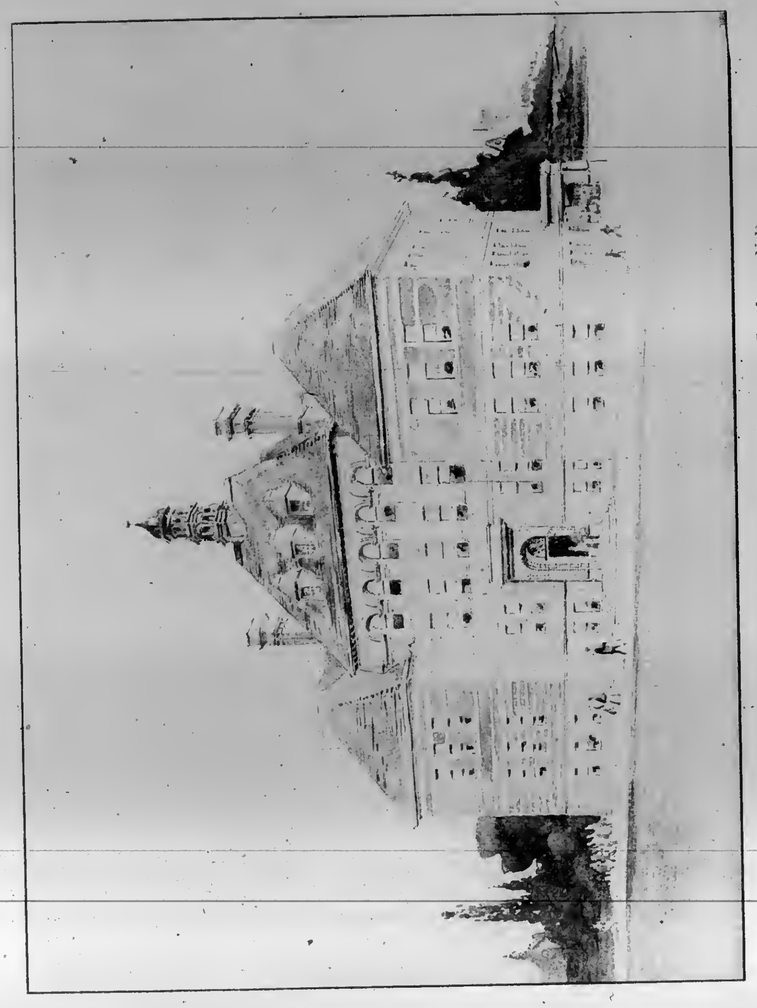
BOOTH'S PATENT

THE hardness, brilliancy and durability of Nickel makes it peculiarly adaptable for the purpose, and will, we are sure, commend this innovation as a further advance in the sanitary and artistic economy of the bath room, the more especially on account of the very low price at which we have placed it.

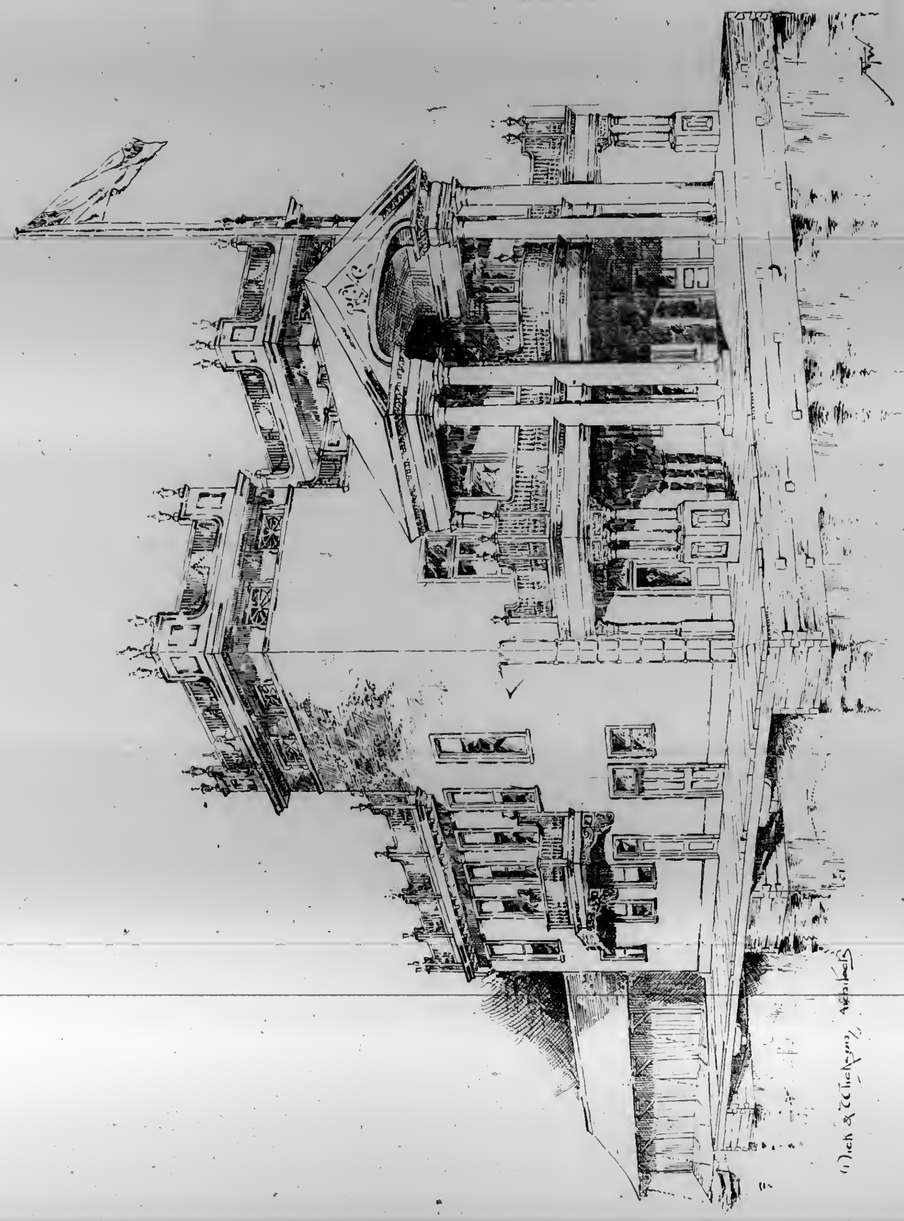
We are now prepared to supply our Steel-Clad Baths with Nickel Plated Linings at an advance on the list of **$1.50.**

The Toronto Steel-Clad Bath and Metal Co., Ltd.

125-127 Queen St. E., Toronto.



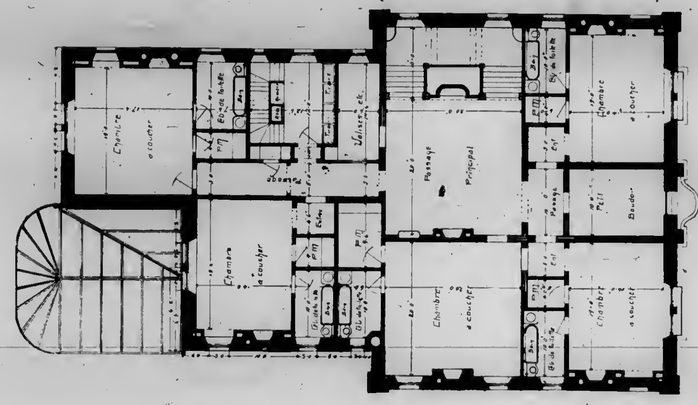
COMPETITIVE DESIGN FOR HIGH SCHOOL BUILDING, ST. JOHN, N.B.
CURRY, BAKER & CO, ARCHITECTS, TORONTO.

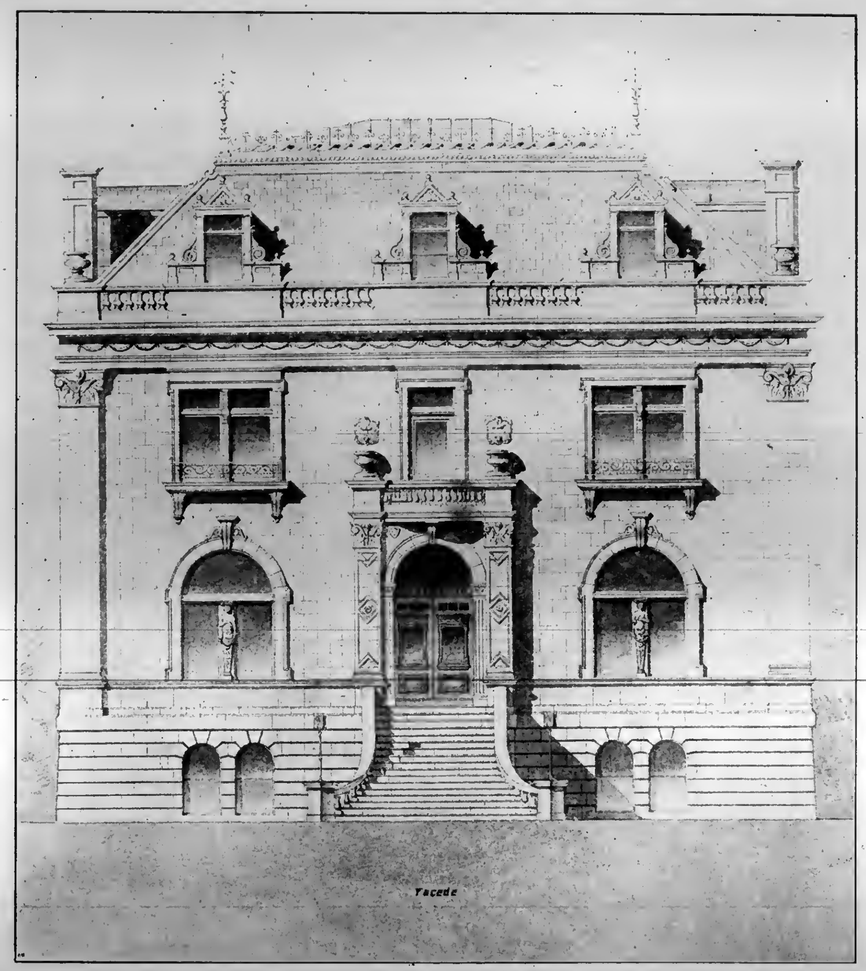


DESIGN FOR CLUB HOUSE FOR ROYAL CANADIAN YACHT CLUB, TORONTO.
DICK & WICKSON, ARCHITECTS

V.8-9
Canadian
archit
and

BRIDGE AT ISLAND PARK, TORONTO.





DESIGN FOR A PRIVATE RESIDENCE.

Submitted in the Final Examination of the Province of Quebec Association of Architects, 1896,
By JAS. FORGET DESPATIE, Montreal.

V.8-9
Canadian
archit

Plans Buildings for the Broadview Ave. Cong. Church

Dick and Tickell Sons, Archts.

7.8-9
Canadian
Archi
and

CANADIAN ARCHITECT AND BUILDER.

VOL. IX.—NO. 10. OCTOBER, 1896 PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertisements sent promptly on application. Orders for advertisemnets should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	H. B. GORDON, Toronto.
1ST VICE-PRESIDENT	J. GEMMELL, Toronto.
2ND VICE-PRESIDENT	JOS. W. POWER, Kingston.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

F. J. ALEXANDER	Ottawa.
THOS. FULLER	Ottawa.
E. J. LENNOX	Toronto.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:
W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. T. TAYLOR, F.R.I.B.A., Montreal.
1ST VICE-PRESIDENT	J. F. PEACHY, Quebec.
2ND VICE-PRESIDENT	A. RAZA, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	E. MAXWELL, Montreal.

COUNCIL:

A. C. HUTCHISON	Montreal.
JAS. NELSON	Montreal.
J. WRIGHT	Montreal.
ROBT. FINDLAY	Montreal.
CHAS. BAILLAIRGE	Quebec.
F. H. BERLINGUET	Quebec.

AUDITORS—G. E. TANGUAY and H. C. NELSON, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

JOHN ALDRIDGE, President.	JOHN RUSSELL.
THOS. CANNON, Jr., 1st Vice-Pres.	H. LUCAS.
JOHN VICK, 2nd Vice-President.	JOHN YORES.
DAVID WILLIAMS, Treasurer.	JAS. CRANG.
WM. BOOTH.	JOHN M. GANDER.
JOHN WICKETT.	GEORGE HENRY.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Trade Combines.

An agreement has been entered into between the Granite Dealers' Association of Aberdeen, Scotland, and the Boston Wholesale Granite Dealers' Association, whereby the former binds itself not to sell to anyone in the United States who is not a member of the Boston Association, while the latter Association binds itself not to purchase granite from any person outside the membership of the Aberdeen Association. Our recollection is that there are on record instances in which the courts have compelled combines of this character to sell to outsiders who were desirous of purchasing their goods. The legal view appears to be that when an individual or a company engage in the business of publicly selling any material they are bound as far as possible to supply the public demand for such material, or at all events they have not the right to draw a distinction between the would-be purchaser who is a member of a trade organization and one who is not.

Proof of Qualification by Arcbitects and Builders.

The many disasters which have occurred in recent years due to the ignorance and carelessness of persons practising as designers and constructors of buildings, have in some measure directed public attention to the necessity of compelling such persons to give proof of qualification for their important duties. While the efforts put forth by the architects of the State of New York and the Province of Ontario to obtain legislation of this character, have so far failed of their purpose, it is gratifying to know that the necessity of such legislation is becoming more widely recognized, and if those who have been pressing for reform in this direction do not become weary in well doing, there is little doubt that the desired object will be attained in the near future. From the National Association of Building Inspectors convened last month at Buffalo, comes the following resolution on the subject: "That it is the opinion of the National Association of Building Inspectors that public safety demands that persons practising the profession and trade of architect, civil engineer and builder should do so under license, to the end that those who practice such responsible professions and trades should first show their fitness to do so; therefore, we recommend the passage of State laws leading to the accomplishment of this end." Building inspectors are daily brought in contact with the work of incompetent architects and builders, and have the opportunity of knowing, as few can, the danger of loss

to property owners and of health and life to the occupants of buildings erected by these classes. Consequently the pronouncement which has just been made by their association should receive proper consideration from the public and more particularly from the governing bodies.

The A. I. A.

The American Institute of Architects will hold its thirteenth annual convention at Nashville, Tenn., on the 20th, 21st and 22nd inst. A discussion has been arranged for at this convention, on "The Influence of Iron and Steel Construction and of Plate Glass on the Development of Modern Style."

Water Flush and Diameters of Drains.

The Northern Architectural Association in conjunction with officials of the Newcastle and Gateshead Water Company recently made a number of experiments for the purpose of ascertaining the quantity of water required to properly flush a water closet and connecting drains. Also the diameter of drain necessary to insure proper cleansing. These experiments are said to have demonstrated the fact that with proper closets and fittings two gallons of water are sufficient for flushing purposes in dwellings, and that a four inch drain was more perfectly cleansed than a six inch one, notwithstanding that the former contained a more acute bend and was laid at a less steep gradient than the latter. In the principal cities of Canada the use of cast iron pipe for house drains has very properly been made compulsory, and in corroboration of the results of the above mentioned experiments, experience has shown that the most satisfactory results are secured by the use of four inch soil pipe in preference to pipe of larger diameter.

The Location of the Kitchen.

What has become of the idea so prevalent among architects a few years ago, that the top of the house and not the ground floor is the proper location for the kitchen? We recollect how convincingly a Hamilton architect talked on this subject two or three years ago, but we have yet to hear of an instance in which he has put his ideas in practice. The main argument in favor of changing the location of the kitchen in the manner suggested was, that the kitchen odours would find an immediate outlet into the atmosphere instead of being confined and diffused throughout the house. It is to our mind at least a matter of doubt whether the proposed change would secure this desirable result. We know of an office building in which the odor of the cooking from the caretaker's kitchen on the sixth floor at times assails the nostrils of the occupants on every floor, even to the basement. We should be pleased to receive from some of the advocates of the elevated kitchen an explanation regarding this conspicuous failure of their theory.

The P. Q. A. A.

We print in this number an account of the proceedings in connection with the recent annual convention of the Province of Quebec Association of Architects. A perusal of the annual report of the Council shows that an earnest effort has been made during the year by the management of the Association to accomplish a number of very desirable objects. It is to be regretted that in some directions the results achieved have been small owing to failure to get a sufficiently large attendance of the members at the meetings. The enthusiasm which has prompted a few of the leading spirits to stand by the work of the Association in the face of these and other discouragements is highly commendable, and we trust will prove an inspiration to others to give more of their thought and time to the promotion of the Association's welfare. In spite of difficulties the Association has already accomplished a useful work, and has abundantly justified its existence. A much greater work lies before it in the future, and this also will be achieved if every member would feel his individual responsibility to give what assistance is in his power. The establishment of a chair of architecture in McGill University is doubtless in a measure an outcome of the efforts of the Association on behalf of the proper education of future generations of architects, and conversely the Association should derive assistance and support from this department of the university. The City Council of Montreal has shown itself to be alike deficient in gratitude and appreciation of what is due the interests of the citizens, by neglecting to take action upon the recommendations submitted by the Association for the improvement of the building by-laws of the city. A committee of the Association spent months of earnest effort for this object, and it will be a lasting disgrace to the Council if this effort is not recognized and proper consideration given to the recommendations which have been submitted. This statement equally applies to the City Council of Toronto, which is making no effort in the direction of approving or disapproving of the recommendations of the Ontario Association of Architects for the amendment of the city building ordinance. Such treatment is but a poor reward for disinterested efforts in behalf of the public welfare. In connection with the recent convention of the Quebec Association, we miss the papers and discussions on architectural subjects which have usually formed an interesting and instructive feature on similar occasions in the past. Considerable effort and self-sacrifice are certainly involved in the preparation of such papers, but a corresponding benefit is derived by those who hear and read them as well as by the authors themselves from the necessarily thorough study of their subjects. We therefore hope to see this valuable feature re-introduced in the annual conventions of the Association in the future. The Arts and Crafts Exhibition proved an extremely valuable adjunct to the convention, and is well calculated to give public prominence to the Association and its work. There was manifested at the convention a strong desire for the formation of a Dominion Association of Architects. Such an Association, if properly organized and supported should be able to promote in many ways the interests of architecture in the Dominion. In view, however, of the difficulty which is experienced in maintaining the interest of the members in the work of the Provincial Associations we are disposed to doubt the success of a larger organization, the members of which would be scattered from one end of the country to the other. The obvious difficulties in the path of such an organization should be fairly faced and considered before any definite action is taken. If the architects throughout the Dominion would express through our columns their views on the subject, the probable success of the movement could be more easily estimated.

T.8-9
Canadian
archi

BY THE WAY.

A certain well-known firm whose business it is to manufacture and install heating apparatus were recently advised that one of their plants was not doing satisfactory work. Without showing the least surprise at the information the member of the firm to whom it was addressed, replied in terms like these: "Oh, well, that house was put up by So-and-So, and the heating system is not by any means a fair example of our work. You see, the price was so cut down that it simply was not possible to give the work proper attention." Here we see the evil results of trying to get work done too cheap. The man for whom the system was installed is no longer the owner of the house—in fact he "went down" with many others in the crash which followed the Toronto real estate boom. The present owner in purchasing took it for granted that the heating system was all right because the firm who installed it have a first-class reputation. Aside from the disappointment and discomfort experienced by him as the result of finding that the system is not up to the expected standard, was it wise on the part of the heating contractors to tender at a price which made it impossible for them to do the work properly and maintain their reputation? I have no hesitation in expressing the opinion that it was not, as one such imperfect job is likely to result in future losses exceeding many times in amount the paltry profit which they may have succeeded in squeezing out of the contract.

× × × ×

"There are about half a dozen persons who are not getting their usual amount of sleep these days on account of the contract for heating the new city and county buildings," said a member of a well-known Toronto firm of heating contractors to me the other day. Then he went on to tell me who these persons were, and how the different manufacturers of radiators were working tooth and nail to guide the contract into the hands of their friends who might be depended on to purchase from them the required radiators. My informant remarked that the condition in the specifications requiring that tenderers must show that they have successfully carried out previous contracts of corresponding magnitude, and that they are in a position financially to carry out the work, would be sufficient to narrow the competition down to half a dozen firms at most. "It is a foregone conclusion," said this gentleman, "that the contract will be taken at a low figure, but I think that in view of the many risks involved in a contract of such magnitude, the contractors who successfully complete the work, are entitled and should certainly receive a substantial profit." In answer to my enquiry he expressed the opinion that the work could only be successfully carried out by placing the entire contract in the hands of one firm, and resting the responsibility entirely upon their shoulders. Any attempt at sub-contracting would be sure to lead to confusion and trouble. As an instance of the risk involved in large contracts of this character, my attention was called to the fact that the disagreement into which Mr. Neelon, the contractor for the masonry of this building, fell with the architect, and the extended litigation arising therefrom had caused the contractor's ruin, and that Messrs. Brown & Love, one of the most honorable contracting firms in the Dominion, had suffered the loss of thousands of dollars as the result of their effort to be released from their tender for the completion of the work. "There will be required for this contract," said my friend, "a large number of American specialties, for which 'cash down' must be paid, while the contractor will perhaps be required to wait a long period for payment of his accounts under the contract. He must therefore have a long bank account, and should, as I have already stated, reap a liberal margin of profit from the undertaking." It is understood that the architect has estimated the cost of the heating system for the building at $100,000.

× × × ×

It is by no means an unusual experience to meet with men who cherish original notions regarding the kind of house they would like to build for their comfort. It is well that in the majority of instances these notions never get beyond the form of "castles in the air," for if put in concrete shape the inventor would quickly be disillusionized. If we are to believe a writer in Truth, however, one such individual who happened to be blest with an abundance of "the needful," not only conceived but carried out a decidedly novel idea of house building. We are told that "this man, who has a large lake upon his estate, recently caused it to be drained, and in the deepest part he has had a house built which contains three rooms a smoking-room, a dining room, and a servant's waiting-room. The frame-work of the house is of iron, and the floor is stone resting upon a foundation of concrete. The sides and the roof, however, are entirely composed of very thick plate glass. There is a passage under the water from the boathouse to the glass house, and air is obtained through large clumps of artificial water-lilies which rest upon the surface of the lake. It is indescribably pleasant to sit in one of the rooms upon a warm day; the air is very cool, there is no sound to be heard, and it is especially interesting to watch the fish swimming round, attracted by the glare of the electric lights. This is decidedly a new luxury. The house and the passage, moreover, cost comparatively little to build." If the statement that a house walled and roofed with plate glass, resting on a foundation of concrete and with subaqueous passages, was constructed at comparatively little cost was meant to be taken seriously, we have another proof of the adage, that "Truth is stranger than fiction."

STRENGTH OF GIRDERS.

The Effective Span, for computing the strength of a girder, says the Contract Journal, is the distance between the centres of the bearing areas which support the ends of the girder. The span is usually measured in feet and inches in practice, but for use in computation it is either in feet or parts of a foot, or all in inches. This is according to the nature of the expression (or coefficients) in the formula, as it requires all dimensions $\left(\frac{b\,d^2}{l}\right)$ to be in the same denomination. b, d, l denote the breadth, depth, and length respectively.

As the weight of the girder itself forms a part of its load, hence only the weight per foot run of the clear span between the supports should be taken. The weight of the girder is treated as a uniformly distributed load, and is double that of a centre load.

In computations for obtaining the stiffness of girders, the length of the span and the deflections must be taken as those of the clear span only between supports, and not to the centres of the bearing areas, as required for computations of the strength of girders.

LOADS AND STRENGTH OF ROOFS.

In making estimates of the weights of roofs it is essential that external appendages, such as lantern lights, ventilators, etc., should all be included, as well as ceilings, attic floors, water-tank and water, and any quantity of fixtures, furniture and storage liable to be sustained by the roof supports. All articles and details of the roof structure and the external and internal appendages should be estimated at their maximum weights, so that the gross estimate shall cover all probable strain-producing loads that are likely to be encountered in the use of the building. In addition to these dead loads there should, in the case of occupied atties, be an allowance for the live load of occupants. This allowance may be somewhat less than the usual allowance of 1¼cwt. for the ordinary floors of dwellings per square foot of their area, as the probability of its containing a moving crowd would be very remote. Probably a ½cwt. to ¾cwt. per square foot would be a sufficient allowance to make for this purpose to include ordinary furniture, but would be exclusive of the weight of the flooring joists, plastered ceiling, etc. The weight of a full water-tank of 2ft. 7in. height of galvanized iron with fittings would be about 2¼cwt. to 2½cwt. per square foot of bottom area, the weight of water being 10lb. per imperial gallon, and there being about 6¼ gallons in a cubic foot. The weight of single ceiling joists of dry fir to sustain attic floor, together with flooring boards, may range from 9lb. to 12lb. per superficial foot; lath and plaster ceiling two coats 9lb., three coats 10lb. per foot super; ceiling joists for counter ceiling adds 2¼lb. to 2½lb. per square foot. The weight of roof trusses varies with span and pitch, the spacing apart, and the kinds of materials used in the construction. Approximate weights may be obtained by reducing it to the horizontal projection of the floor area covered by the roof, and then multiply a unit area as a square foot by the weight of the horizontal projection of the portion of the roof supported by the truss—i.e., the bay or the space between the centres of two adjacent trusses. On this basis an average may be arrived at for the ordinary pitch of one-quarter span, using a king-post truss, say, up to 35ft. span, and for larger spans a queen-post truss. The weight of a dry fir truss complete, including tie-beam, for 20ft. span will be 1¼lb. per square foot of floor area covered by the half of its bay on each side of it; 30ft. span, 1 9-10lb.; 40 ft. span, 2½lb.; 50ft. span, 2 3-5lb.; 60ft. span, 3½lb.; 70ft. span, 3 4-5lb.; 80ft. span, 4½lb.; 90ft. span, 4 4-5lb.; 100ft. span, 5⅓lb.; for each additional 10ft. of span add ½lb. For intermediate spans interpolate the corresponding proportion of the difference for the spans adjacent to it.

The purlins, ridge board, and ridge roll add 2lb. to 2½lb. per square foot of floor area covered by roof. Common rafters add about 3⅓lb. to 3 2-5lb. per foot super of floor area covered; sheating of 1in. thick boards of fir, spruce, or pine (white) 3lb. to 3½lb. per square foot of roof surface; Georgia pine, oak, ash, 5lb. per square foot. The weight of the external covering adds as follows: lead, 6cwt. to 8 cwt. per square of 100 square feet; slating laid with 3in. lap, including nails, but not battens or iron laths, for doubles 13in. by 9in. and ladies 16in. by 8 in., 8¼lb. per square foot of roof surface; countesses, 20in. by 10in., 8lb.; duchesses, 24in. by 12in., 8½lb.; tiles, 11in. by 7in., plain, with 3in. lap, mortar pointing, including laths and absorbed damp, 18lb. per square foot; pantiles, 13½in. by 9½in., including same as plain tiles, 12lb.; Italian, ridge, and furrow tiles, including pointing and damp, 14lb.; slate battens, 3½in. by 1in., for doubles, 2lb.; for countesses, 1¼lb.; zinc roofing, 14 to 16 zinc gauge, 1½lb. to 1¾lb.; galvanised iron, corrugated, 16 wire gauge, 3½lb.; 18 wire gauge, 2½lb.; 20 wire gauge, 2lb.; sheet iron, 16 wire gauge, 2½lb.; 20 wire gauge, 1½lb.; thatch, including battens, 6½lb. From the foregoing data, approximate weights of roofs can be estimated, making allowance for increase of length of rafters over the span for other roof pitches; thus if the value of the half span be 1, then the length of the rafter for quarter pitch is 1·12, for one-third span pitch 1·2, for three-sevenths span pitch 1·32, for half-span pitch 1.414. These weights of the roof, together with the weight of all appendages, all act in a vertical direction. An allowance for the weight of accumulation of snow is also made, say 5lb. per square foot of floor area covered by roof is considered sufficient for this country. In America this same allowance is made for localities such as St. Louis, Richmond, Louisville (Ky.) in north latitude about 37½deg. to 38deg.; 10lb. is allowed in Baltimore, Cincinnati, and Indianapolis; 15lb. is allowed in Philadelphia, Pittsburg, and Wheeling; 20lb. in New York City, Cleveland, Chicago, Des Moines; 25lb. in Boston, Albany, Buffalo, Milwaukee, St. Paul; 30lb. in Northern New England and New York States, Michigan and Minnesota. Some writers have suggested that the allowance for the stress produced on a roof normally to the inclination of its pitch by wind pressure of the maximum force used in practice, would sufficiently cover the allowance for snow, as before such a maximum wind force could take effect upon the windward side of the roof all the snow would have been blown off it, and hence the allowance for snow according to this suggestion need not be made, except for very cold climates. The suggestion, however, could not apply to flat roofs, "well roofs," and such as are completely sheltered by solid parapets or otherwise protected from the force of the wind. It may be observed that in cold countries the snow is generally frozen into solid ice on sides of roofs to which the sun rays have direct access. The direct stresses on the roof, therefore are distinguished as (1) the permanent loads, estimated on the basis just detailed; (2) the accidental loads (a) as snow, and (b) wind pressure. These pressures should all be determined separately, and then any combination of them which produces the greatest sum of stresses affecting any member of the truss should the stress value to be adopted in estimating the strength and stiffness of each member thereby affected. The same principle will likewise apply to the stresses produced on the resisting planes of all joints and joint articulated connections with the truss members.

The weight of the roofing material, or the external covering of slates, tiles, etc., as well as that of the snow and the wind pressure direct or reversed, is sustained by the common rafters in the first instance. It is by them transmitted to the purlins which support the common rafters at intermediate points, their ends being supported respectively by the ridge piece or purlin, and by the wall plate. It is usual to divide the external and structural loads, acting upon the common rafters, equally between the points of support, so that each intermediate point shall have double that at each end. Such a distribution, however, assumes that the common rafters

are cut through over each purlin, so that they would thus act as separate beams. But as the common rafters are not thus usually cut through over the purlins, but are continuous, having proportional cantilever reactions over each intermediate support up to the points of contraflexure, the position of the points of contraflexure or their distance from the supporting intermediate purlins, and the value of the bending moments and moments of flexure, depends on the depth of the rafter or continuous beam, the distribution of the load, elasticity of the material, etc. The formulæ for thus obtaining the distribution of the load over the various purlins are complicated and need not be given here, as they have been calculated for the usual scantlings of common rafters of fir. The proportions of the distribution here to follow are based on a continuous uniform cross-section of straight rafter, supporting a uniformly distributed load. The points of support are equidistant from one another, and their bearing surfaces all in the same straight line. The loads for the two halves of the spans continuous over several supporting purlins are alike; it is therefore only necessary to give the lowest or eave half of the continuous rafter supports. When the number of spans is odd the number of supports is even, and there is no centre support. But when the number of spans is even and the number of supports odd, the centre support is the turning point of the values of the purlin loads for both halves. Thus when there are two spans and three supports the wall plate and the ridge pieces each bears ⅜ of the load upon their respective spans, and the purlin bears 10-8 of a similar load. When there are three spans and four supports, the eave and ridge piece each bear 4-10 of the single-span load, and the two intermediate purlins each bear 11-10 of the same load. Similarly, when there are four spans and five supports, the wall plate and ridge bear 11-28 of single-span load, the second and fourth supports bear each 32-28, and the third or middle purlin bears 26-28 of the single-span load. For five spans with six supports, the wall plate and the ridge each bears 15-38, the first and fourth purlins 43-38 each, the second and third purlins each 37-38 of load.

The practical difference that this ratio of distribution of the loads over the rafters, and consequently over the purlins, will affect roofs of large span and having the trusses set a considerable distance apart—say, upwards of 12ft. or 14ft. In such cases the scantlings of the purlins would require to be proportioned for the increased ratio of load. In ordinary roof timbering the scantlings of the purlins would all be alike, but in such case they should have sufficient strength for the maximum apportionment of load. Taking as an example the case of two spans and three supports, the difference in the load on the purlin between treating the rafters as two separate beams and one continuous beam is that in the former the purlin would only bear half of the entire load on the rafter, whereas as a continuous beam it bears five-eighths of the entire load. The excess of load as a continuous beam imposed upon the purlin is thus one-eighth of the entire rafter load for the whole span of the purlin. If the span of the purlin be 14ft. between the spacing of the trusses and that the purlin was placed 8ft. from the wall plate, the load area of roofing supported by it would be 112 square feet. Then suppose the permanent load on the purlin, including its own weight, all uniformly distributed, were 26lb. per foot super for plain tiles, the total would be 2,912lb., or, say, 3,000lb. in round numbers. The excess of one-eighth of the entire load or one-quarter of the above, half-rafter load would be 750lb., and if the wind load were, say, three-fourths of the above say 563lb., the total load would be 1,313lb. This proportionate excess in such a case as assumed, would be a sufficiently large excess to require a special computation of the strength of the purlin so as to be safe against bending under it on the occurrence of a storm of wind.—The Contract Journal.

VENTILATING AND WARMING STABLES.

Before considering the ventilation, it will be well to see what is a proper and sufficient area of floor space for stables and loose boxes, and also the cubic space that should be given for each horse.

In practice the sizes of stalls and loose boxes vary according to the space at command, without in most cases any reference to sanitary considerations, but a good standard size for a stall is 6 ft. wide by 9 ft. long, from the wall to outside of stall post; if they are wider than 6 feet the horse has too much room and can turn around in the stall, while if longer than 9 feet the horse is dwarfed in appearance.

The gangway at the end of the stalls should not be less than 6 feet wide in a stable with stalls on one side only.

The size of loose boxes is not affected in the same manner, and very good dimensions for a loose box are 12 feet long by 12 feet wide; but it should not, unless under very exceptional circumstances, be less than 10 feet by 9 feet, and the gangway should be 6 feet wide, whether the boxes are along one only or both sides of the stable, and the doors should open outwards.

Taking the above as standard sizes we get the floor areas as under:

For a stable with stalls on one side, 90 square feet per horse.

For a stable with stalls on both sides, 81 square feet per horse.

For loose boxes on one side only, 216 square feet per horse.

For loose boxes on both sides, 180 square feet per horse.

The cubic space to be allowed to each horse varies according to different authorities from 900 to 1,600 cubic feet for an ordinary size animal. Hutton gives 1,560 cubic feet as necessary. We should say that it should not be less than 1,500 cubic feet, which is one and a half times that laid down by the best authorities as requisite for a healthy sleeping apartment for a human being; and we may, we think, safely assume that this proportion will not be excessive for an animal like a horse, considering the exhalations that must arise from soiled litter, etc.

This capacity, taken with the floor areas already given, gives a height of 16 feet for a stall stable with one row of stalls, 20 feet for a stable with two rows, and about 9 feet for loose boxes.

It will be at once recognised that while the floor area actually given does not in most cases vary very much from our standard, the cubic capacity is seldom given except in some high class hunting and other stables in the country, and never in London, where it is very uncommon to find a stall stable having more than 1,000 cubic feet per horse, and that insufficiently ventilated.

The following examples are from stables in existence.

Unfortunately the cubic space is not so complete as we should wish it. We have not had time to supplement it, but those examples we have taken will be recognised as good ones.

	Floor area	Cubic space per horse.
Gifford Hall Stables, stall	120	1680
" " loose boxes	216	3020
Wretham Hall, loose boxes	185	
Frogmall, Kent, stalls	134	
Moreton Hall, stalls	126	
" " loose boxes	216	
Cowesfield House, stalls	120	1080
" " loose boxes	240	3780
Easton Park, Suffolk, stalls	105	
" " " loose boxes	150	
Lock Inch Castle, stalls	130	
" " loose boxes,	195 to 250	
Claremont House, stalls	130	
Copse Hill Hunting Stables, stalls	130	
Ditto loose boxes	186	
Berkswell Hall, stalls	128	
" " loose boxes	190	
Havering atte Bowe, stalls	147	
" " " loose stalls	120	
Private Stables at Brighton, stalls	95	
Ditto loose boxes	104	
Private Stables in London, stalls	84	798
Ditto loose boxes	100	950

From these examples it will be seen that, even in superior town stables, the cubic capacity is actually below that required for the human being.

In the country stables, the floor spaces are in nearly all cases equal to or more than our standard, while the cubic space is considerably more in the case of loose boxes, showing that the amounts we give as standards are generally recognized as being necessary for a really good stable.

In the following remarks we shall therefore assume the cubic space to be dealt with as 1,500 cubic feet per horse, and the average height of the stable as 15 feet; and with this explanation our readers will be able to correct the quantities hereafter given to suit other capacities.

The next step is to decide what quantity of fresh air is required to be admitted in summer and winter; but as in summer the extra quantity required can be easily supplied by opening the windows, which must be provided for lighting (for it must not be forgotten that light is as necessary as air to maintain a healthy state of body, whether in man or horse) it will be sufficient to consider what ventilation is required in the winter only.

Dr. Parkes, in his well-known work on Hygiene, says we should allow 6 cubic feet of fresh air per minute for a man; M. Peclet and Mr. Hood give from 3½ to 5 cubic feet of fresh air per minute, as the minimum quantity that should under ordinary circumstances be allowed for a human being in the winter to maintain the wholesomeness and purity of the apartment; and it seems reasonable to assume that a horse would require at least half as much again, or say, 7½ cubic feet per minute in the winter, and double that in the summer, and a further allowance must be made on account of the exhalations from soiled litter, etc.

The size of the inlet ventilators should, according to Dr. Parkes, be 24 square inches per man, and the Commissioners on improving the sanitary condition of Barracks, etc., laid down 1 square inch for every 60 cubic feet capacity, which, on 1,500 cubic feet gives an area of 25 square inches—we, have, however, considered that a horse requires 1½ times the space, and consequently the air, that a man wants, and therefore the area for each horse should be 37 square inches, which, allowing the maximum velocity that can be permitted without causing a draught, viz., 3 feet per second, gives an admission of 46 cubic feet per minute, equivalent to changing the whole air of the stable twice in each hour.

This quantity of air will be delivered when there is a difference of 10 deg. between the outside and inside temperatures.

There must, however, not only be inlet ventilators for the admission of fresh air, but outlet ventilators for the escape of the vitiated air, and, quoting Mr. Hood, "it is advisable to make the aggregate area of the openings that admit the fresh air larger than the aggregate openings for the efflux of the vitiated air. This becomes necessary notwithstanding the increase of volume which takes place in the heated and vitiated air."

If the opposite course be adopted, and the outlets be larger than the inlets, then a counter-current takes place, and the cold air descends through the outlet tubes unless prevented by some special means, and by making the inlet of large area the velocity of the incoming current is reduced, and unpleasant draughts avoided.

It is also expedient to divide the entering current as much as possible, for by so doing the dangerous effects of cold draughts are prevented when the entering current is colder than the air of the room; and when it is hotter, it prevents the air from rising too rapidly towards the ceiling and therefore distributes it more equally through the apartment.

Provided the aggregate openings for the admission of cold air be not less in size than those for the emission of the heated air, the quantity of air which enters depends less upon the size or number of the openings which admit the fresh air, than upon the size of those by which the vitiated air is carried off.

We have now arrived at this result, that for each horse we require 37 square inches of inlet valve area, while the outlet area must be less; say 20 or 30 square inches per horse.

Outlet valves should either be taken into chimney flues or into special shafts made for the purpose, and carried up as high as possible above the ceiling of the stable. The valves themselves should be placed close up to the ceiling.

Everyone with a knowledge of stable matters knows that there is more or less stagnation of air at the head of a stall, closed in as it is on three sides, and with the manger plate projecting some 15 to 18 inches into the stall at a height of about three feet above the floor, thus forming a kind of open box; also in a range of loose boxes where the only air that gets into the bottom of the boxes is what finds its way under the doors, which are often kept an inch or two off the floor for the purpose. Attempts to remedy this have been made by keeping the sills of stalls and loose boxes an inch or two off the floor, with the result that a space was left in which horses were liable to catch their feet, and which it was difficult to get under to clean.

The new arrangement consists of a new form of sill, of girder shape, having the webb connecting the upper and lower flanges perforated with holes. The bottom flange is made flat to rest on the floor, with caulkings going into the floor to secure it laterally. The top flange is made with a groove to take the woodwork, which is thus kept well above the floor and away from all damp. At the head of the stall or loose box an iron plate takes the place of part of the woodwork, and below the level of the manger plate, this is perforated in a similar manner to the sill, so that the air can circulate freely from stall to stall, or box to box, throughout the length of the stable. The section of the sill is such that there are no corners in which dust can accumulate, and it can readily be swept or washed clean by a broom, and there are no projections or corners against which a horse can injure himself.

We have given the areas of inlets and outlets for, what we consider sufficient ventilation for the winter, but this must be supplemented in summer, as already mentioned, by windows. There is no doubt that a stable, to be healthy, should also be light, and where possible overhead skylights should be given; but in the majority of cases this is impossible, and we should then advocate glazed hopper or swing windows above each stall or loose box, and where there is only one row of stalls or boxes, ordinary sliding windows on the gangway side opening top and bottom with their sills not less than 5 feet above the floor.

The actual area of windows required varies, according to different authors, from 1 to 10 square feet for each cubic feet of space. It may therefore be assumed that it should not be less than fifteen square feet for each horse, more being given according as the light is obstructed by other buildings, etc., in close proximity.

This article has now extended to such a length that we have small space for any remarks on warming. It must therefore suffice to say that 5 square feet of hot water pipe heating surface per 1,000 cubic feet of space, or 7½ square feet per horse, should be sufficient; and hot water coils should if possible be placed in the space beneath a window and so protected that there may be no projections against which a horse could injure himself when passing.

MARBLE IN INTERIOR WORK.

Now, when we come to interior work, a new field is open to us. We are not bound by influences such as those that have been under our consideration. What we have to consider primarily is strength of material for its purpose; secondly, its adapability; thirdly, and generally to the client the most important, its appearance when finished. With all due respect to your president's opinions, I, if I followed my own inclinations, should give marble the premier place as an internal material. Doubtless a number would say that marble is out of the question for general purposes, its cost is so great; but marble does not itself ask for treatment such as you give to stone. Work executed in marble can and should be finished so as not to have any appearance of grimness or even of dinginess.

Marble should not be looked upon as a constructional, but rather as a decorative material; and, looking at its use from a monetary point of view, I would quote Mr. W. Brindley's paper before the Royal Institute of British Architects some two or three years back, where he tell us that "at St. Sophia 2,000 feet super of delightful decoration of a durable character was cut out of a single block of Cipollina marble, the whole opened out and making a continuous pattern." The small slab we have here is of the same material, and is a scale pattern of the pavement in St. Mark's, Venice. Then, again, to adapt marble to concave or convex surfaces, I would ask you to visit the church lately erected by Dr. Freshfield at Lower Kingswood. You will find that we have followed out the scheme of the Byzantines, viz., forming the convex face of the apse with a series of narrow slabs opened out chevron fashion, thus producing a curtain-like appearance, which has a very pleasing effect. To save such work as this in fact, all slab work from having the appearance we find in some churches, and what your president rightly deprecates, several things have to be considered. For instance, if the walls are built of mortar, the sand of which is Thames sand, so-called; but if that sand comes from the mouth of the Thames, that constitutes sea sand. Consequently you will get that dampness and efflorescence that is usual with that kind of mortar; the walls being "eased" with marble, the salt naturally finds its way through. Marble should never be fixed solidly to the wall, but left hollow, and also with a joint here and there left open to allow for the condensation that invariably takes place. The work should be well cramped to the wall with copper cramps. The best of plaster should be used in fixing, and I have no hesitation in saying that if slab work is fixed under these conditions, and with a care in selecting suitable marbles, you will get satisfactory work, as shown by the slab work at the vestibule of the Athenæum Club, National Gallery, and other places I could mention. These buildings were all in a proper state to receive marble. Then, again, as to keeping the work clean after it is fixed. All that is required is proper attention with dry dusters. Marble work should never be washed down as you wash tiles. The dust that clings to anything damp, if rubbed constantly on the polished surface, is literally ground into the face of the marble. This applies more especially to the light marble. But if a perfectly dry dusting is given to your work I venture to say that the result will be satisfactory. These may seem very ordinary remarks and may weary my hearers, but they are of great importance if you want satisfactory results.

The mason is a methodical man. If he works a moulding—say a cornice, for instance, or a string mould—he would proceed by applying his section to chamfers and then working his chamfers through. Now, in designing your moulding this should be taken into consideration, as moulding drawn to suit the method of working seems to me to be only right, and in support of this I would ask you to examine the old specimens that are here, and also the diagram.

Work drawn on these lines, especially in marble, lessens the cost of labor considerably, the mason being able to get at it much better than if at the outset you upset his method of working. You will also observe that marble moulding drawn on these lines can be got out of these slabs and made out with a core of stone, thus giving you in effect solid cornices, etc. In drawing your sections for marble it is very essential that you should have a knowledge of the material and its capabilities of receiving mouldings. The composition of the various kinds varies to such an extent that a moulding that could be worked in one marble would be quite out of the question in another. For instance, take a chimney piece in statuary or Pavonazza, and then one in the Cipollina or Rouge Etrusque. What could be produced in the former materials would be quite out of the question in the latter. Speaking generally, the rich colored marbles do not ask for an elaborate treatment in the way of mouldings; in fact, the different colors, lines and markings of the material are very apt to upset the arrangement of mouldings unless they are treated in a broad manner. The use of machinery has considerably reduced the cost of marble work in England during the past few years, and also the time taken in production. The use of marble by the architects during this revival, may I call it, has been very great, and I believe will be greater in the future, when its adaptabilities are more widely and better known.

[1] From a paper read by Mr. Hervey Flint before the Architectural Association, London.

HAMILTON ART SCHOOL.

The annual meeting of the above school was held on the 14th of September, Rev. Dr. Lyle occupying the chair in the absence of the president. The report of the principal, Mr. Ireland, stated that during the year 54 students were enrolled, and that the school was making satisfactory progress. The receipts of the year were shown by the secretary's report to be $3,522.01, which, with a balance of $102.15 from last year, made a total of $3,624.16. The expenditures amounted to $3,450.54.

The following were appointed the committee on examinations for 1896-7: John Knox, Thos. Beasley, F. W. Watkins, J. T. Barnard, G. H. Bisby, W. D. Long, J. J. Mason, A. O'Heir, F. B. Greening, J. Pottinger, Dr. Gaviller.

The government medals and certificates and the local prizes were given out. The following awards were announced:

Architectural perspective—No prize given for lack of funds; Herbert H. New, 1st hon. men.; no 2nd and 3rd; hon. mentions given to increase value of 1st.

Architectural design Harold H. Mundy, winner; H. G. Batton, 1st hon. ment.; Herbert G. Mason 2nd, and P. Stewart 3rd.

Drawing from the antique, full figure—Walter R. Duff, winner; Mabel S. Ireland, 1st hon. men.; Jessie Kellar 2nd, K. Saunders 3rd.

Pen and wash drawing for illustrating—Marion E. Mattice, winner; C. Locke, 1st hon. men.; A. N. Browne 2nd.

Building construction Andrew P. Stewart, winner; Ralph Mason, 1st hon. men.

Design for tiles and glass No prize given for lack of funds; Ben. Kilvert, 1st hon. men.; no 2nd and 3rd hon. mentions given to increase value of 1st.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

PROCEEDINGS OF THE RECENT ANNUAL CONVENTION AT MONTREAL.

THE Province of Quebec Association of Architects met in annual session on Thursday the 8th inst., at 10 a.m., in their rooms, New York Life Building, Montreal, the President, Mr. A. C. Hutchison, in the chair. Among those present were: Messrs. A. C. Hutchison, President; A. T. Taylor, 1st Vice President; J. F. Peachy, 2nd Vice President; Jos. Venne, Secretary; Jos. Perrault, Treasurer; A. H. Lapierre, Theodore Daoust, Robert Findlay, J. Z. Resther, Councillors; H. Ç. Nelson, W. E. Doran, A. G. Fowler, Maurice Perrault, J. R. Gardiner, J. W. Hopkins, Simon Lesage, E. Mann, E. Maxwell, G. A. Monette, P. A. R. Labelle, James Nelson, Alphonse Raza, L. Z. Gauthier and James Wright of Montreal; Chs. Baillargé, J. F. Peachy, F. X. Berlinguet and G. E. Tanguay, of Quebec.

Letters of regret were read from different members.

In a brief address the President called the convention to order.

Reports of the Treasurer and Auditors were received and adopted, also the report of the Council which was as follows:

REPORT OF COUNCIL.

The fifth annual meeting of the Association held in the city of Quebec in October, 1895, was well attended, and the Council takes this opportunity of acknowledging the generous reception tendered the Council and members from Montreal who attended that meeting by their confreres in Quebec, and to testify to the interest taken in the Association by the members resident in Quebec.

Many items of interest to the Association were discussed at that meeting, and the following were referred to the Council for its consideration:

First: The holding of an exhibition of architectural drawings on the occasion of the annual meeting in 1896.

Second: The preparation of a schedule of professional charges for the use of members.

Third: The preparation of conditions to be observed in competition for public buildings.

Fourth: To prepare a standard form of contract.

The Council regrets that owing to the difficulty in obtaining a quorum of its members many meetings could not be held, and it was unable to accomplish all the work allotted to it; they, however, present this report of the work they were able to accomplish.

EXHIBITION. Early in the summer it was decided to give effect to the resolution of the Association to hold an exhibition of architectural drawings, and it was resolved that the scope of the exhibition should be widened so as to include modern artistic work applicable to architecture, and a loan collection of antiques.

The preparation for this exhibition has, during the last three months, occupied most of the time of the Council and of members of the Association whom they associated with them to assist in making the necessary arrangements.

As the funds of the Association could not be drawn upon to meet the expense of such an exhibition a number of the members have subscribed to a guarantee fund which it is hoped will defray the cost.

The Council leave to the members to judge, when the exhibition is opened this evening, as to whether it is a success or not, bearing in mind that most of the drawings are the individual work of the members, and if the exhibition is successful the Association as a whole will benefit by it.

The Council would gratefully acknowledge the help extended to it by the Art Association of Montreal in promoting and carrying out the exhibition, and in placing their galleries at our disposal. Without the assistance thus rendered it would have been impossible for your Council to have carried out such an undertaking.

SCHEDULE OF CHARGES. The schedule of professional charges has been prepared and is now in the hands of the printer and copies will be mailed to members in a few days. The procuring of the signatures caused considerable delay in its preparation.

COMPETITION FOR PUBLIC BUILDINGS.—The preparation of conditions to govern members in competition for public buildings received but slight consideration owing to the difficulty in obtaining meetings of the Council and to the political events during the year which prevented securing the co-operation of public officials.

ASSOCIATION COMPETITIONS.—At the request of the Editor of the CANADIAN ARCHITECT AND BUILDER the Council named a standing committee consisting of the president, vice-presidents and secretary during their term of office to whom all competitions under the auspices of the Association or of the CANADIAN ARCHITECT AND BUILDER will be submitted.

STUDENTS' ASSOCIATION.—The students connected with the Association formed themselves into an organization for the advancement of their interests and for mutual improvement in their studies. With a view to promote these objects the Council gave the use of the rooms and library free, only stipulating that the cost of lighting and necessary attendance should be paid, and that students availing themselves of these privileges should register their names in conformity with the by-laws.

For some unexplained reason the meetings have not been continued, and the privileges granted have not been taken advantage of.

STANDARD FORM OF CONTRACT.—Owing to the difficulty before referred to of holding meetings, because of the non-attendance of members of Council, the preparation of a standard form of contract could not be undertaken, and this matter will have to be referred to the new Council.

AMENDMENTS OF CHARTER.—The members of the Association resident in Quebec presented a number of amendments which they wished to have made in the charter, but after careful consideration the Council deemed it best not to approach the Legislature for the present.

AUGE BILL.—When this bill was before the last session of the Legislative Assembly, the Council, as on former occasions, asked for its repeal. Although their request was not granted, such modifications were made as to do away with the most objectionable clauses.

ART COMMITTEE. A committee appointed by the Council to confer with the corporation of Montreal and request the appointment of a Standing Art Committee had interviews with the mayor. The mayor expressed himself in favor of the appointment of such a committee, and promised to bring the matter before the Council and aldermen, but so far no definite action has been taken, and the matter still remains in obeyance.

BUILDING BY-LAWS. The committee regret that the corporation of Montreal have not yet given consideration nor effect to the building by-laws prepared by the committee appointed by it, and on which so much time and labor was expended. It is hoped that the corporation may at an early date adopt the by-laws as submitted to them.

EXAMINATIONS FOR REGISTRATION.—At the semi-annual examinations held in Quebec in the month of January, three candidates presented themselves for examination for registration—all of whom, namely: Messrs. J. E. Payette, J. Ferget Despatie and P. A. R. Labelle succeeded in passing in the subjects prescribed in the by-laws, and received their diplomas. At the same examinations one candidate, M. P. Leveque, presented himself for matriculation examination, and was successful in passing.

At the semi-annual examinations in July only one candidate entered for matriculation, M. Rene Frechette. As he was from Quebec, the examiners did not think it worth while for him to undertake the journey when there were no other candidates. It was therefore proposed that the candidate present himself for examination next January, and that if he succeeded in passing his time of study would date from July last.

The Council have to report the following case which has been presented to them and in which they could not grant the request made without violating the act of incorporation and by-laws. The case is as follows: A student passed the matriculation examinations and then entered the office of an architect who is not registered. Having completed his term of probation, he wishes to enter for final examination and, if successful, be registered.

As this case presents difficulties that the Council did not feel warranted in overcoming without violating our charter, it is referred to this meeting.

LIBRARY. No additions have been made to the library during the year, except "Les Grands Prix d'Architecture," engraved and published by A. L. F. Vandoyer and L. P. Baltard, Paris, 1834, donated by M. J. Venne, and the proceedings of the American Institute of Architects. The periodicals subscribed for by the Association have been bound and placed on the shelves.

MONTHLY DINNERS AND PAPERS.—During the winter months the dinners and reading of papers instituted in former years were maintained, but, owing to the apathy of members, they were not so successful as they should be.

The following papers were prepared for these monthly meetings: "Ancient Rome," with lime light illustrations, by Alex. C. Hutchison; "Old Colonial Architecture," by Robert Findlay; "Truth in Architecture," by W. E. Doran; "Evolution of the Plan in Building," by Jos. Venne.

MONT ST. LOUIS INSTITUTE.—The directors of the Mont St. Louis Institute have made the request that in view of the course of instruction in architecture given to their pupils, that the time required for service in an architect's office after they have been admitted to study shall be three instead of four years. As the granting of this request would be in conflict with the act of incorporation and by-laws, the question is referred to this meeting.

REGISTER.—The names of several members have been removed from the register for non-compliance with the by-laws respecting the payment of subscription, and the Council regret to record the decease of M. J. B. Resther, who took an active interest in the formation of the Association, and was ever ready to assist in furthering its objects. A special meeting was called on the day of his funeral and a suitable minute of condolence made, and a copy sent to the family. A wreath of flowers was also sent and placed upon the coffin.

ATTENDANCE AT MEETINGS.—The following is a record of the attendance of members at meetings of council: A. Ç. Hutchison, president, 20; A. T. Taylor, 17; J. Venne, 20; J. Perrault, 14; R. Findlay, 14; J. B. Resther, 6; A. H. Lapierre, 7; T. Daoust, 4. Messrs. J. F. Peachy, 2nd vice president, C. Baillargé and G. E. Tanguay, residing in Quebec, are not inscribed in this register.

There were, besides the requested meetings of Council, a number of meetings of committees appointed by the Council to assist in carrying out the work of the Association, more particularly in connection with the exhibits.

The Council would place on record its appreciation of the assistance thus rendered.

THE PRESS.—The thanks of the Association are tendered to the Press for interest and notice of its proceedings.

JOS. VENNE, Secretary.

The report submitted by the Treasurer, Mr. Jos. Perrault, was of a very satisfactory character, showing a strong balance to the credit of the Association in bank.

The reports of the Council and the Treasurer having been adopted, the election of officers was proceeded with, and resulted as follows, the scrutineers being Messrs. G. E. Tanguay, of Quebec, and H. C. Nelson, of Montreal: President, A. T. Taylor, Montreal; first Vice-President, J. F. Peachy, Quebec; second Vice-President, A. Raza, Montreal; Secretary, Jos. Venne, Montreal; Treasurer, E. Maxwell, Montreal; Council, A. C. Hutchison, Jas. Nelson, J. Wright, R. Findlay, Montreal, Chas. Baillargé and F. X. Berlinguet of Quebec.

Auditors: Messrs. G. E. Tanguay and H. C. Nelson.

The most important feature took place in the forenoon session on the tariff of charges. There were lively discussions. M. Berlinguet, of Quebec, said that the tariff at present in the hands of the Lieut. Governor should not be sanctioned, being in some respects too high and in others too low. M. Baillargé called the attention of the meeting to the fact that an architect was not allowed to testify in his own case, as the other professional men could do.

It was proposed by Mr. A. Raza, seconded by Mr. Perrault, that this important question should be referred to the new Council for consideration at a special meeting, and that a report thereon be presented as soon as possible.

The idea of having a Dominion Association of Architects was favorably received, and has been referred to the same committee. Mr. C. Baillargé, of Quebec, and M. Perrault referred to the advantages of such an association.

The request of the authorities of the Mount St. Louis Institute was taken into consideration, but no immediate conclusion was reached.

The retiring president then introduced his successor, Mr. A. T. Taylor, who thanked the members of the Association for the honor conferred upon him, and said that he hoped that they would help him to make the Association a flourishing one.

In the afternoon the invited guests and Quebec members were driven through the city and to Laval University and the Diosesan College of Theology, which buildings they thoroughly inspected. The party then went around the mountain and greatly enjoyed the scenery.

THE EXHIBITION.

The second exhibition held under the auspices of the Province of Quebec Association of Architects in the galleries of the Art Association, Phillips Square, was a pronounced success in every respect, and augurs well for similar undertakings in the future.

Although the drawings were inferior in number to those of the exhibition of two years ago, there was a noticeable advance in point of excellence which ought to amply reward the promoters for their labor, and be appreciated by the profession as a whole, and the public at large.

If the architectural drawings occupied less space than in the former exhibition, together with the exhibits of the Arts and Crafts Department, the entire space occupied this year was far greater, two galleries being entirely taken up, and part of a third. The Arts and Crafts Department was a most valuable addition and is destined to bring to light many an ignored artist in the line of decorative sculpture, painting, iron work, and other allied arts closely connected to architecture.

The exhibition was inaugurated in the evening by a delightful conversazione, which was attended by a large and select society. Sweet music was discoursed and refreshments served in the large class room adjoining the new gallery.

The following is a list of the drawings exhibited in alphabetical order by authors:

Archibald, John S., Montreal, 1, Church of St. Bertrand and Street in Lisle, France; Barnes, R. Percy, Montreal, 2, Church at Philipsburgh, 3, "Claremont," Pointe Claire, 4, "Glynn Hedd," Lachine; Bigelow, Henry Forbes, Boston, U. S., 5, Perspective of St. Mark's School, Southborough, Mass., 6, Perspective of the Grand Stand for Readville Trotting Park, U. S. A., 7, Perspective of a Block of Shops at Gilbertsville, New York, U. S. A.; Brown, McVicar & Heriot, Montreal, 8, Summer Hotel at Chambly, 9, Sketch for Three Houses, 10, Interior of Hall, 11, Apartment House, Peel street, 12, Sketch for an Apartment House, 13, Residence of C. Davidson, 14, Residence of A. J. Inglis, Westmount; Cox & Amos, Montreal, 15, a Block of Seven Cottages at Westmount, 16, Designs for Additions to the College of St. Laurent, 17, Design for Altar and Reredos Church at Rougemont, P. Q., 18, Block of Stores, St. Catharine Street, 19, House at Westmount, 20, Residence at Kensington; Daoust, Theodore, Montreal, 124, Perspective of College at St. Henry, 125, Front Elevation of House; Department of Public Works, Ottawa, 21, Interior of Library of Parliament, 22, Perspective of Drill Hall, Halifax, 23 to 31, Public Buildings at Winnipeg, Victoria, Berlin, Port Hope, Clifton, Hull, Bathurst, New-

castle and Amherst respectively; Dufort, Cajetan, Montreal, 32, Detail of a Courtyard, 33, Chickering Hall, 34, House of Geo. Willis, Chicago, 35, Columbia College, 36, Swampscott, 37, a Summer Residence; Findlay, Robert, Montreal, 38, Residence of W. M. Knowles, 39, Residence of Dr. D. F. Gurd, 40, Residence of R. Findlay, 41, Residence of J. L. Morris, 42, Residence of W. R. Miller, 43, Residence of J. Allan, 44, Residence of J. S. Sheffield; Finley, S. Arnold, Montreal, 45, Sketch of Old House at Laval, France, 46, Sketch of Old English House, 47, Sketch for Shooting Box, 48, Rambling Sketches; Fuller, Thomas, Ottawa, 40, Design for Capitol at Albany, 50, Design for Church, 51, Ground Plan of Public Building at Victoria; Gardiner, J. Rawson, Montreal, 52, Design for Board of Trade Building, 53, Two Cottages, Green ave., 54, Lindfield Church, England, 55, a Lakeside Cottage, 56, a Bit in Westminster Abbey; Hutchison, Alex C., Montreal, 57, Two Villas at Westmount, 58, Y.W.C.A. Association Building, 59, Proposed Melville Church, Westmount, 60, Design for Hospital, 61, Design for Presbyterian Church, Point St. Charles; Kilham, Walter H., Boston, U.S., 62, Group of French Towers, 63, Italian Doorways, 64, Study for Custom House; Lindsay, H., Montreal, 65, Perspective of Hall in Residence of Mrs. J. Levy Messrs. J. & H. C. Nelson, architects; MacVicar, D. Norman, Montreal, 66, Sketches in Reims, France, 67, "Town Tower," Oxford; Maginnis, Charles D., Boston, U. S., 68, Massachusetts State House, Boston, 69, Sketches in Rouen, France; Mann, Eric, Montreal, 70, a Street in Old Edinburgh, 71, Residence for M. S. Foley; Maxwell, Edward, Montreal, 72, Board of Trade Building, Montreal Shepley, Rutan & Coolidge, architects 73, Westmount Primary School, 74, Bell Telephone Building, Montreal, 75, Bell Telephone Building at Winnipeg, 76, R. J. Tooke's Building, 77, Banking Room in Bell Telephone Building, Montreal, 78, Residences, Montreal, 79, Cottages, 80, a Study, 81, Chapel at Avignon, France, 82, St. Ouen, Rouen, France, 83, Foreign Sketches, 84, Tower of University Chapel Palo Alto, California, 85, Country Residence, 86, Bridge, Back Bay, Fens, Boston, 87, Study for a Residence; Miller, J. Melville, Montreal, 88, a Mountain Hotel; Mitchell, C. Alexander, Montreal, 89, Sketch of Old House, Grey street, 90, Sketch of Old Porch in Normandy, France; Nelson, J. & H. C., Montreal, 91, Perspective of House for Mrs. J. Levy; Nelson, H. C., Montreal, 126, The Old Savage Farmhouse, Sherbrooke Street, 127, The La Salle House, Lower Lachine Road; Patterson, C. B., Montreal, 92, Residence Baltimore, 93, Sketch for Church; Payette, Eugene, Montreal, 94, A City Residence, Submitted in Final Examination to the P. Q. A. A.; Perrin, W. M., Montreal, 95, Perspective of Frame House, 96, Perspective of Stone House, 97, Perspective of Chapel, 98, Rendering from Photograph, 99, Cottage in Sepia; Raza, Alphonse, Montreal, 100, Residence of O. Faucher, 101, Club House, Lake Chapleau, 102, Residence for A. Armot; Rodden, R. M., Montreal, 103, 104, 105, Plans For Public Library; Saxe, C. J., Montreal, 106 and 107, City Mansion, 108, Colonial Residence, 109, County Residence, 110, Summer Residence, 111, Shakespeare's House, Stratford-on-Avon, 112, Sketch; Taylor, Andrew T., F. R. I. B. A., Montreal, 113, Diocesan Theological College, Montreal, 114, Bank of Montreal, Seigneurs Street Branch, 115, Additions to Art Gallery, Montreal, 116, Leaves From a Sketch Book; Venne, Joseph, Montreal, 117 and 118, Perspective Views of a Church, 119, Competition Design for Church at St. Jerome; Winslow and Wetherell, Boston, U. S., 120, House at Lake Massahesic, N. H., 120 and 123, Houses at Brookline, 122, Business Premises for Shreve, Crump & Son, Boston.

Mr. Andrew T. Taylor, F. R. I. B. A., contributed water color perspectives of buildings of actual interest, such as the Diocesan Theological College just completed, which undoubtedly ranks amongst the best of the very interesting buildings erected by this talented architect. The drawing representing this building although well rendered in color, conveys but a faint idea of the beauty of the original. In plan three sides of a quadrangle overlook University street, the principal side carrying a graceful tower in its axis while opposite an elaborate gothic gateway separates the court from the street. It is thoroughly English in character and we feel that Mr. Taylor was well at home in designing this building and succeeded without effort in making it what he intended it to be. A water color perspective of the new Art Gallery shows also with advantage, together with five or six water colors of Italian towers which could well form part of a worthy pendant to "Sir Christopher Wren's Towers and Spires," which Mr. Taylor had published in London by Botsford when practising in the Commercial Metropolis.

Mr. Joseph Venne exhibits two perspective drawings of a proposed church, one of the interior rendered in color, and one of the exterior rendered in ink. The porch is remarkably well proportioned and detailed, as is also the choir, which is well studied. The interior is of a semi-classical character and very rich and elaborate in design. An elevation of a competitive design for a church at St. Jerome also exhibited by Mr. Venne has well proportioned and arranged doorways.

Mr. A. C. Hutchison had two perspectives of villa residences erected at Westmount, designed in the American style and very well rendered in ink, together with other remarkable drawings, amongst which is the Y. W. C. Ass'n. building designed in very good taste.

Messrs. J. & H. C. Nelson's house for Mrs. J. Levy shown by two drawings rendered in ink is an agreeable and unpretentious design with a well arranged and detailed staircase.

Messrs. Findlay and Maxwell exhibited a large number of drawings the former having mostly pen and ink drawings, while the latter exhibited mostly water colors, which were much admired.

Nearly all of the drawings sent in by American architects are also worthy of praise, and the Arts and Crafts Department had also very interesting and numerous exhibits which would also deserve some attention but the space being so very limited in this number, little can be said for the present.

We cannot, however, close without mentioning Mr. Philippe Hebert's beautiful group entitled "Le Rapt" representing an Indian holding a girl on his shoulder with his left hand and a threatening knife in his right hand.

Mr. Page exhibits some iron chandeliers and grilles refined in design and of a finish rarely met with in daily practice.

Briefly the success and high degree of excellence which the present exhibition has attained is a guarantee that regular and periodical exhibitions of this character will be held in the future, which institution would do a good deal for the advancement of architecture, and a more intelligent appreciation of that useful art by the masses.

ILLUSTRATIONS.

ENTRANCE TO VICAR'S CLOSE, WELLS CATHEDRAL. SKETCHED BY MR. FRANK S. BAKER, A. R. I. B. A.

RESIDENCE OF MR. COLUMBUS GREENE, ST. GEORGE STREET, TORONTO. BEAUMONT JARVIS, ARCHITECT.

The materials employed in the construction of this house are plum-colored hard burned brick and light grey stone. The trimmings are painted in bronze green.

YOUNG MEN'S CHRISTIAN ASSOCIATION BUILDING, LONDON, ONT. MOORE & HENRY, ARCHITECTS.

The building is 110 feet by 100 feet, 4 stories high, built of stone and brick, with slate roof and plate glass windows.

The basement contains the bowling alleys, swimming tank, locker and dressing rooms, shower, tub and needle baths, toilet rooms, heating apparatus, etc. The first floor contains an octagonal reception hall, secretary's offices, boys' rooms, reading room, large parlor, lecture hall and gymnasium, together with cloak rooms and toilet rooms. The auditorium is also on the first floor with a separate entrance having direct access to the street. The second floor contains the board room, ladies' parlor, large entertainment hall, kitchen, upper part of gymnasium, with running track and visitors' gallery and the gallery of the auditorium, also the quarters of the London Etomological Society. The third floor contains class rooms, public and private offices, cloak rooms, etc.

The whole building is thoroughly lighted and ventilated, having wide corridors running through to connect the different apartments, wide staircases, and is to be heated by low-pressure steam with thorough ventilation. The contracts call for the building to be completed in October, 1896.

DESCRIPTION OF THE FIRST PRIZE DESIGN FOR THE CANTILEVER BRIDGE, OVER THE RIVER ST. LAWRENCE. BY EDWARD S. SHAW, C. E., BOSTON, MASS., U. S. A.

It is proposed to build this bridge over the River St. Lawrence, about two miles below the Victoria bridge, with a long cantilever span of 1250 feet, over the main ship channel, and at a clear height, throughout the central portion of this span, of 150 feet above the summer level of the river. The approach viaduct on the Montreal side will commence near the corner of Delorimier avenue and St. Catherine street, thence upon a curve and over the shore span of the cantilever bridge to the main pier of the long span, situated on the edge of the wharf near Belle Rive Park. Thence the long span crosses the main channel to the other main pier and beyond to an anchorage pier, both upon Ile Ronde, a small island in the river just below St. Helen's Island. From Ile Ronde the wider but shallower portion of the river is crossed by a bridge and viaduct on a descending grade to the Longueuil shore.

In the advertisement for competitive designs issued by the Montreal Bridge Company, certain requirements were given, the most important of which were the length of and clear height above water of the channel span, and the nature of the traffic over the bridge to be provided for, this latter being stated to require two railway tracks, two tracks for electric street cars, a highway for ordinary vehicles and two footways. Other minor stipulations were made, and a blue print outline of a design was sent out to applicants, but it was stated that these were not intended to hamper designers, original designs being invited.

The accompanying illustrations show, as one of the main features of this design, two massive stone piers, situated upon the margins of the main ship channel on the Montreal wharf and on Ile Ronde, each 110 feet by 30 feet in plan, at the top, and rising to a height of 60 feet above the summer level of the river, these piers being surmounted by the balanced arches, of compound curvature, of the superstructure. In continuation of the ascending lines of the stone pier, a steel pier or column of massive proportions towers to the height of 230 feet above the sub-pier, or fully 300 feet from summer water to the lanterns or turrets upon the summit.

From the tops of these towers the upper cords descend in approximate catenary curves, suggesting the curves of the main cables of a suspension bridge, to the junction with the free span of 350 feet which connects the two cantilever arms, these arms being each 450 feet in length.

The long span of 1250 feet and its two flanking spans of 600 feet each are divided by the four main trusses into three longitudinal ways, the middle of which, 26 feet in clear width, carries the double track steam railway, while the two side passages, each 21½ feet in clear width, suffice for the highway and street car tracks. Bracketed out from the outer trusses are the sidewalks, 6 feet in clear width each.

Throughout the middle portion of the long span, for a distance of 650 feet, the elevations of the several ways are practically the same, this portion of the bridge being built with a camber or slight upward curve, increasing the headroom at the centre to 153 feet. Commencing at points on this span, distant 300 feet from each of the main piers, the approach grades (2 per cent. and 4 per cent. respectively), of the railway and highway commence, the greater grade of the highway, street car tracks and sidewalks sufficing to bring down these portions of the floor enough to pass under the railway tracks upon the spans adjacent to the anchor piers, and to continue under, and descend with the same grade as the railway tracks, upon the approaches.

The main trusses or longitudinal supporting frames of the cantilever and flanking spans, as well as the trusses of the approaches are built vertical or plumb, instead of in planes inclined outwardly or "battering," as in the Forth bridge and also in many high viaducts and long span arch bridges. Where a bridge supports only a single or double track railway or narrow or medium width highway it is necessary to spread the base of the supporting trusses, arches or towers, to secure sufficient stability to prevent the structure from being overturned by excessive wind pressure, but in this structure on account of the great breadth of the bridge required for the several ways, this breadth being 80 feet measured between centres of outer trusses, it is apparent that it may not be necessary to slope or batter the trusses in order to obtain the requisite base to render the structure stable against the most severe winds of ordinary or periodical and frequent occurrence, and in this design the trusses have been placed in vertical planes, with advantages of simplicity of design and cost of construction. In the main piers steel buttresses are built out at right angles to the plane of the trusses, increasing the width of the superstructure base, and heavy steel anchors are provided, extending down almost to the base of the masonry sub-piers near their

ends, to guard against the possible effect of winds of extraordinary violence.

The lower chords of the flanking spans of the cantilever bridge, and of the longer spans of the south approach, are curved down to the stone piers of the substructure, both to diminish the height of, and quantity of masonry in the substructure and to improve the appearance of these portions of the design.

In the south approach there are 15 spans ranging from 300 feet down to 160 feet, the lengths and depths of these spans being varied in approximate proportion to the height of grade above the water. From the last span shown on the southerly side, the highway and electric car tracks are carried upon a solid embankment, with sloping rock-built sides, the railway being upon an elevated structure over the middle of the highway.

The approach viaduct, upon the curve on the Montreal side, is a structure simulating an arch viaduct, with full centre round arched trusses, having a sufficient centre depth to be self-supporting and to exert no horizontal thrust upon the substructure, under vertical loads.

It is proposed to use the European style of all riveted connections throughout, no eye-bars or pin connections being used, excepting possibly in anchorages. While the pin connected method of bridge construction is preferred by the majority of bridge engineers in the United States, short span bridges excepted, the riveted method is almost exclusively used in Europe, and the immense Forth bridge, the largest rigid bridge in the world, stands as a conspicuous precedent for the employment of this system of construction for bridges of exceptional magnitude.

The bridge has been designed to carry a heavy train of locomotives and cars upon both of the railway tracks with a proper allowance for the travel upon the highways and sidewalks, and for wind pressures, and with working strains ranging from $\frac{1}{6}$ to $\frac{1}{3}$ of the breaking strength of the material, according to position and duty.

It is proposed to use mild open hearth steel throughout, having an ultimate tensile strength from 60,000 to 72,000 pounds per square inch, and with restrictions as to the amount of phosphorus and sulphur, the impurities which, if contained in excess, are most prejudicial to the good quality of steel, and its ability to resist impact, or sudden blows or shocks.

The estimated weight of structural steel is 37,000 tons of 2,000 pounds, and the estimated cost of the superstructure is $3,514,000.

MONTREAL BRIDGE—LIVE LOADS AND WIND PRESSURES.

Length of bridge covered by load feet.	Live load on single track lbs. per lin. ft.	Live load on highway lbs. per square ft.	Live load on sidewalk lbs. per square ft.	Total live load lbs. per lineal ft.	Wind pressure, bridge empty lbs. per sq. ft.	Wind pressure, tracks loaded lbs. per sq. ft.
20	8,000	210	110	25,720	90	50
30	6,330	160	93.3	20,190	73.3	41.7
40	5,500	135	85	17,420	65	37.5
50	5,000	120	80	15,760	60	35
60	4,670	110	73.3	14,610	56.7	33.3
80	4,250	97.5	77.5	13,270	52.5	31.3
100	4,000	90	70	12,440	50	30
120	3,830	85	68.4	11,890	48.3	29.2
160	3,630	78.8	66.3	11,260	46.3	28.1
200	3,500	75	65	10,780	45	27.5
240	3,420	72.5	64.2	10,510	44.2	27.1
250	3,400	72	64	10,450	44	27
270	3,370	71.2	63.8	10,350	43.7	26.9
300	3,330	70	63.3	10,220	43.3	26.7
350	3,290	68.9	62.7	10,070	42.9	26.4
800	3,130	63.8	61.3	9,540	41.3	25.6
1250	3,080	62.4	60.8	9,390	40.8	25.4
1490	3,070	62.1	60.7	9,359	40.7	25.4

EDWD. S. SHAW, C. E., Boston, Mass.

A WORD OF CAUTION.

THE enthusiastic Canadian student of architecture who may be planning a visit to the Paris Exhibition of 1900, will do well to remember that in some of the Provincial towns a person attempting to make a sketch in the streets is liable to find himself arrested and held by the police as the emissary of a foreign nation which is preparing for the invasion and conquest of the republic. The absurdity of such official interference appears to have dawned upon the mind of the Prefect of Police of Paris, for an order was recently issued that artists and photographers are not to be interfered with unless by reason of them crowds of people congregate and impede the traffic in the streets.

PRISMATIC GLASS.

ONE of the latest and probably most important improvements in building material is the prismatic glass for transoms and sidewalks, introduced by the Prismatic Glass Company a few months ago. This window glass is made in small squares, which are put together with lead or other material to suit size of windows or transoms. The inner surface of the glass is covered by horizontal ridges or half prisms. These half prisms are so constructed that when a light ray which falls naturally at an angle of about 45 degrees passes through this glass it becomes refracted or bent upwards and is carried out horizontally into the interior of a room instead of falling to the ground or floor at the natural angle. This is a very simple contrivance, but the result is wonderful. In one jewelry store in Toronto, where the glass has been introduced, before using the prismatic glass, upwards of 40 and on cloudy days 80 incandescent lights were required to give sufficient light in the interior. Since using prismatic glass the proprietors of the store say that they have not required any artificial light except on very dark days, and that they have saved from $40 to $80 per month in their artificial light bills. The same result has been experienced by three of the largest departmental stores in Toronto who are using the glass. Architects and owners who have used prismatic glass are emphatic in their praise of its result.

The sidewalk lights work on a somewhat different principle. The rear surface of each prism acts as an independent reflector and an ingenious but simple arrangement is made so as to provide for the slant of a sidewalk, and still allow these reflectors to throw light into the interior of a basement without being diverted or tilted up, which is the result in most pendant or prismatic sidewalk lights.

Although only on the market for a few months in Canada, both prismatic window glass and the sidewalk lights have met with large sales and nearly all the important mercantile and commercial buildings erected in the principal cities in Canada have been fitted out with this glass.

The use of this glass does away with the necessity of light wells and sky lights, which always serve as fire traps and use up valuable space.

The City of Venice has announced its intention of holding a second International Art Exhibition, to contain pictures, sculptures, etchings, and drawings, from April 22 to October 31, 1897. Prizes for the best works to the amount of not less than 40,000 lire will be awarded by an international jury of artists. The Municipality of Venice will grant three prizes of 1,500, 1,000 and 500 lire respectively for the best critical essays on the exhibition, published during the first month after the opening. Artists must give notice of their intention to exhibit not later than January 1.—The Building News.

As it is often difficult to obtain any information concerning the inside height of a church or other building, Korber mentions in the "Deutsche Techniker Zeitung" that he has found toy balloons very useful for this purpose. The string must, of course, be very light. A straw smeared with a little glue placed at the top of the balloon helps to keep it in position for a few moments. It may, unfortunately, prove quite as difficult to procure a toy balloon good enough for the purpose, as to hunt up papers and drawings containing the desired information. But Korber is not wrong, when he says that somebody might prepare balloons specially for this purpose.

STUDENTS' DEPARTMENT.

THE PRACTICAL SIDE OF TRAVELLING.

UNDER this heading Mr. A. Needham Wilson gives the following hints in A. A. Notes to architectural students abroad in search of knowledge:

It seems to be a somewhat invidious task to lay down any general rules of procedure for foreign sketching tours, the necessities and circumstances differ so widely according to the line of route of the country traversed that nothing more than personal experiences can be given, and the neophyte must glean what he can from the variety offered him. It has to be borne in mind that the student is about to study architecture produced under a different aspect, under a different climate, and governed by atmospheric conditions totally distinct from those of our own country, and though it may be necessary to lay down some fixed route, or fix upon a list of notable buildings, there must be a temptation to search for untrodden ground. Some notion—further than a mere broadening of ideas of future usefulness, must be in the mind of the student, to be gathered from the material he will collect during his tour, and naturally he will pick this up as fancy leads him. Therefore I venture to think the idea of working from some centre is a useful one. More luggage can then be carried, as the bulk can then be left at your base, and bare necessities only taken afield. Sometimes it will be found practicable to live in apartments, or en pension, and then a few luxuries will be found most welcome. To Mr. Bolton's suggestions as to outfit, I have little to add, as I consider them excellent. There are one or two points, however, to which attention might be given. Slow drying water colors will be found very necessary in extremely hot weather, and personally I found two folding campstools indispensable. They are light and easy to carry, and for plotting dimensions on the spot, form a handy trestle for the drawing-board by placing one above the other. For certain work a bamboo rod or reed, 10 or 15 feet long, will be found very useful in measuring to otherwise inaccessible points. These are generally easily procured, and need not be carried from place to place, and, above all, take a sketching umbrella.

Personally speaking, I cannot say I have found such extreme difficulty with regard to credit notes as Mr. Bolton has, as the centres from which I worked had duly accredited agents, and I certainly never lost by the exchange. It must be understood that I write of certain parts of the south of France, with which I am more intimately acquainted. Living there is extremely cheap, providing that you shun the grand hotels.

My companion and I lived luxuriously at one small hotel for forty francs a week for the two, "en pension."

Mr. Bolton appears to stand in great awe of concierge and sacristan, and speaks contemptuously of introductions. I certainly agree with him that the credentials furnished by the Royal Institute are of little use, but the best credentials I had were cards furnished by a government architect to whom I had an introduction. It proved an "open sesame" to me to everything. A case in point. I had seen through an archway a court, in a certain city. I applied for permission to sketch. The owner, a noble, was absent. The concierge said it would be all right. We accordingly commenced work. A scion of the noble house turned us ignominiously into the street. We produced our credentials our passport, our Institute card, our Academy bone, our A. A. ticket, our letter. We implored; we threatened to write to the Times; but the stony-hearted youth (about fifteen) saw us off the premises. We went to our protector and returned armed with a note. Instantly the place was at our feet. "Everything is at Monsieur's service." "Would Monsieur like a table and a chair?" M. le Comte regaled us with Malaga; we had the run of the place; we sketched old furniture. Madame la Comtesse apologized, and we felt that we were Britons again. Armed with those cards we penetrated places that no Briton had ever seen or heard of. We walked unscathed amid police and "gendarmerie," and even sketched the ancient tower of the "Mairie" at Avignon from a window of the gendarmerie itself. I never bothered with sacristans and concierges. I went invariably to the head authority and procured proper permission. In this I never failed, and as a result was never interfered with. Of course, in travelling from the beaten track, I repeatedly had to seek permission to sketch where no sacristans or guardians existed, and then I found our powerful friend's influence most marked. The permission of the priest or other in charge never failed to secure me from any annoyance. I certainly found it saved instead of wasted time.

Do not let a student go abroad with a fixed idea that the fact of his being an Englishman is sufficient to secure him the entree everywhere, without proper permission. Such conduct causes more trouble and gives us a worse character than many imagine; and certainly if you differ in creed with that of the church in which you are working, do not offend the susceptibilities of worshippers and authorities by conduct that you would not be guilty of in your own land or church of your own creed. Even if no stipulation to such effect is made, it is expected that you will cease work during Divine Service. Remember that as you act, so it will be better or worse for those who may follow in your footsteps, and an indifference to others' feelings may cause your successors endless trouble. As a case in point, I may mention that the priest in charge of the grand church of S. Trophime, at Arles, hesitated for some time before giving permission on the grounds that other students had persisted in sketching during service and on Sundays. At St. Gillies, Gard, the cure spoke in terms of strong indignation of the conduct of certain English, who, forsooth, because they were Protestants, seemed to think it unnecessary to respect the feelings of those who differed from them. It may be annoying to break off in the middle of your work, but a little arrangement will obviate this. Is it a large church with a fine west elevation? sketch outside till the sun drives you in. When service commences, go into the cloisters.

Both clergy and sacristans will consider you if you consider them, and, speaking personally, neither in England or abroad have I ever found the consent given grudgingly by the clergy. Though you may have a right to be in a church, it does not follow that you have a right to sketch.

To turn to another matter; do not be content with a superficial examination of a town. The tide of modern improvements may only have covered up much that is worth the seeking. It is there if you will look for it. Nimes, with few exceptions, is a city of plain streets, and yet a mass of rich Renaissance work was found hidden behind the plain exteriors, much of it sketched

for the first time by an Englishman. In suburbs and outskirts, in outlying towns and villages, I have rarely failed to find something worth a walk. Surely half the charm of a lengthy tour is to discover the unknown.

In conclusion, I would venture to urge the advisability of measuring and plotting to scale on the spot, whenever practicable, whilst everything is at hand and before your eye, and when there is no possibility of the vivid impression fading from your memory.

I would only add to Mr. Bolton's admirable remarks on sketching the advice to draw firmly and strongly.

MANUFACTURES AND MATERIALS

CEMENT WORKS IN GERMANY.

There are, according to Kuhlow, some 63 cement works in the whole of Germany. The Rhine is the principal centre of this manufacture, but in the neighborhood of Hamburg there are three or four in operation for the production of the article. The annual production of Germany amounts to nearly 11,000,000 barrels, giving employment to some 1,800 hands, whose annual earnings amount to some £698,780. The largest customers for this article in Europe are Russia and Norway, and of transatlantic countries, the United States, Brazil, Chili and Venezuela. The exportation to Great Britain and British possessions is comparatively small. The following table gives approximately the quantity and the value exported to European and other countries :

Country.	Cwts.	£
Norway	58,500	6,700
Russia	34,353	2,900
United States	1,380,872	168,000
Brazil	446,340	40,200
Chili	131,000	13,000
Venezuela	103,000	9,800

NATIVE BUILDING MATERIALS OF THE CANADIAN NORTHWEST.

A Canadian contributor to the Engineering and Mining Journal of New York gives the following information with regard to the native materials available for building purposes in Manitoba and the Northwest Territories :

The artice that comes next in importance in the way of building materials to lumber is lime, which is used largely in plastering and mortar, and where good clean gravel is readily obtained, may, and in the future probably will, be utilized largely in the construction of concrete buildings. Limestone is found in drift to a greater or less extent through Manitoba and the territories. It is found in situ to an unlimited extent near the mouth of Dauphin River, extending for some miles both east and west of the same. There are also large outcrops on Lakes Manitoba and Winnipegoosis, and the Rocky Mountains in this region may be said to be wholly composed of this material. The writer in preparing this paper does not desire to create the impression that he has endeavored to report all the points at which outcrops of such materials are found ; but is merely mentioning localities where such have come under his own personal observation.

Where limestone is being mentioned as found in situ, good quarries of the rock for building material are readily obtained ; in fact, in very many points are already opened and fairly well developed, and before leaving this branch of the subject it might be well to direct your attention to the probability of very extensive quarries of limestone being developed at the narrows of Lake Manitoba, the rock there lending itself very readily to a smooth finish at a low cost, and it is also alleged that the nature of the formation is such that blocks of large size can be easily quarried.

Both granite and limestone drift rocks may be found nearly everywhere to a greater or lesser extent throughout Manitoba and the Northwest, and, where they are large enough, they can generally be split into any desired shape or size, and even where comparatively small masons can construct buildings not alone substantial, but also ornamental. While on this subject it may be of interest to mention a series of huge granitic rocks which have been deposited, no doubt through the influence of ice, along the foothills of the Rocky Mountains. To convey an idea of the size of some of these, it may be mentioned that one particular boulder located on Section 21, Township 20, Range 1, west of the fifth meridian, shows above ground a bulk of 50 feet in length, 30 feet in width and about 25 feet in height. How large a portion of it is hidden from sight below the ground has never been determined.

Those who have had an opportunity of seeing the bridge piers erected by the Canadian Pacific Railway over the Winnipeg River here have no doubt been struck with the splendid appearance of these specimens of Aberdeen granite, of which they are composed. This material is obtained in the immediate vicinity, and the probabilities are that there is a very large field of this stone which can be had in blocks of any dimension, and there can be no doubt it is susceptible of as high and fine a polish as its original namesake, the "Aberdeen granite," of Scotland, and it will probably in the future take a prominent part in the construction of any works where such material is required.

There is a large outcrop of sandstone in Lake Winnipeg, which is pronounced to be first-class. There are also some sandstones to be found in the vicinity of Turtle Mountain, the qualities of which, so far as endurance is concerned, would appear to be all that could be desired ; but owing to its color and texture it is doubtful whether it will ever find a market outside of the local consumption, for which, however, it is liable to become very valuable. An outcrop of sandstone may also be seen on the Assiniboine River in the neighborhood of Indian Ford and some stone has been brought to Winnipeg from this point ; but owing to its cost it was not a successful financial venture. It may be useful for local purposes, but probably not beyond that. When the Cypress Hills are reached there are a considerable number of sandstone outcrops and very extensive beds are crosscut in places by the South Saskatchewan, the Red Deer, the North Saskatchewan, the Bow, the Belly, the St. Mary's, the waterton, and the Old Man's Rivers ; but the finest quality of sandstone is undoubtedly found along the foothills of the Rocky Mountains and the supply there is practically inexhaustible, enough to rebuild all the cities in the world as they exist at the present time. It would seem a great pity that with so much stone, in the country our hard-earned cash should be sent across the line to our neighbors for the purchase of stone, as both quality and color is in favor of the domestic article. One is not rash in prophesying that the extensive use of red sandstone will prove anything but pleasing and soothing to the eye if carried to excess.

Vast deposits of this rock are met with in the Rocky Mountains and can be obtained in any size blocks that is required. This material is very well fitted for bridge piers, in fact any structure which is liable to be exposed to the action of water, combined with low temperature.

Where the Canadian Pacific Railway crosses the backbone of the continent there is a large outcrop of slate which gives every promise of becoming a valuable article of good quality as soon as there is demand enough to warrant capital going to the outlay of developing. There is a deposit situated on Kicking Horse River, near its mouth, which was mined or quarried to some extent a few years ago. Some was shipped to the coast, but the action of the moist climate there was too severe for it and disintegration set in. It is, however, more than probable that the same slate, if used in Manitoba or the Northwest Territories, would prove a very good roofing material and withstand the influence of the atmosphere as well as most other roofing slates.

In the Rocky Mountains, along the line of the Canadian Pacific Railway there are to be found very large bulks of quartz carrying copper stains, which are capable of receiving a high polish, and are of a very beautiful color, resembling marble in finish, and would no doubt prove useful and ornamental for the manufacture of table tops, mantels, etc.

The notice announcing to members the first meeting of the Chicago Sketch Club, following vacation, reads as follows : "Members will come prepared to discuss fish stories, summer girls, century runs and similar topics."

Mr. C. E. Sintum, the Canadian Commercial Agent in Norway, reports an increasing trade between that country and the Dominion, and incidentally mentions that he recently gave a considerable order for steam radiators to a Toronto firm.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Storm Windows.

It is now time in this northern climate to prepare for the winter, and abundant orders will be placed in the sash and door factories for storm sashes and doors. In order to make storm sashes effective they should be made to cover the whole front of the window frame, and held in place by screws which should pass through the sash stile and grip the casing. This, of couse, cannot be done in a majority of cases, particularly if there are venetian blinds hung to the windows, as it would entail the necessity of taking off the blind trimmings in the fall and putting them on again in the spring, with all the chances of having them mislaid or lost. When the blind trimmings prevent the screwing on of the storm sashes on the outside of the casings, they should be fitted snugly between the casings, and if the sashes are thicker than the casings, which is often the case, the inside of the sash should be rebated over the blind stop, sufficient to admit of the sash dropping into the frame far enough to let the stile be flush on the outside. When this is the case, the storm sashes may be held in place simply by the use of the common Japanned cast iron button which may be obtained at any hardware store for about ten cents a dozen. By making use of these buttons, the labor of placing and removing the storm sashes is made about as light as it is possible to make it, especially if two hardwood dowels be set in the top-rail of the sash, and corresponding holes be made in the head casing to receive the dowels ; then, two buttons, one on each side of the frame, will answer for each sash. These buttons should be fixed low down the frame, near the sill, and should be tight enough to prevent any movement of the sash by the action of the wind, and thus prevent the buttons from turning and allowing the sash to get free and fall out of place.

Storm sashes should never be less than 1⅜" in thickness ; indeed it would be much better if they were made 1¾" thick, as they meet with a good deal of bad usage and wear and tear, in being put up and taken down so often. It is a mistake, also, to make storm sashes with large lights in imitation of the sashes they cover. In the frequent removals, in and out of the window frames, the glass is liable to get broken and more particularly is this the case if the panes are large, and the cost of replacing a large pane is an item worthy of consideration. Small panes cost less if they get broken, and they are not so liable to be broken, owing to their being protected with the mullions and muntins. These mullions and muntins also strengthen the frame and fit it better for the hard usage it has to endure. It goes without saying, that storm sashes of all sorts should be well painted. In the best style of work the sashes get two coats of good paint, composed of white lead and linseed oil, before being glazed ; they should also be fitted in place and numbered before being painted, and the edges, top and bottom, as well as sides, should be painted. All the glass should be well bedded in good putty and well held down with a goodly supply of glaziers' zinc points. Much depends on having the glazing well done, for, as storm sashes are more exposed to severe weather than other sashes, special care should be taken when the glass is put in the sash, in order to make it firm and secure. Some painters mix a fair proportion of white lead, moist or dry, as may be needed, with the putty to make it adhere firmly to both glass and wood. This method has its faults, inasmuch as should a pane of glass break, it is next to impossible to break out the putty to make room for the new glass, as the lead and putty becomes as hard as stone.

Storm Doors.

Storm doors, like storm sashes, should be made somewhat stronger than the ordinary door, and to this end, when the doors are framed and panelled, they should have all the muntins mortised into the rails sufficiently deep to admit of tenons, not less than 2" long, which, by the way, should fit snug in the mortise, and white lead should be used as a holder instead of glue. It will be well also if the plough grooves are painted with white lead before the panels are slipped in, as, by doing so, the life of the door will be prolonged from 15 to 25 per cent. The rails should be well fastened into the stiles, and the tenons should be well painted before being driven into the mortises. It is always best to employ three butts in hanging a storm door, the third butt, besides assisting to hold the door, will do much towards preventing it from twisting or warping, a condition that too often occurs in storm doors. All the butts, of course, should have loose joints, as this will enable one to take off the door without taking off the wings of the butts. A very important matter in connection with a storm door is the lock and its furniture. This should be of the very best quality, and should be heavier than the lock on the inner door, while its furniture should be of the same style and finish. In all cases it should be a mortise lock, and should be attached to the door in the most substantial manner. The keeper should extend round the jamb a trifle if possible, in order to protect the jamb or casing from being shattered if the door should be dashed by the wind against it, while the bolt may be shot out, which is sometimes likely to happen. When storm doors are taken down in the spring, they

should be laid carefully away in such a manner as to prevent them from warping, bending or twisting, and put where no water can get at them. The keys should be tied with fine wire to the knobs, and the pins belonging to the loose butts should be fastened to the butts also by a short strand of fine wire. These simple precautions may be the means of preventing much inconvenience and annoyance when it becomes time to again put the doors in service. All of the foregoing relates more particularly to panelled storm doors, but the same hints and suggestions to a large extent, are applicable to the ordinary batten door, with the exception, perhaps, of the locks, for where a batten door is used for a storm door, a thumb latch is generally employed in place of a lock, and where this is the case, it is the better way to get the best thumb latch for the purpose obtainable.

Chimney Building.

THERE is no part of a house that requires more care and thought in its construction than the chimney if good results are desired. Yet there is no part in which so little skill, and what may be termed building science, is usually displayed, as in the construction of chimneys. Nothing contributes to the health and comfort of a household in a greater degree than a good chimney, one that will do its duty without having to be forced or doctored. To obtain the best results possible, so far as known at present, the following suggestions should be considered and adopted where the conditions will admit: On no account put a chimney on a flimsy foundation. If, as is sometimes the case, it is necessary to build a chimney from a stand, it should be seen that the plank or timber forming the uprights of the stand, rest on a good solid foundation, and not on the flooring or joists as is frequently done. Many buildings have been destroyed by fire originating between the ceiling joists and roof, because of defective foundations, which have settled, and the brickwork of the chimney shaft having been held in between the joists or roof timbers, has separated at the junction, thus leaving an opening from the flue to the woodwork, which, being dry, was easily ignited by the first spark or flame that found its way through the break. A chimney shaft should never be built so that ledges of brickwork rest on either studding in the walls, joists or roof timbers. This is frequently done, but it is a bad and a dangerous practice. When built from the ground the foundations should be deep enough in the ground to be below the action of frost, and if built so as to form part of an outside or cross wall, it should be well tied or bonded with the stonework of such wall.

When it can be done the flue should be as nearly perpendicular and straight as it is possible to make it, and should be smooth inside, without angles, corners, jogs or contractions, and at no point in its entire length should wood of any kind be near it. Wherever the shaft passes through a floor or a roof, the floor or roof should be "trimmed" around the brickwork, and a space of an inch left clear between the wood and the brickwork; this space can easily be made water-tight in the roof, by proper flashing. If the building should be a frame or a "baloon" one, the brickwork should be kept at least four inches from the outside of the wall. The flue should be "parged" or plastered with a mortar composed of one part fresh cow dung and three parts of ordinary cow dung well mixed and applied the usual way. This mixture should be made as required and used before it has time to set and become hard. A flue so treated will present a smooth glassy surface, hard as a rock, and soot will not accumulate on its sides, while the draft will be much improved. The draft may be further improved by increasing the area of the flue about an inch every ten feet in its height. This increase of area must not be made suddenly or by a jog, but gradually all the way up, from bottom to top. Under no consideration whatever should joists or timbers of any sort, or for any purposes, rest on or in the brickwork of a chimney, for they simply make hidden incendiaries that may some day lead to the destruction of the whole building. An ordinary flue intended for service in a dwelling house where wood or soft coal is used for fuel should contain an area of about 125 square inches, and not less than 96 square inches. If hard coal is used as fuel, the latter number of square inches of area will answer very well. Each fire-place or stove-pipe should have a separate flue, for, if a number of stove-pipes enter the same flue the draft is sure to be defective and troublesome. Wherever it may be necessary to pierce a flue to suit a stove-pipe, the flue should be enlarged at least one-fourth in order to enable it to perform the extra work imposed on it by the addition of another fire.

If a fire-place is connected with the chimney, its hearth should be built independent of the floor timbers, and should rest on brick or stone work and should be filled up nearly level with the floor with concrete, on which hearth tiles or neat cement should be laid to the proper height. In constructing the fire-place care should be taken to contract the throat and keep it well forward, so as to be directly over the fire. In making the contraction, experience has shown that the best system is to start to draw in the brickwork or contract the throat, just at the haunches of the jambs, and make the contraction from both sides, on an angle of 45 degrees, continuing on this angle until the desired flue area is reached, then continue the flue as described in the foregoing. The chimney breast should be made to measure in the room exactly 4 ft. 11 in., so that when a half inch of mortar is applied to both sides by the plasterer, the breast will measure just five feet, which is the regulation size for the width of mantels. The plastering, of course, is rendered on the bare brick work. If a pressed brick mantel is intended to form the fire-place it may vary somewhat from the measurement given, the dimensions, however, may be obtained from the firm from whom the pressed bricks for mantels are to be purchased.

While bricks on edge are permissible for dividing flues from one another, the outside wall of the chimney ought never to be less than six or eight inches thick. A six inch wall may be constructed by laying the outer course of bricks on their flats, and the inner course on their edges and when the courses are all on one plane on top, lay a course of "headers" chopped off to six inches in length, putting the broken end inside the flue as it will act as a bond for the parging. For an 8" wall the bricks may be laid as headers and stretchers every alternate course. The best hard faced bricks will be used for that portion of the shaft that will be exposed to the weather, and good sound bricks should be used throughout the whole work. It is advisable to place a soot drainer at the lower end of every flue so that the chimney may be cleared from soot whenever necessary. The foregoing remarks refer exclusively to chimneys built altogether of bricks, but are in a great measure applicable to chimneys built of stone or of adobe. Generally when a chimney is built of stone it is either lined up with bricks or vitrified drain tiles, the latter, when of sufficient area, make the very best flue and are reputed to be the safest as they never gather soot. Adobe chimneys, many of which are found in the remote settlements and on the prairies, should be plastered inside with mortar made as described earlier, and the whole should be left until perfectly dry before any fire is allowed to approach it. Abobes or "dobys" as the westerner calls them, are simply mud bricks, neither more nor less. In dry climates like New Mexico and Arizona and other parts of the southwest they are much used in building, and many of the old forts, mud forts, were built of "dobys," and they have bravely stood the weather for many a long year. In the absence of bricks the Canadian settler often makes use of the "doby" to build the chimney of his log cabin, but he generally mixes cut stone with the mud, and instead of calling his "brick" a "doby" he calls it a "cat." We have never been able to discover the reason why the latter designation was given to the mud brick, but suspect it comes by some round-about way from the Quebec French. Can any of our readers solve the puzzle?

METHODS OF ESTIMATING FOR PAINTERS.

THE use of a reliable system of measurement, which can be laid before the patron, and charging by the piece, or foot or yard, rather than by the "lump," is worthy of general adoption.

In many places the "square" of 100 superficial feet is used. On some work a man can paint six "squares" a day, while on other work he may be able to paint only three squares in the same time. The charges are made to suit these variations, and is preferred by many to the more elaborate, though really more reliable method of applying different prices to different sorts of work. The claim made for the system is that such fixed rules as these, though involving occasional hardships, will obviate the disputes that are likely to arise from differences in the judgments of divers measurers. This system is worthy of noting here, and it is as follows:—

EXTERIOR PAINTING.

1. All plain surfaces are to be measured by their length, multiplied by their breadth. No deduction to be made for ordinary doors and windows. Nor is any addition to be made for scaffolding, staging, etc.

2. On irregular surfaces, such as mouldings, panels, etc., the tape line must follow the contour of the surface, and into depressions, quirks, etc., wherever the brush has properly been.

3. On frame buildings, the thickness of the edges of clapboards, shingles, siding, etc., to be added to the length of the surface.

4. In all cases where the terminal edge is cut in, six inches is to be added to such cutting for each foot in length.

5. In windows and glazed work, when the amount of cutting-in exceeds the surface measurement, the additional cutting-in is to be added to the surface measurement.

6. In shutters, blinds, and other finish containing movable or fixed slats, such slats are to be measured. In trellis work, also, double the measurement.

7. In ornamental work, such as cornices with dentils, medallions, brackets, etc., the parts of the work so ornamented are to be measured as double work and added to the moulded work already measured, as provided in Rule 2.

8. In balustrades, balconies, stairwork having balusters, the opening in which the balusters occurs is to be measured as equal to one-third of the surface for measurement.

9. In ornamental iron cresting, grille work, etc., the surfaces are to be measured and the amount multiplied by three.

10. Picket fences, gates, etc., are to have one-half of their surface measurement added thereto.

INTERIOR PAINTING.

11. Rules for exterior painting apply to interior work as far as practicable.

12. Wood-finishing subject to same rules as painting.

13. In all cases of wall painting the height is to be measured from tip to base or wainscot to the ceiling, and no openings of less than 3 ft. wide are to be deducted. Where the opening is from 3 ft. to 6 ft. wide, one-half of its contents are to be deducted, but one-sixth in width is to be added for each side of the openings, its entire length.

14. In calcimining or wall tinting, the walls and ceilings treated are to be measured over all, and no deductions for openings to be made. The same rule to apply to white-washing.

15. In all cases of wall painting or calcimining where plaster cornices are painted or tinted, the girth of the cornice to be measured double and added to the wall surface. Where ornament is painted in such cornices, etc., the provisions of Rule 7 are to be observed.

16. All striped work and stencilled border or frieze work must be measured by the lineal foot.

17. No carved work, plaster centres and ornamentation, foliated capital of columns, statuary, etc., are subject to measurement, but are to be charged for by the piece.

18. Painting finished in more than one color, measurements as for plain painting. The extra cost to be in the price charged for the work, but all striping in gold or colors to be measured by the lineal foot.

19. In measuring beaded ceiling or wainscot, or other work in which sunken beads are found, for each bead not more than 1½ in. wide, add 1 in. to the length of surface measured.

20. In all floors, hardwood or otherwise, all wainscot, base, surbase, picture moulding, etc., in which the paint or wood-finish is required to be cut in, at its terminal edge, the provisions of Rule 4 are to be observed.

As already stated and shown, there are various methods of getting at one and the same purpose. Take measurement of a surbase, and one way is to take actual measure and add four inches for cutting in at top and bottom. Another way is to take lineal measure, and if the base is ten inches wide, call it a foot, because painting the extra two inches is not considerable, and when you come to a fourteen inch base, you call it still a foot. And thus the matter is equalised. In the latter way nothing is added for cutting-in at top and bottom, and this avoids disputes with customers, who may not see the justice of charging for cutting-in.

v.8-9
Canadian
archi
and

Other conditions enter into the problem of measuring work that still further embarass the measurer. The work may be new or old, and in various stages of newness and decay. New work differs much in the manner of its preparation for painting, and an old job may be easier to repaint than a certain new job. The proper way to provide for this would be to have a separate schedule for each class of work. Thus new and old work might be divided into class A, best condition for painting; class B, fair condition; class C, poor condition; class D, bad condition. This would be put under proper heads, as "new work," "old work." Removing old paint by burning it off should be noticed under its proper heading, or removing by alkalies or any similar treatment. It is worth 30 cents a square yard to burn off paint from a plain surface.

In measuring balusters it is very difficult to lay down a fixed rule of measurement. The rule is to allow double measurement for square balusters, and treble for round. Say a row of balusters is 12 ft. long and 3 ft. high, including a rail on top. The tape line is run over the rail from one side to the other, giving 6 ft. This being doubled gives 12 ft., and multiply the length, 12 ft., by this height of double 6 ft., or 12 ft., gives a total of 144 ft. The turned baluster would give 216 ft. Balusters, of course, differ in style, and hence much must depend upon the judgment in measuring. Again, take window blinds, or Venetian shutters. If these are large the profit of painting them by the square yard will be large, while doing small blinds the same way will hardly pay, especially at the hands of a slow workman. Some painters, in measuring the front of a house, say, estimate the job "solid," taking no account of windows. Others count windows separately. It certainly takes longer to paint a building that has many windows than one having but few, and unless some separate account is made it is hard to say how a correct estimate can be made. In doing roofs that have turned up seams, say an inch high, it is proper to add two inches for each seam the roof contains. Estimating gable ends, peak roofs, and the like, some halve the distance from the square of the building to the apex of the roof, and count same as below the square. Others, again, taking into account the trouble involved in doing such work, count the work as square.

Other elements affecting cost of doing work consist in such matters as number of colors; number of coats; tints to match certain objects, as wallpaper, carpets, etc.; graining, its quality; varnishing, quality of varnish. The work on a fine house will necessarily cost more to do than that on a cheap house, and these matters can be arranged under the headings suggested and relating to new and old work of various conditions of finish. It is not difficult to lay down fixed rules that will apply to the great bulk of the work done, but the exceptions are the trouble. Graining may be classed as first, second and third quality, or fine, good and "knock-off," as some grainers call quick, cheap work. There can scarcely be any room for other character of work between these classifications.

Having set a standard price on such work, say two shillings per yard, then for first-class work add 25 per cent., and for third-class or cheapest work deduct 25 per cent. This is a sort of sliding scale, and might be made to apply to painting as well.

Painters ought not to guess at the cost, nor take the architect's figures for it. Nor should they conclude that because a certain similar job cost so much to do, this particular job will cost about the same. Estimate too high, and the job is lost. Too low, and money is lost. There is a certain arrangement among some of the master painters in the States whereby incorrect estimating is somewhat obviated. An association is formed, and when a member makes a bid or tender for a job, he lays his figures before the association, as does any other member estimating on the same work. An average is made of these bids or tenders, the man nearest that average getting the work, or if not near enough, his price is raised to the average, and the others withdraw from the contest. But they are not absolute losers. Indeed, the low bidder is the gainer, because he is sure of receiving a certain percentage of the amount of the successful man's contract price, whereas had he secured the work at his own figure, he would doubtless have had his work for nothing. This plan works very well. It nullifies the evils of competitive bidding, and even those who fail to get the work get a percentage of that work's profits. And when the owner of the work understands this scheme he likes it, too, because he knows that he is getting his work done at a fair price.

THE FOUNDATIONS OF THE NEW YORK CATHEDRAL.

On a commanding eminence in the outskirts of the Morningside Park, New York City, work has been progressing for some months upon the foundations for a costly and imposing cathedral, which is designed to be one of the largest and finest, if not the most beautiful and important of modern ecclesiastical structures. Its site is on the crest of a bluff overlooking a large part of upper New York and the Hudson river. It lies between Morningside Drive and Amsterdam Avenue, and extends from One Hundred and Tenth to One Hundred and Thirteenth Streets, affording ample area for the display of its architectural beauties, while the handsome buildings of Columbia College and of St. Luke's great hospital adjacent will be consistent environment. The finished building will be about 320 feet by 290 feet in extreme dimensions, about as large as St. Paul's in London, and will have a grand tower about 445 feet high. At present the construction is begun only upon a small part of the edifice, viz., upon the tower and its adjacent choir, for which the foundations are now well advanced.

As the rock outcropped in places at the site, it was believed that solid and most satisfactory foundations could be very easily secured, but when excavation and levelling was begun it developed a singular and troublesome condition of affairs, which has necessitated much delay and expense. The stone, the familiar gneiss of the locality, was disposed in very irregular masses, the formation of which was almost like waves, the surfaces of the outcropping ledges sloping down in places at a sharp angle and intersecting at the vortex of troughs 20 to 45 feet below the surface. At other places the surface of the solid rock was not so deep, but was very irregular, and much of the upper part of the stone was found loose and disintegrated or filled with pockets of earth and clay, so that considerable excavation was necessary to secure an enduring and reliable platform on which to impose the heavy and extensive loads of the enduring structure.

It was, therefore, determined to excavate several large pits which should each contain the piers for several adjacent important foundations. The earth and loose and unsound rock were all removed, and the solid rock faces exposed roughly dressed and scrupulously cleaned with wire brushes, then thoroughly washed with hose and brooms and the space filled up to elevation 112 (an average depth of 15 feet and a maximum depth of 45 feet) with a uniform mass of concrete, upon the level surface of which the cut granite pier footings are laid. The surface is nearly continuous, interrupted only by some recesses where the distances between pier footings were largest, and to leave canal-like passages about 12 feet deep for pipes, etc., although up to elevation 100 feet no openings at all were left in the concrete laid. The great tower itself rests on arches sprung high in air from four smaller corner towers with flying buttresses. Each of these four towers transmits an estimated pressure of 17,000 tons to the bed of concrete which supports its base, 38 feet square, thus producing a load of about ten tons per square foot. To distribute this and proportionate load from the rest of the structure, great pains have been taken to secure a solid and homogeneous bed. To this end the concrete, which is composed of cement, sharp sand and gravel in proportions of 1, 2 and 3 respectively, was thoroughly mixed quite dry and rammed by 20-pound rammers from 10-inch horizontal layers to 8-inch thick layers, and till the water was flooded to the surface. When night came the layers were terminated wherever it happened with long sloping edges, and when work was resumed in the morning the whole top surface was plastered with a mortar made 1 cement and 2 sand, upon which the next course of concrete was laid and rammed exactly as if setting blocks of stone. The concrete became very hard over night, and this method is believed to have secured a real monolithic condition throughout the whole mass of concrete, which now contains about 11,000 cubic yards, and will require about 2,000 yards more to complete it.

Quartz gravel, 1½ to 2 inches large, and sharp sand, both from Port Eaton, on the north shore of Long Island, are used for the concrete, which is mixed of such consistency as to be just capable of moulding into a ball in the hands. The cement (17,000 barrels of which has been used so far) is Aalborg's, Alsens, Germania, Mannheimer and Silica-Portland. The latter is used almost exclusively for masonry mortar. The cement is stored in two large houses on the site. A sample of cement taken at random from one barrel in every ten is tested on a Riehle 1,000 lbs. machine by the engineer's inspector in a laboratory equipped at the site. Here about 600 briquettes are kept hardening under water for one, seven and twenty-eight day tests. Very little of the cement has had to be rejected, much of it with three parts of sand developing a tensile strength of over 200 lbs. in seven days. The usual tests of fineness and rapidity of setting are performed with customary standard apparatus.

The foundations will contain about 5,000 yards of dimensioned granite masonry. The concrete work is notable for its unusual magnitude, the manner in which it is executed, and for the character, arrangement and operation of the plant for making and handling it. All material is carted to the site and delivered directly to the derricks, to the storehouses, to the working platforms, or is distributed by the central track. All the concrete is mixed in two standard Sooysmith machines, set on opposite sides of the work so as to deliver their product close to the place where it is required. Each mixer is set with the top of its hopper about level with a working platform that closely surrounds it at the surface of the surrounding ground, and upon which materials are delivered by wheelbarrow and derrick and placed in bins. Men with shovels keep it continuously fed into shoots that carry it down to a platform about 6 feet below, upon which rest the lower ends of three inclined chain and bucket conveyor elevators that are driven at the same speed, about 2 feet per second, by a small vertical engine on the same platform. This engine also drives the mixer. All are driven by belts which will slip and allow the machinery to stop when obstructed rather than break as a gear would. One elevator is encased throughout in a tight wooden case, the lower part of which is filled with loose cement, which it brings up and empties into the upper part of the mixer hopper. The next elevator is on the opposite side of the hopper, a couple of feet nearer the discharge end, and delivers sand from a heap at the foot of the chute below, where two men are constantly in attendance to see that each bucket is level full. The third elevator is 2 feet further away, on the same side as the cement elevator, and similarly served by two men, and delivers gravel. The mixer is about 12 feet long over all, and inclined about 1 in 12 down towards the discharge end. Its shaft makes about 20 revolutions per minute, and is fitted with about sixty inclined bevelled radial cast-iron arms that mix the materials very thoroughly, even before they are wet by a man with a hose-nozzle just opposite the gravel elevator, and considerably more afterwards. The elevator buckets each hold about 1 cubic foot and discharge their contents over to the further side of the shaft. They are set at distances apart on their chains inversely corresponding to the proportionate quantities of material they are to furnish for the concrete. Below the mouth of the mixer is a third and still lower platform, upon which are two short 30-inch gauge tracks, about 4 feet apart centre to centre, each with one car upon it. A car upon one of these tracks is run up under the mouth of the mixer and a little to one side of its axis, but parallel with it, and the mixer delivers continuously into its 1-yard iron bucket (which it can fill heaping full in a minimum time of about two minutes) by a flat wooden chute about 4 feet wide and 6 feet long, mounted on a horizontal axis just below the mixer and in a vertical plane through its own axis. This chute is operated like a butterfly valve, first tipped up to an angle of 45 degrees with the vertical on one side, so as to divert the flow from the mixer all into the bucket on the right-hand car. When that is nearly filled a bucket and car are pushed up on the left-hand track. The top of the chute is revolved 90 degrees to the right, and the discharge from the mixer is instantly diverted into the empty car, and the full one is run off and taken by the derrick, which can usually swing it to the required place and empty it immediately. Sometimes hauling and the delay of materials threaten to hinder the work, and such occasions are taken to lay concrete most remote from the mixers that takes more time or the use of two derricks to handle it. When the concrete has set it is kept constantly well sprinkled for several days.

About twenty men are required in direct attendance upon each concrete mixer, and about forty-five more are required for all the concrete work, tamping, wheeling, hoisting engines, etc., for each machine's maximum

v.8-9
Canadian
archi
and

product. As high as 260 men a day have been employed on this contract, the active prosecution of which was begun on April 1. The highest output of one concrete mixer has been 262 yards of tamped concrete, or 328 heaped 1-yard buckets of loose concrete in 8½ hours. Vertical faces of concrete are obtained where necessary by 1-inch mould boards secured to well-braced studs outside.

The principal plant consists of the two concrete mixers, driven by two 15 horse-power vertical high-speed engines, a Murray and a Safety; two horizontal tubular water bottom 50 horse-power Lidgerwood boilers, one Cameron duplex steam pump with 3-inch suction, which has been needed only to remove the rain-water, one derrick, 70-feet mast and 65-feet boom, all with four steel rope guys and running tackle, good for 10 tons load each. Two of them have the Buffalo standard fittings and the remainder those of the St. Paul Hoist and Derrick Company, and all of them have new round sticks of Norway pine spars from Brooklyn yards. They are all painted white, and present a neat and handsome appearance. They are operated by six double-drum Lidgerwood hoisting engines, two of them with individual boilers. Messrs. Heins & LaFarge are the architects, and Gen. William Sooy Smith, of Chicago, is consulting engineer of the cathedral, and the above-described work is being executed by Sooy-smith & Co., contracting engineers, of New York, upon a commission contract. The earth and rock excavation was done by J. D. Crimmins and J. J. Hooper respectively, and John Pierce has a contract for dimension granite for piers, etc.—Builders' Reporter.

UPRIGHTING A TALL BRICK STACK.

UNDER the above heading Brick describes the method by which Mr. E. W. Seamans, of Grand Rapids, Mich., succeeded in righting, at the Standard Concrete Manufacturing Works, at Norristown, Pa., a tall chimney that had declined considerably from the perpendicular:—

At the company's works there is a brick smokestack 122 feet high and 11 feet square at the base, the walls are 36 inches thick and the whole structure weighs not less than 400 tons. Some time since the top of the stack began to lean over and, when it inclined 45 inches from a vertical line, it was felt to be too dangerous to allow to go any further.

It was agreed that any attempt to pull it back to a perpendicular position would certainly cause its destruction. Contractors would not undertake the task of righting it for any less sum than the cost of pulling down and rebuilding it. So Mr. Seamans thought out an entirely original scheme for straightening it; this he had to carry out himself, as no one would take the risk.

To raise the sunken side of the stack was an impossibility. The only course left, therefore, was to sink the other side four and one-half inches. To accomplish this ten and one-half inches of brick work was removed from the foundation on three sides. As the bricks were removed square blocks of wood were inserted, one after the other, until three sides of the towering mass of bricks rested on wooden cubes. Between the blocks supporting the stack temporarily substantial brick piers six inches high were built, leaving a space of four and one-half inches between the top of the piers and the bottom of the undermined brick-work.

The foundation was now in readiness for the culminating feat, the removal of the wooden cubes, which, successfully effected, the side of the stack would be lowered to the piers prepared for supporting it while the interstices were bricked in. The blocks had to be removed gradually and simultaneously.

Each block was ignited and all were kept burning briskly. If one burned faster than the others the fire on that particular block was quenched until the others reached the same stage of incineration. Thus all were made to burn uniformly, and as the blocks were being reduced to ashes the stack slowly righted, until the last ember died out, when its top was on a vertical line with the base.

The entire work consumed one day. The reduction of the wooden blocks to ashes required an hour. In that time the top of the stack moved forty-five inches, but so slowly that men with powerful field glasses could not detect the slightest motion.

PERSONAL.

Mr. A. M. Ross, senior member of the firm of Ross Bros., painters, Hamilton, Ont., is dead. He was born in that city in the year 1838, and worked for a number of years in the car shops of the Great Western Railway. After the death of his father he took charge of his business, and conducted it with his brother.

There is much anxiety on the part of the friends of the Hon. Mr. Harty, Minister of Public Works for Ontario, owing to the conflicting reports regarding the condition of his health. It is hoped, however, that he may be successful in his effort to regain health, and be able in the near future to again resume the active duties of his Department.

Mr. A. M. Calderon, the well-known architect of Ottawa, has taken unto himself a bride, in the person of Miss May Bate, daughter of Mr. Newell Bate, merchant of the same city. The wedding took place on the 23rd of October, at Christ Church, the venerable Archdeacon Lander officiating. Mr. and Mrs. Calderon left on a short tour in the States.

The death occurred at Victoria, B. C., last month of Mr. William Wilson, at the advanced age of 94 years. Deceased was born in Banff, Scotland, where he learned the mason's trade, coming to Canada at the age of 29 years and settling in the city of Quebec. For upwards of half a century he carried on business as a builder and contractor, and erected a number of important buildings in that province.

At St. John's church, Toronto, on the 6th of October, Mr. Frank S. Baker, of the firm of Curry & Baker, architects, was united in marriage to Miss Florence Mary Kenrick. The ceremony was performed by the Rector of the church, the Rev. A. Williams, in the presence of a large assembly. Mr. Baker and his bride are spending their honeymoon in the Eastern States. We join our congratulations to those of their numerous friends, and wish them a happy and prosperous voyage through life.

On the 22nd ultimo the death occurred in Toronto, after a lingering illness, of Senator John Ferguson, M. D. Deceased was born in the county of Middlesex, Ont., in 1839, and was at one time a prominent contractor. He built a portion of the New York and Oswego Midland Railway, and the Galt and Berlin road was also constructed under his supervision. He was given the contract for the enlargement of six miles of the Welland canal, and, with Mr. Robert Mitchell, built the larger portion of the waterworks system in Toronto and also the works at St. Catharines.

Every poor speller seems to finally go into the sign-painting business.—Atchison Globe.

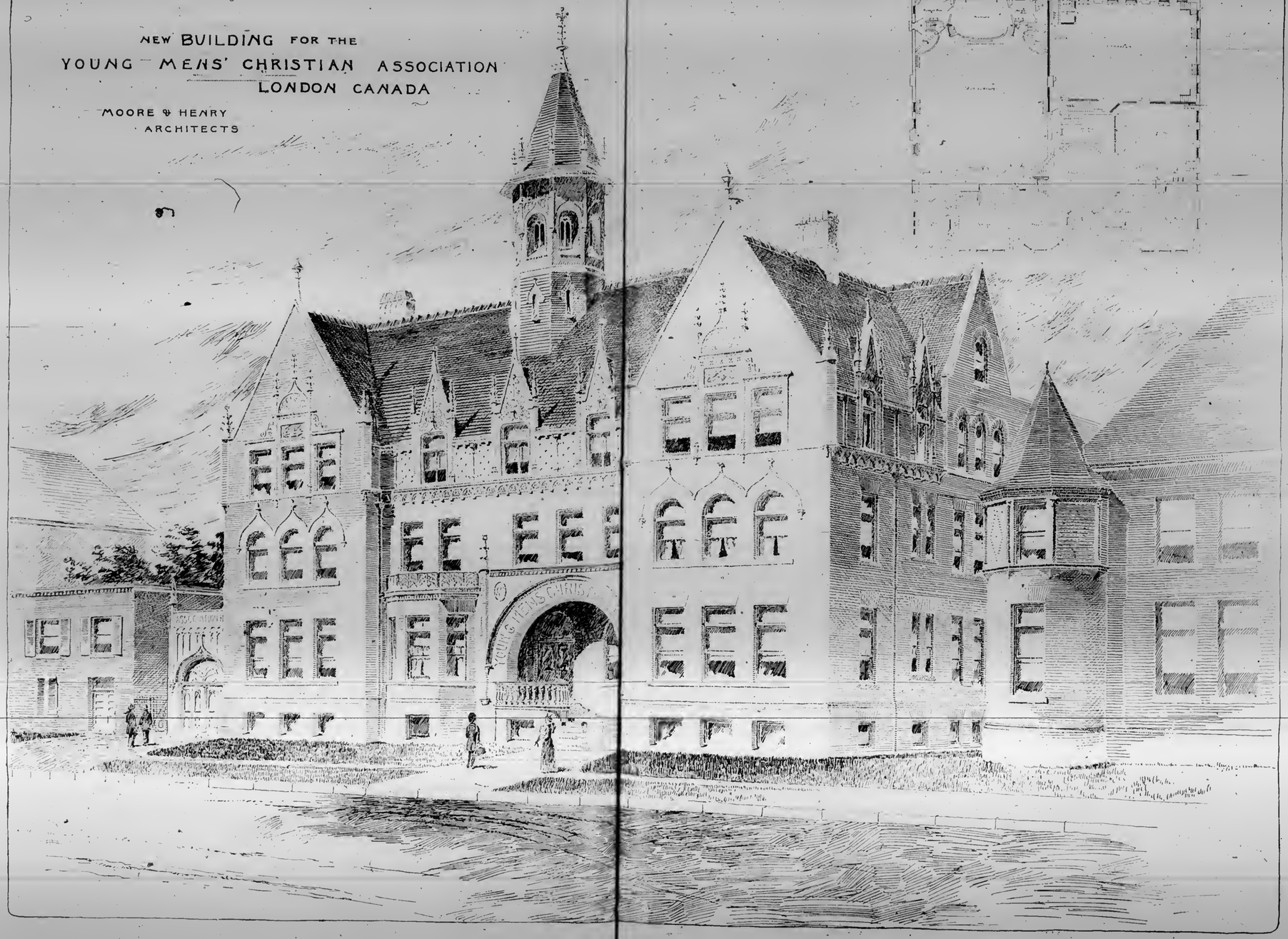
A striking instance of the durability of timber, under certain conditions, was afforded during the excavation for the foundation of the Bowling Green Building, New York. A line of spruce piles was discovered at some distance below the surface of the ground, which, as far as we can learn, were placed in position about 150 years ago and actually formed a bulkhead, the tide then reaching this point. These piles, upon examination, were found to be perfectly sound, and to all appearances would have been just as sound and good 150 years hence.

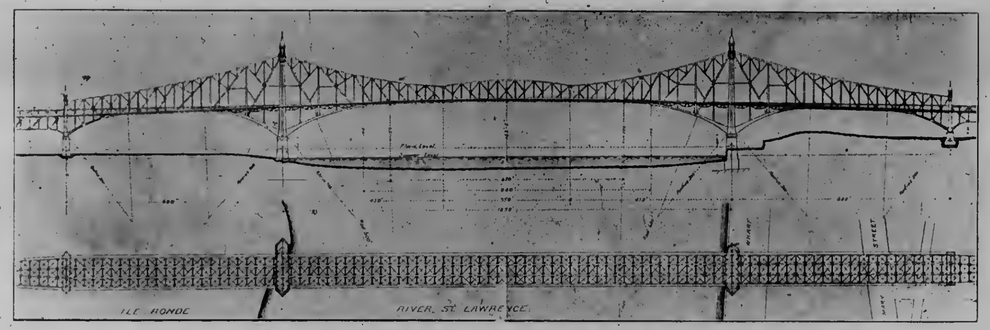
In his selection of typical workmen Mr. Gladstone has given preference to those in the building trade. The editor of the British Workman having asked Mr. Gladstone for a message to working men which is to be reproduced in fac simile in that ournal, has received one, of which the following is the most interesting paragraph: "I think there is among parents in what are called the laboring classes too much anxiety to take their children out of hand labor and to transfer them to head labor. But a good deal of what is called head labor is not worthy of the name, whereas hand labor is, in many branches, capable of great elevation. Take, for example, the connection of the mason's trade with the sculptor's art, and the relation between the carpenter and the wood-carver. Further, the higher hand labor is very much better paid than the lower head labor. It would be of great utility to laboring men if they would think this through for themselves."

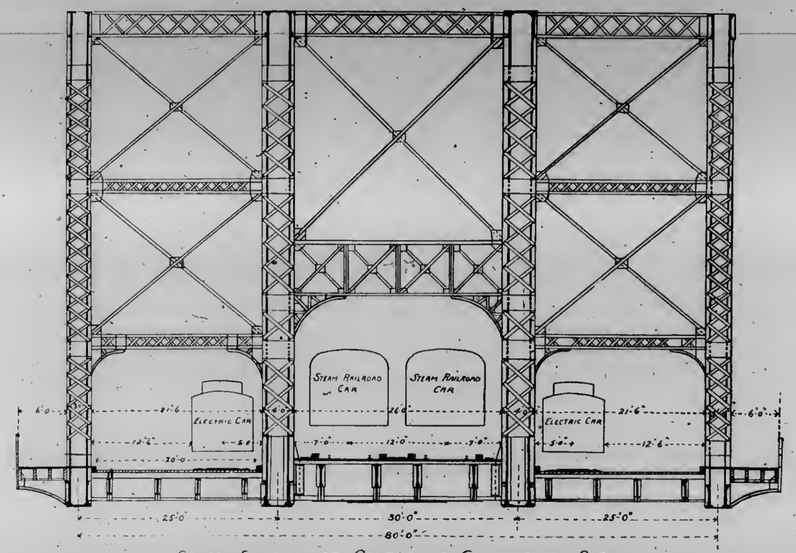
v.8-9
Canadian
archi-
and

NEW BUILDING FOR THE
YOUNG MENS' CHRISTIAN ASSOCIATION
LONDON CANADA

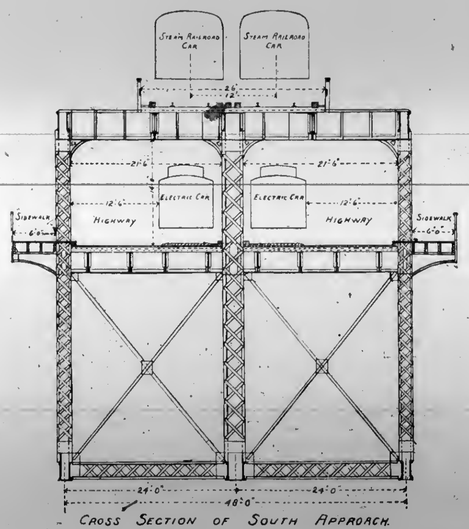
MOORE & HENRY
ARCHITECTS



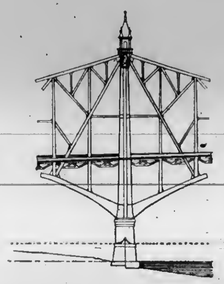


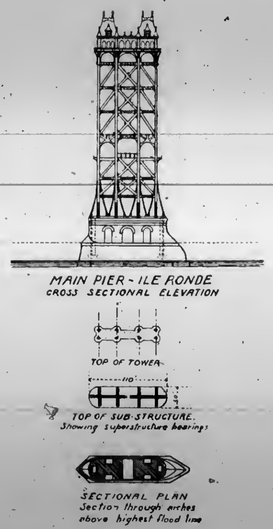


CROSS SECTION AT CENTRE OF CANTILEVER SPAN



CROSS SECTION OF SOUTH APPROACH.





FIRST PREMIATED DESIGN FOR PROPOSED CANTILEVER BRIDGE OVER THE ST. LAWRENCE RIVER AT MONTREAL.

SUBMITTED BY EDWARD O. SHAW, C. E., BOSTON, MASS.

ENTRANCE TO VICAR'S CLOSE, WELLS CATHEDRAL.
SKETCHED BY MR. FRANK S. BAKER, A.R.I.B.A.

V.8-9
Canadian
archit...
and ...

RESIDENCE OF MR. COLUMBUS GREEN, ST. GEORGE STREET, TORONTO.
BEAUMONT JARVIS, ARCHITECT.

V.8-9
Canadian
Archit...
and ...

CANADIAN ARCHITECT AND BUILDER.

VOL. IX.—NO. 11. NOVEMBER, 1896 { PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods.

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.

Bell Telephone 2269.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisemnets should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	H. B. GORDON, Toronto.
1ST VICE-PRESIDENT	J. GEMMELL, Toronto.
2ND VICE-PRESIDENT	JOS. W. POWER, Kingston.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

F. J. ALEXANDER	Ottawa.
THOS. FULLER	Ottawa.
E. J. LENNOX	Toronto
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:

W. A. LANGTON - Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. T. TAYLOR, F.R.I.B.A., Montreal.
1ST VICE-PRESIDENT	J. F. PEACHY, Quebec.
2ND VICE-PRESIDENT	A. RAZA, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	E. MAXWELL, Montreal.

COUNCIL:

A. C. HUTCHISON	Montreal.
JAS. NELSON	Montreal.
J. WRIGHT	Montreal.
ROBT. FINDLAY	Montreal.
CHAS. BAILLAIRGE	Quebec.
F. H. BERLINGUET	Quebec.

AUDITORS—G. E. TANGUAY and H. C. NELSON, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

JOHN ALDRIDGE, President.
THOS. CANNON, Jr., 1st Vice-Pres.
JOHN VICK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. BOOTH.
JOHN WICKETT.
JOHN RUSSELL.
H. LUCAS.
JOHN VOKES.
JAS. CRANG.
JOHN M. GANDER.
GEORGE HENRY.

JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

A Point of Law.

It may be a matter of some interest to our readers to know what legal rights are possessed by persons who may desire to move a building along the public streets from one situation to another. The Supreme Court of New Jersey expressed the opinion that the use of a public highway for such purpose was not within the rights enjoyable by the public in a public highway for the purpose of travel. The Supreme Court of Indiana decided that although citizens had the right to ordinary use of the streets they could not interrupt traffic or discommode the public by tearing down electric wires in order to remove buildings along the streets. In the case of the Toronto Street Railway Company vs. Dollery, it was held that a person cannot lawfully blockade the tracks of a railway company by moving a building.

Teaching of Architecture at McGill University.

We have the pleasure to present in this number a personal sketch and portrait of Professor Capper, who has been chosen to fill the newly established Chair of Architecture at McGill University, Montreal. Professor Capper was honored by being called upon at the very outset of his career in McGill, to deliver the annual university lecture. It will unquestionably be gratifying to the profession throughout Canada to observe that the teaching of architecture has been given a place side by side with instruction in engineering and the other professions at the foremost seat of learning in the Dominion. A perusal of Professor Capper's address gives the impression that the new Department of Architecture has been entrusted to competent hands, and that at its head is a gentleman inspired by high ideals and a determination to impart as far as possible those ideals to his students and others with whom he may be brought in contact.

Proposed new Building By-Law for Montreal.

Allusion was made in our October number to the fact that up to that time the City Council of Montreal had taken no action with reference to the new building by-law which was drafted and submitted for their approval early in the year by the Province of Quebec Association of Architects. It is gratifying to learn that during the last month representatives of the Association were invited to join the aldermen in considering the matter. We have not learned what progress was achieved, but now that a beginning has been made in the direction of dealing with the subject, we trust that the necessary time will be given for its thorough consideration, and

that in the near future the Council will pass a by-law giving effect to the valuable recommendations made by the architects, which are the outcome of months of effort for the public welfare. We hope that the City Council of 1897 of Toronto, will also feel it to be their duty to either approve or reject the suggestions presented by the Ontario Association of Architects for the improvement of the existing by-law, which is admittedly defective in many important particulars.

Modern Toronto Architecture.

The many large buildings which have been erected in Toronto within the last six or seven years, and those which are in process of erection at the present time, have given a metropolitan character to the city which it did not formerly possess. The appearance of most of these buildings, including the new City Buildings and the Foresters' Temple, now nearing completion, is satisfactory. It seems to us subject of regret, however, that the important structures last mentioned should have been situated in such close proximity to each other. Both would have gained in appearance had they been farther apart. The view of the new city buildings at present obtainable from Bay street is very meagre and unsatisfactory indeed, partly due to the towering structure at the north-west corner of Bay and Richmond streets, which has reached a height of eleven storeys. It would add very much to the appearance of both of these important buildings if the city should decide to expropriate sufficient land to enable Queen street to be widened opposite the new city buildings, thus removing a number of the dilapidated old structures which at present disfigure the locality and render it impossible to obtain a satisfactory distant view of the new buildings. The new city buildings are now sufficiently advanced to show that they will present, when completed, a character at once imposing, pleasing and refined in comparison with the American creation in Queen's Park. The statement has been published within the past few days that the Duke and Duchess of York will take part next year in the ceremonies attendant upon the formal opening of the building.

Fire Retardent and Light Diffusing Properties of Wired and Ribbed Glass.

Brief mention was made in our last number of recent tests which show the superior light diffusing qualities of ribbed as compared with plain glass. At the request of our readers we have obtained further information on the subject, for which we acknowledge our indebtedness to the Boston Manufacturers' Mutual Fire Insurance Co. The President of this company is Mr. Edward Atkinson, a well-known authority on methods of fire proofing. Mr. Atkinson's company recently arranged for a complete investigation of the subject at the Massachusetts Institute of Technology. From photometric comparisons made at this institution of the intensity of the light from two windows similarly situated, one glazed with plain glass and the other with ribbed glass, the light-diffusing properties of the latter were shown to be from fifty to two hundred per cent. greater than those of the former. While the general resultant direction of light entering through a window is downward, at an angle of 40 to 50 degrees, the action of the ribbed glass appears to be prismatic, the greater part of the light falling upon it at any point being refracted and spread out into a fan-shaped beam. The horizontal ribs tend to throw the light which would otherwise fall to the floor far into the room, while the vertical ribs spread out the light on both sides. The relative effectiveness of light is much greater where the light is derived indirectly than where it is derived directly from the sun. Heat appears to be diffused on the lines of the light, and while the same amount of heat may pass the ribbed glass that would pass through clear glass, it is so much better distributed as to give the effect of a cooler temperature. The fire retardent properties of wired glass have also undergone investigation by the same company, and the results obtained are both interesting and valuable. Glass of this description, heated to a red heat, so that a piece of paper held against it on the outside was easily ignited, was in this condition showered with cold water. The result was found to be that while the glass was cracked into countless pieces it still adhered together, forming one sheet. The following conclusions are drawn from the test: (1.) Wire glass can safely be used in skylight (on the main buildings of factories or works) and in such will withstand a severe fire and will not give way when water is thrown on it. A wooden framing for skylight, covered with tin, all seams lock-jointed and concealed nailed, is superior in fire-resisting quality to iron framing. (2.) Wire glass in wooden sash, covered with tin, all seams lock-jointed and concealed nailed, can be safely used for windows toward an external exposure. (3.) Wire glass can be safely used in fire doors to elevator shafts and stairway towers where it is necessary to light said shafts. (4.) In office buildings, hotels, etc., where it is undesirable to have elevator shafts entirely enclosed and dark, wire glass permanently built into brick or terra cotta shaft, or arranged in wood, metal covered frame can be safely used. (5.) Wire glass plates, securely fastened in standard fire shutters, can be safely used toward an external exposure. In this case the fact that a possible fire in a building, all windows of which are protected by fire shutters, can much more readily be detected from the outside through the wire glass, is of importance. We have previously referred to the manner in which buildings are destroyed as the result of the windows cracking and falling in, resulting in currents of air rushing in through the openings, either carrying flame into the building or fanning into life the fire slumbering within it. The use of wired glass, which would be less costly and much more sightly than iron shutters would tend to greatly lessen the danger of the destruction of buildings from this cause.

"MODERN METHODS" OF A "PROGRESSIVE ARCHITECT."

We have from Hamilton the prospectus of one who calls himself a "progressive architect" doing business by "modern methods." The scheme laid bare of all the puffery with which he surrounds it is simply the issue of plans and specifications in connection with the mail order department of a departmental store. The prospectus contains cuts of several houses, of the merits of which, as there are no plans given, we are not able to form an exact opinion, but the offer frequently repeated throughout the prospectus "this plan can be reversed free of charge if desired" not only cannot be said to be consistent with good planning, but is truly unprofessional. The architect is, like the doctor or lawyer, a professional adviser; that is to say, the client comes to him as the repository of special knowledge, and out of his knowledge he advises the client for the client's interest. This progressive architect, however, appears to have cut loose from all this; his business is merely to sell, and the client may look after himself. He must know, if he is really an architect, how important to a plan is the right aspect of its rooms, and how impossible it is to reverse a good plan without completely overthrowing all that made it good. That a kitchen should be in the cool part of the house, a dining room where it will get the morning sun, that a drawing room is best with a western light, that bedrooms should not look to the north if it can be avoided, nor a porch be set to catch the northwest winds, nor a furnace placed on the lee side from the same cold quarter are all commonplaces of house planning. Yet this vendor of plans, if in his unprogressive days he has designed a house with the dining room in the south and the kitchen in the north, is quite willing to reverse the plan now and introduce a modern method of baking the cook in summer in a south kitchen, as a set off to freezing the householder at his breakfast in winter in a north dining room and to say nothing to his client about the changed state of affairs. It would have been all right if the prospectus instead of reading "This plan can be reversed free of charge. Regular professional fee is $53. Our price is only $10," had read "Our price for this plan is only $10, but if your lot faces the other way do not on any account order this plan, but have a house planned for your own lot at the regular professional fee of $53, and you will find that the difference, which is only $43, will pay for itself over and over again by giving you a house that you can live in with comfort or keep always let." In dealing thus honestly with the public in offering his old plans our progressive architect would have secured confidence for the branch of his prospectus entitled "Plan of Your Own." Here he offers always in connection with the mail order department—to "work up a sketch" from instructions or a rough plan. Consideration of the price is in this case reserved until the sketch is made, and though under ordinary circumstances we have no wish to interfere with any man's method of doing business—since our prospectus writer introduces his own way of doing business to the public by way of an attack upon the usual methods, we can only say that, in comparison with this method of dealing with the question of cost, the usual method of percentage fees, clumsy as it is, seems safer for the client.

AN EDUCATIONAL STANDARD FOR ARCHITECTS.

With the election of Major McKinley to the Presidency by a substantial majority is accomplished the last of the departures in the public affairs of the United States and our own country, which business men have promised would be turning points in business affairs, and we may hope now for the beginnings of revival in trade.

When the building trade begins to look up we fancy there will be noticeable a greater merit in the buildings than in those erected during the last period of energy. Although building has been slack during these last six years, architects and architectural students have not been idle. The architectural societies of Ontario, Quebec and British Columbia were started at the close of the boom times, and, though they have been much hampered by the bad times, they have done enough work to justify their existence. The education of an architect, which before 1890 was an indefinite matter, is now scheduled. Every student in these provinces may hear exactly what he ought to know; has books and opportunity provided, and the guide and stimulus of a system of graded examinations. The architects who have been engaged in forming the libraries, ordering the curriculums and conducting the examinations, have themselves profited by being concerned in these things. They have also had their conventions, have profited by hearing papers—still more, no doubt, by writing them—and perhaps most of all by the mere fact of meeting together to hear and discuss them. Architects know one another now as they did not formerly; there is a greater interchange of ideas; the sociable condition, which is essential to the development of all art workers, is much better established now than formerly. In fact, the architects have had an enforced opportunity for reflection, and the associations were instituted just in time to give them the means of profiting by it. We may therefore consider that in the space between the good times which are past and the good times which are coming on, the educational ideal of architects has been recognized, and the architects themselves are better conformed to it than formerly. As the next period of prosperity will see the erection of more important and permanent investments than the previous period, there is cause for satisfaction that the education standard has been raised. The pity is that it has not been placed in a position from which there is no retreat. If the proposal brought forward last year in this province to make the title "architect" a degree accompanying a diploma, had been put through the House, we should now be able to look forward to the next period of building with the confidence that at least all the juniors concerned in it—and in their hands would usually be the actual draughting and detailing—would be trained men. Great results might have flowed from a fundamental measure of that kind—indeed may yet flow from such a measure, for it is likely that the measure will not be dropped after having so nearly met success.

It is impossible for anyone who has at heart the growth of a good style of building in the country not to wish that the architectural societies, or some other bodies, were made the agents of the government for the education of all architects. Each pile of building material brought to a site depends upon the architect for its ultimate value as much as does a lump of clay upon the hand of the potter. The architect's work is the creation of property out of raw material, and it is but a short-sighted policy that takes no account of provision for his training.

It is true that all building in the country is not done by architects; indeed, it is probable that if a line of demarcation is drawn between architects and builders the country builder and designer will have a status which he never had before. But to throw a line of building more definitely into the builder's hands for design as well as building is more likely than otherwise to stimulate his taste for good design. In the older countries there has been excellent work done by builders in a traditional manner of work. In any case, he is bound to rise in his style if the architects do. He is a quick and skilful imitator. It is his manner of designing. His facility is with his materials; his ideas he gets from example, and though it is the custom to abuse the builder's design, he has usually much practical sagacity, and knows a good thing when he sees it. At the back of the builder's design is always the architect, and the more a good style of building is diffused among architects the better will

be the general run of building for which architects are not required.

So that after all we have to look to the architect for the character of building in the country, and we hope that he has made the most of his recent leisure and of such opportunities as have been offered to him to prepare himself for his responsible function of creator of property.

MR. A. T. TAYLOR, F.R.I.B.A.

We have the pleasure of being able to present to our readers an excellent portrait of the new president of the Province of Quebec Association of Architects, Mr. Andrew T. Taylor, F.R.I.B.A. Mr. Taylor has been a most enthusiastic and stedfast worker in connection with the P. Q. A. A. for the promotion of the interests of architecture in the province of Quebec, and has thus honestly won the position of honor to which he was elected at the last annual convention of the Association.

Mr. Taylor was born and educated in Edinburgh, Scotland. He served his articles with Messrs. Pilkington & Bell, and subsequently entered the office of the City Architect of Aberdeen. Following this he was for a time with Mr. Joseph Clarke, F. S. A., in London, diocesan architect and surveyor for Canterbury, where he had large experience in the restoration of old parish churches and church work generally.

Mr. A. T. Taylor, F.R.I.B.A.
President of the Province of Quebec Association of Architects.

Mr. Taylor was elected an Associate of the Royal Institute of British Architects in 1878, and was made a Fellow of the Institute in 1889. He studied in the architectural school of the Royal Academy under Mr. Phene Spiers, gaining the Royal Institute medal in 1874 and again in 1881, and also a Soane medallion medal. He passed the examinations and qualified for the post of a district surveyorship. After having travelled over the continent of Europe for some time he entered upon the practice of his profession in London, where his partner, Mr. Gordon, now is.

In Canada a large number of buildings have been erected from his designs, amongst others, the Macdonald Engineering and Workman Buildings at McGill College, also the Physics Building, the Redpath Library, the most recent Medical Building, and just now, the new Chemistry and Mining Buildings at the same place; Bishop's College School, Lennoxville; the Diocesan Theological College, Montreal—an illustration of which appears in this number—many banks, including buildings for the Bank of Montreal in Vancouver, Calgary, Regina, Perth, several in Montreal, including the entire renovation of the head office of the Bank of Toronto, Montreal; the renovation of the Montreal General Hospital; a large number of residences, including the magnificent house of the Hon. Senator Drummond; the new Art Gallery, Montreal, etc.

Mr. Taylor obtained the second place and premium in the important competition for the Glasgow Municipal Buildings, in which over 116 competitors took part, and was selected to be one of two experts in the competition for the British Columbia Government Buildings at Victoria. He is Professor of Architecture at the Presbyterian College, Montreal, has been a member of Council of the Art Association for many years, academician of the Royal Canadian Academy, etc.

Mr. Taylor is also the author of a book on the "Towers and Spires of Sir Christopher Wren," and joint author of the series of "Dominion Drawing Books" used in the Protestant schools of the province of Quebec.

THE ONTARIO ARCHITECTS' BILL.

To the Editor of the Canadian Architect and Builder.

Sir,—Your desire to obtain special legislation for architects in Ontario is to be commended, but it seems to me that in the form this bill has been presented and as often rejected by the Ontario Legislature, such a law would not be so much in the interest of the public as in favor of a few of the already self-dubbed architects. As a teacher of architecture I decidedly wish there was an examination conducted by an independent and recognized public examining body, of such a nature as would be a guarantee that those who had passed this test of knowledge were worthy to rank on an equality with other professional men; and whatever subjects were optional, it should be compulsory that the candidates pass an examination in the strength of the various building materials and the modes of constructing the same in a scientific manner; that is, having due regard to the strength, strain, and stress of the several parts, individually, and of the whole when combined as a whole, so that such structures might be safe under all ordinary conditions of loading and wind stress on the one hand, and free from undue waste of material on the other. The public, I feel assured, would be in favor of, instead of being opposed to, such legislation.

You seem to infer that the public are not opposed to the passage of the bill. I know for a fact that decided opposition exists, and have tried to ascertain why this is so, and find 1st, as the bill was framed the present self-dubbed architects were to be architects still, but with authority to formulate all sorts of conditions to prevent younger and better trained men from entering the "ring;" 2nd, the bill as I understand it demands that candidates must have attended the School of Science in Toronto or have served five years in the office of a self-dubbed architect, and they have in consequence associated the School of Science as being an institution of about the same status as many of these men.

The era of "articled pupils" is no longer existant, and the meanness of the proprietors of almost numberless offices has brought about this state of affairs. I ask, is it just to a young man after he has attended public school, collegiate, and perhaps university, to enter an office as a pupil, when in reality he is an office drudge?—who, by the way, is not free to break his part of the agreement as soon as he finds the principal has no time to teach him anything. He must "pick up" as best he can a knowledge of the business out of office hours, as he is kept at specifications, tracing, etc., keeping office tidy, being there if any person happens to call when the proprietor is out. If office work is slack he may be allowed to copy a perspective drawing, which has already been published by the Canadian Architect and Builder, during his office hours, and when his five years of such drudgery is over he may perhaps be given his railway fare to expatriate himself to the United States, or endure every obstacle possible being raised to prevent his starting an office in Ontario.

Sensible people now do not article their boys who intend to follow the profession of clergyman to a worthy divine, but they send him to school, and parents of would-be architects now do the same. I claim that in this school our architectural students acquire more knowledge in two years than they do in the average office in five years, and on leaving get good appointments in the States.

After calling the attention of your readers to the weak points in the scheme, allow me to suggest a few remedies:

1st. Let the Toronto University or the Hon. Minister of Education grant degrees for architects, which I would suggest be in the following order: A. Arch. (Associate in Architecture), for students; B. Arch. (Bachelor), for 3rd year students; M. Arch. (Master); D. Arch. (Doctor). Any person should be allowed to be examined, no matter from whence they came or wherefrom they obtained their knowledge, and a diploma should be given to all who can pass the prescribed examinations.

2nd. Make the owners of buildings, whether such are already built or in process of construction, responsible for damages to employees and other persons having business in the vicinity of such building at the time of total collapse or falling of any part thereof.

3rd. Avoid mentioning that people must employ an architect; the public think the Association of Architects want laws to prevent any person whatsoever from even building a shed in a yard or an addition to a barn unless an architect is to be called in and the inevitable 5% charged.

4th. If those architects who have not work enough to keep them and their assistants going all the year round choose to arrange to give instruction (provided they are capable of so doing) to their assistants, let such instruction be paid for by those receiving it; and on the other hand, when an assistant works for an architect his labor is of value, and should be paid for accordingly, either by piece work or by the hour. The best men are the busiest and have no time to teach boys.

5th. If the proprietor of a building is made responsible, and he has employed an architect to put up a safe structure, the proprietor should in turn be enabled to sue the architect for damages should an accident occur.

If the Association will modify the bill on these lines there is no doubt it will pass, and the public will soon judge for themselves the merits of different architects, and no doubt in time the recognized 5 per cent. will go, and less commission will be paid for work requiring but little skill, and more for that which does. Apologizing for taking so much of your valuable space,

S. John Ireland,
Principal Hamilton Art School.

PROF. S. H. CAPPER.

It affords us much pleasure to be able to present to the readers of the Canadian Architect and Builder the accompanying portrait of the first Professor of Architecture at McGill University, Mr. Stewart Henbest Capper, M.A. (Edin.), A.R.I.B.A.

Professor Capper, who is 36 years of age, and consequently at the zenith of his powers, was educated at the Royal High School at Edinburgh. In 1875 he entered the University of Edinburgh, graduating in 1880 as Master of Arts, with first-class honors in the Department of Classical Literature and being awarded the Pitt Club scholarship in Classics. From 1879 to 1884 he

Prof. S. H. Capper.

acted as private tutor and also as private secretary in the household of the British Plenipotentiary at Lisbon and Madrid, and took advantage of the opportunity to study the architecture of Spain and Portugal. From 1884 to 1887 he studied and travelled in France and Italy, being admitted by examination a student of the Ecole des Beaux Arts, Paris. From 1887 to 1891 he practiced as an architect in Edinburgh, and during this period erected a number of important buildings. In 1891 he was elected an associate member of the Royal Institute of British Architects, and shortly afterwards was admitted a university extension lecturer in connection with Edinburgh University. He has given numerous courses of lectures upon Architecture, both historical and technical, in Edinburgh, Perth and Dundee. In 1896 Mr. Capper was appointed examiner in the Faculty of Arts at Edinburgh University for the department of archæology and art history.

We have had the privilege of seeing copies of the testimonials presented by Prof. Capper to the governors of McGill University. They bear the signatures of men of the highest educational attainments in the universities and professional societies of Great Britain, France and Spain, and leave little room to doubt the qualifications of the gentleman who has been chosen to instruct the rising generation of Canadian architects. The architectural students of the future are to be congratulated upon the fact that the means of obtaining a thorough architectural training are now available within the boundaries of their own country.

THE ONTARIO ARCHITECTS' ACT.

In another column will be found a letter from Mr. S. John Ireland, principal of the Hamilton Art School, in which he upholds the idea of exacting a standard of education from architects, but objects to the amendment to the Ontario Architects' Act, by which it has been proposed to effect this end in Ontario.

The intention of the proposed amendment is, briefly: To allow all architects who are at present making their living as architects to continue to call themselves so, but to prohibit after a certain date anyone from beginning to call himself an architect without having undergone a certain process of education. And the education of the future architect is to be accomplished by preparation for a series of examinations, either in private or by attending the School of Practical Science or another training school, and by serving a certain length of time in an architect's office in order to acquire an acquaintance with the practical work of architecture.

Mr. Ireland's contention is chiefly that this period of apprenticeship is unnecessary, and that a school such as his own can turn out architects fully prepared to enter upon practical work. He seems to think, by the way, that graduates of the School of Practical Science are exempted from serving in an architect's office, but this is an error. Their time of service is, however, shortened from five years to three. He draws a very gloomy picture of the student's work in an architect's office, and it is true that there are good offices and bad offices; but if Mr. Ireland thinks that time is wasted which is concerned with specifications, drawing plans, keeping office files and arrangements in working order, seeing persons who call in the absence of the architect, and even in setting up and rendering perspectives, he knows little of the nature of the experience that is necessary before a young man, however high he may have ranked at an art school, is fit to undertake the practical work of the business responsibilities connected with putting up a building. The legislature is concerned with the rights of the public as much as with those of the student (if indeed the right of a student to balk his own education is at all one of those rights for which legislators have consideration), and we fancy it will not see its way, in the case of any bill which is brought before it, to abolishing the enactment that students shall serve some time in the office of a practising architect.

Mr. Ireland seems also to think that the legislature should abolish what he calls the "self-dubbed architect," but how to do this is a difficulty. The "self-dubbed architect" is simply the existing architect, and to abolish him would be to abolish vested interests. It is not the doing of anyone interested in the bill, but of the tradition of English legislation that "as the bill was framed the present self-dubbed architects are to be architects still." To take every occasion of alluding to them as "self-dubbed" is therefore unkind of Mr. Ireland; but to go further and allude to them as a "ring" which would try to keep out younger and better trained men, or to allow himself to conceive the idea that an architect would dismiss his student with the gift of his fare to the United States in order to get him out of the country, or to suppose that students would have to "endure" the raising of obstacles to prevent their starting an office in Ontario, is to imagine a lowness of mind in the members of an artistic profession which we should not have expected to find attributed to them by the principal of an art school. It is worth noticing in this connection that the objection which has been raised in England to making the title "Architect" obtainable only by examination is not that existing practitioners will repress younger men, but that the profession will be flooded by young men because it will have risen in dignity. So with many men there are many minds. But it is about details. The main idea that architects should be properly qualified for what they profess, and that the title "Architect" should be assumed only as a degree, representing the attainment of a certain standard of education and training, is coming to be a matter of general agreement, and Mr. Ireland appears to be prepared to approve of legislation, which would properly attain this end.

In the latter part of his letter Mr. Ireland gives some items of advice to intending legislators or promoters of legislation. Article 3, to "avoid mentioning that people must employ an architect," emphasizes what is, we fear, a very common misapprehension. There are no doubt many persons who think that an attempt is being made to make it impossible to build a shed without the intervention of an architect and what Mr. Ireland calls "the inevitable 5 per cent." It seems also that some builders think they will no more be free to build from their own plans, but that at the first sign of building some monopolist architect will be down upon them and place his veto on the work until he is called in and gets his fee. It is no wonder that legislators who approve of the measure themselves are nevertheless timid about being associated with it. As a matter of fact, neither the Act nor the amendment do or could declare that an architect must be employed for anything. It is the architect himself upon whom it is proposed that the law should lay its hands and say what he must do; that if he wants to profess architecture he must give evidence that he is qualified to produce sound architecture. That is the whole story, and if anyone can extract from such a proposal anything but benefit to the public, or any direct benefit to the architect, or any indirect benefit to the architect which is not also a benefit to the public, he has a statement to make that has never been made before; for any objections that have been raised hitherto have been founded either upon mere anxiety or upon misapprehension of what is proposed.

In simple truth, the Act is intended to benefit not the architect, but architecture. But the architect believes that everything which raises his art will make his own life better worth living. Therefore he favors it.

PUBLICATIONS.

William Paul Gerhard, C. E., Consulting Sanitary Engineer, is the author of a book entitled, "Theatre Fires and Panics—their Cause and Prevention," the first edition of which has just been published by John Wiley & Sons, New York. Price $1.50.

We have received from the publisher, Mr. Wm. T. Comstock, 23 Warren street, New York, a copy of his Directory of Architects of the United States and Canada for the year 1896-97. An examination of the book shows the list of Canadian architects to be so full of errors, as to be of little value. The price of the directory is $1.00.

The cutting in half of the ordinary rate for weekly papers by the Montreal Weekly Gazette has been attended by a large increase in circulation, which the publishers expect to see still further expanded during the coming season. The Weekly Gazette gives all the news and interests all classes who take an intelligent interest in public affairs and the development of Canada's resources. At fifty cents a year it is the cheapest of the metropolitan weeklies, and it is good. It is published by the Gazette Printing Company, Richard White Managing Director, Montreal, to whom correspondence and orders should be addressed.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

DEFECTIVE PLUMBING.

"Property," a real estate paper published in this city, recently printed the following:—"Two cases have just been reported to us which prove the folly of getting a cheap plumber, who will turn out a job that is always unsatisfactory and sooner or later leads to further expense. In repairing the closet in a house in this city the workman happened to strike the ventilator in the ceiling with his head. It fell down with such a slight knock that the man looked at the hole and found that the ventilator was a dummy one, not going beyond the plastering of the ceiling, and of course it was not of the slightest use. In the other case, one of our leading plumbers was called in to examine some tenements where the tenants complained of bad smells and leaks. On examination he found that the soil pipes were made of galvanized iron and had naturally been rusted into holes, allowing both gas and water to escape. The whole of the houses had to be done over again, entailing double expense and a lot of trouble. Moral: Get your plumbing done by a reliable firm."

SAFETY OF FLOORS.

The City Building Inspector reports as the result of his investigations into the cause of the collapse of the building in this city in which the recent fatal fire occurred, that the falling of the upper floor was due to overloading with merchandise. The floor was so far overloaded that the additional weight imposed by the water thrown into the building by the firemen caused the supporting beams to bend and give way. The practice of loading floors of warehouses with merchandise to an unlimited extent, and without taking the precaution to enquire what load they were originally designed to bear, is far too common in all cities. The means for the prevention of accidents from this cause are provided in the draft building by-law prepared by the Province of Quebec Association of Architects, and now under consideration by the City Council, as follows:—

"The floors in all buildings hereafter erected, or floors in existing buildings which may be renewed, shall be so constructed as to carry safely the weight to which the proposed weight of the building will subject them, but the least capacity per superficial square foot exclusive of materials in floor, shall be as follows: For floors of dwellings, 70 pounds; floors of offices, 100 pounds; for places of public assembly and schools, 125; warehouses, stores, factories and buildings for other commercial purposes, 150 and upwards, according to the use for which they are intended.

"In all warehouses, storehouses, factories, workshops and stores, where heavy materials are kept or stored or machinery introduced, the weight which each floor will safely sustain upon each superficial foot thereof shall within 90 days after the passage of this act be estimated by a competent person employed by the owner or occupant.

"But if the inspector shall have cause to doubt the correctness of said estimate, he is empowered to revise and correct the same, and for the purpose of such revision he and the assistant inspectors may enter any building and remove so much of any floor or other portion thereof as may be required to make necessary measurements and examination.

"When the correct estimate of the weight the floors in any such building will safely sustain is ascertained as herein provided, the inspector shall approve the same, and thereupon the owner or occupant of said building, or any portion thereof, shall post a copy of said approved estimate in a conspicuous place on each story of the building to which it relates."

ARTS AND MANUFACTURES.

The classes in connection with the Council of Arts and Manufactures were opened a few weeks ago. The instruction is as in former years. A great number of pupils were enrolled. Mr. L. A. Boivin occupied the chair. The classes are held from 7.30 to 9.30 p.m., and are entirely free of charge. The greatest enthusiasm prevailed and everything points to a very successful season's work.

ST. JEAN BAPTISTE SOCIETY CLASSES.

The course of public lectures delivered under the auspices of the St. Jean Baptiste Society are well attended. A large number of persons have attended these lectures, and those who have not should not fail to do so in the future. It is a good way to obtain knowledge in different branches of art and science. The lectures are entirely free, the sum of $2,500 being granted every year by the Quebec Government towards the expenses. On the opening night Mr. Justice Loranger, who occupied the chair, explained that the object the society had in view was to educate the laboring classes, and that the lectures were approved by the Council of Arts and Manufactures as well as by the Council of Public Instruction. In presenting the address of welcome to Premier Flynn, the president made allusion to the advantage it would be to have a museum of mineralogy, and asked the assistance of the Province for this object. Mr. Flynn, in replying, wished the society all the success they deserve to achieve in their undertaking. The names of the different classes have already been given in the ARCHITECT AND BUILDER, the only change being that Mr. Boivin, instructor in Applied Science, has tendered his resignation on account of illness, and has been replaced by Mr. E. Lafontaine.

PERSONAL.

Mr. F. W. Guernsey, C.E., of Stratford, was recently married to Miss Rose Sharp, of that city.

Mr. Edward C. Linden, a well-known contractor of Hamilton, Ont., died at the hospital in that city last month. Deceased was 39 years of age.

Mrs. C. H. Wheeler, wife of the well-known architect of Winnipeg, died in that city on the 18th of October. Mr. Wheeler has the sympathy of many friends in his bereavement.

Mr. George Clapperton, superintendent of the Bennett & Wright Co., Toronto, was presented by the employees with a beautiful tea service, on the occasion of his recent marriage.

The friends of Mr. Alan Macdougall, C. E., will be pleased to learn that his health has been greatly benefitted by his recent stay in Great Britain. He expects to return to Toronto at the first of the new year. Mr. Macdougall was appointed to assist in making arrangements in Europe for the visit to Toronto next year of the British Association for the Advancement of Science.

Mr. Thomas Fuller, Chief Architect of the Public Works Department, Ottawa, was recently presented by the Governor-General with a souvenir, in the shape of a solid silver snuff box, the lid of which is a very finely executed bas relief of Christ blessing little children. The engraving on the lid is as follows: To Thomas Fuller, Esq., from H. E. the Earl of Aberdeen, as a small token of appreciation.

Sergt. Harp, who was one of the crack shots of this year's Wimbledon team, is a well-known Toronto contractor, having been in business in that city for ten years past. He has lately returned from Great Britain, where he won upwards of $500 in prizes, and has determined to try his fortune in British Columbia, for which province he took his departure a fortnight ago. Sergt. Harp established for himself in Toronto an excellent reputation as a contractor, and will no doubt succeed in his new field of effort.

The news of the sad death of Mr. John Day, architect, of Guelph, Ont., which occurred on the 5th inst., was learned with much regret. It is supposed that he met death by his own hands. For some years he had been suffering severely from the effects of a fall he sustained while superintending the erection of the Commercial Hotel at Guelph, and at times was quite morose. Mr. Day was the youngest son of the late Wm. Day, builder, and had a thorough knowledge of his profession.

BY THE WAY.

A TORONTO hardware firm have had in stock for several years a pair of door hinges of decorative design, which, on account of their unusual size, they found themselves unable to dispose of. A month or two ago these hinges came under the notice of an architect who had a house in course of erection in a fashionable quarter, and who saw possibilities in effect which might be achieved by their use. The hardware merchant was glad to get rid of the unsaleable articles at less than half the price he had originally put upon them. The architect designed a perfectly plain oak-veneered door, with a small opening filled with fancy glass in the upper part, and placed the hinges upon it. The effect is said to be decidedly unique as well as pleasing. By-the-bye, the builder was obliged to send this door to a piano factory to be veneered, owing to the unusual extent of surface.

× × × ×

"YOUR remarks, recently, anent the injury likely to result to the reputation of the furnace manufacturer who permits work of installation to be imperfectly carried out, were undoubtedly correct," said a manufacturer in this line to me the other day. "The speculative builder used to come to us and specify a furnace far too small for the requirements, with piping and other adjuncts in proportion his object being to sell the house as soon as possible. Formerly we were accustomed to sell what was asked for, believing that as we were to have no part in the putting in of the system, no responsibility could attach to us for its proper working. Latterly we have come to view the matter differently. When we came to consider that the occupant of a house which is thus inadequately equipped for heating, notes only the fact that the furnace bears the name of a certain manufacturer, and attributes all his discomfort to a defective heater, we were not long in concluding that our good name was in danger. Now, when a builder comes to purchase a furnace from us, we insist upon knowing all about the house in which it is to be placed, and we will refuse to sell a No. 4 furnace to do the work of a No. 7o."

ILLUSTRATIONS.

NORMAL SCHOOL, HAMILTON, ONT. WILLIAM AND WALTER STEWART, ARCHITECTS.

DIOCESAN THEOLOGICAL COLLEGE, MONTREAL, QUE.—A. T. TAYLOR, F.R.I.B.A., ARCHITECT.

HOUSE, LAVAL AVENUE, MONTREAL, FOR MRS. JOSEPH LEVY.—VIEW OF HALL IN SAME.—J. & H. C. NELSON, ARCHITECTS.

The material is red and buff sandstone and pressed brick, with red tiles on front gable and upper storey of tower. The interior finish will be chiefly of whitewood. Owing to the nature of the soil the footings of all walls are composed of concrete and light steel girders.

NOTE. In the description accompanying the illustrations of proposed bridge across the St. Lawrence river at Montreal, which recently appeared in these pages, mention should have been made of the name of Mr. Walter Shanley, consulting engineer for the Montreal Bridge Co. and referee for the award of prizes—also Mr. C. N. Armstrong, managing director of the company.

TRUE FACTOR OF SAFETY.

THE employment of the so-called factors of safety implies corresponding degrees of inexactness of our knowledge of the precise static or dynamic value of the resistances of structural materials, details and workmanship. The degree and kind of this inexactness varies, says the Contract Journal, according to the nature and purpose of the structure in question to which the factor is applied. The factor for a live or dynamic load is usually assumed to be double that for a dead or static load. When the load consists partly of static and partly of dynamic effect, the live load may be converted into the assumed equivalent dead load, and added to the dead load portion of the estimate. The factor of safety has generally reference to a fraction of the ultimate breaking or destructive strength of the materials. This gives rise to a large numerical factor. Hence there has been a tendency by the inexperienced to curtail the fractional value of the factor of safety to a rather hazardous extent. This is especially so when applied to materials and workmanship, as well as design, which are of an inferior character. The destructive strength of materials is often a very valuable ratio (say two or three times) of the crippling strength, and is still larger in excess of the elastic limit of the materials. The elastic limit, however, has likewise a somewhat variable and uncertain value with different testers, and the precision of different testing machines is not alike in degree or manner of registering the limiting point. But neither series of values, of the destructive or crippling strengths, or the elastic limit, has any constant relation the one to the other alike in all materials nor in all samples of the same materials. In good present practice the elastic limit is assumed as the basis of the factor of safety, because it is the nearest approach to the serviceable strength of all structural materials for all practical purposes, and involves the minimum of uncertainty. The factor is therefore correspondingly reduced to a half or a third of the elastic limit, according to the complexity of parts. The adaptability of the design and details, and of the character of the workmanship and materials in the several parts and positions, to the purposes of the structure must be considered. Permanence under exposure to weather or injury from other causes, or from variable or accidental loading, etc., must likewise be kept before the mind.

MORTAR OF BRICK DUST.

IT will not be without interest, says the Moniteur de la Ceramique, in a recent issue, to make a note of the application of brick dust for the making of mortar. Why not, indeed, use this substance, if it is good, and even economical in certain cases, as a substitute for cement? Experiments have been made with a mixture of this substance with quicklime, and blocks made of such composition, thirteen millimetres thick, after having remained submerged in water for four months, have sustained, it appears, without cracking or breaking, a weight of 10,500 kilograms per square decimetre. One part in ten of the brick dust was sufficient to give ordinary mortars a remarkable cohesive power. This composition was serviceable for the construction of drains, reservoirs, cisterns, the tops of terraces, etc. The best proportion is one part of brick dust, one of lime, and two of sand, the whole mixed dry and wet with the water necessary.

"ARCHITECTURE IN THE UNIVERSITY."

UNDER the above title Prof. Capper, occupant of the recently established chair of Architecture, delivered on the 5th inst., the annual University Lecture to the students of McGill University, Montreal, as follows:

Architecture is a subject which, in the older universities of Europe, as distinguished from mere technical schools, has hitherto received but scanty recognition. At Oxford and Cambridge it has been represented but fitfully. The name of Prof. Willis, of Cambridge, will recur to many; at Oxford also that of the Slade Professor of Art, John Ruskin. Both must ever be mentioned with honor. But the recognition of the subject has been solely on its theoretic and historical sides, that is, from the æsthetic and archæological standpoints. In no Scottish University is there a Chair of Architecture proper, though Edinburgh possesses a Professor of Fine Art, and Glasgow, by a curious antithesis, is endowed with a Chair of Naval Architecture. The more modern teaching bodies in England, King's College and University College, London, and in Liverpool—quite recently added to the list—the University College of the Victoria University, have ah Chairs of Architecture, both Theoretical and Practical. In France there are many local technical schools, and in the Ecole des Beaux Arts in Paris we have a great central school devoted to Architecture and its sister arts—rather would I venture to say its handmaid arts of Sculpture and Painting. But it is a so-called special school; it forms no part of the famous University of Paris; nor, so far as I know, is Architecture a university subject in Germany, Austria, Italy or Spain. In all these countries there are great technical and special schools, more or less on the model of Paris.

On this side of the Atlantic, on the other hand, in the United States, not only are there great technical schools, such as Massachusetts College of Technology at Boston, but we have a very frank University recognition of Architecture at Cornell, at Harvard also, at the University of Pennsylvania, and, above all, at Columbia College, New York.

In Canada we have at Toronto, forming part of the University, the School of Practical Science, in which Architecture is included.

To the list of those that embrace Architecture in their curricula, McGill University must now be added. The Chair has here been attached to the Faculty of Applied Science, which hitherto, with the exception of Practical Chemistry, has been wholly devoted to Engineering in its various branches. That there are peculiar advantages in this arrangement, I shall, I trust, have little difficulty in showing. I congratulate myself that Architecture is thus closely combined with Engineering, for, after all, of course engineering is for the most part but very specialized architecture, though, too often, it may be maintained, its somewhat unnatural offspring. And I venture too, by way of suggestion, to congratulate my engineering colleagues themselves, for, on the Scriptural principle that "a little leaven leaveneth the whole lump," I cannot but hope that ere long through them the salutary influence of Architecture may be felt, and may insensibly raise those engineering ideals, which, at present, with all their boasted scientific advance, have succeeded—can any one deny it?—in afflicting the world with some of the most gigantic monuments of ugliness that as yet man has ever achieved. (Laughter and applause.)

The peculiar dangers against which Faculties of Applied Science have to contend and as such I unhesitatingly class the great Faculties of Medicine, of Law, and even of Theology itself—are that the true University standard of education for the whole man be lost sight of in the eager struggle and restless activity which characterize our modern conditions of society. In the struggle—I had almost said the scuffle—of existence, the student is naturally eager to equip himself with the utmost despatch for his work in life, that is, to shorten his probation, if by any means he may start the sooner in life's race. He is apt to view with impatience all subjects that lie outside his immediate path, and to devote himself exclusively to those by mastering which he may the more quickly gain his own livelihood and feel that he is advancing apace. Such "Brodstudien," as the Germans call them, the studies whose object is the mastery of the craft by which the student is to live, are specially technical, and form the basis of the technical schools, most admirable institutions, doing admirable work for the land, but still not universities. To grasp the distinction between the technical school and the university is of importance. Speaking generally, the essential difference between the two consists, it seems to me, in this: the technical school is equipped exclusively for and aims solely at imparting the knowledge that is requisite for a man's stock-in-trade, so to speak, as a handicraftsman in the labor of life. It does not seek to do more than fit the student for conducting on approved lines and with success the business of life—whether commercial, or manufacturing, or professional. But the university aims at a higher standard of equipment and of life. Its ideal is more than a livelihood made, however successful. Its ideal is the man, quickened and developed in all the resources of his intellectual and moral being, with the avenues of knowledge opened out to him and harmoniously correlated, even though it is possible for the individual to take but one or other of these avenues for his own special walk in life. A University, if subdivided into Faculties, is yet more than any Faculty or group of Faculties; it is more than all the Faculties combined, for it is the co-ordination of them all into one harmonious whole, evenly balanced and justly interwoven to make up the great, the inexhaustible, sum of human knowledge and human activity, both intellectual and moral. It is said that universities are unpractical; that they do not fit a man for the practical business of life. It seems to me, on the contrary, that the university of to-day, properly equipped and working with modern methods on many lines, enriched by the inclusion in its curricula of all those subjects which modern life embraces and demands, is the only practical training ground for life in its fullest and noblest sense. To be educated is not to be unpractical, and with the vast increase of knowledge in almost innumerable branches that has crowded the intellectual life of modern times with rich stores undreamt of in bygone days, education is but piecemeal and stunted and one-sided that does not in the fullest measure seek to develop harmoniously the man in his entire life and being, that does not strive to widen the horizon of his knowledge, of his intelligence and of his sympathies, and that rests satisfied with an equipment, in itself it may be thorough, that is limited to the immediate needs of his own necessarily narrow calling. (Cheers).

Has Architecture then a right to a place in the university curriculum? Can it vindicate its claim to the higher recognition implied by its admission amongst the subjects of university teaching? Not only do I fearlessly claim for it that right, but I maintain that its inclusion in Applied Science is the surest way of maintaining unimpaired that true university standard of which I have spoken in the Faculty which is liable perhaps more than any other to be assimilated to the mere technical school. It is not the ideal of this Faculty—as has been scornfully or enviously suggested—to flood with the greatest possible number of the best drilled men the engineering profession in this country. The ideal of a Faculty of Applied Science in a great university is certainly to place at the disposal of those men whose bent is toward its particular subjects the highest training that modern science has to offer in those subjects, but at the same time to imbue them, as far as possible, with the broad catholicity of the university spirit, to widen their horizon with the university recognition of the unity of learning and the co-relationship of knowledge, in a word, to educate to the fullest the man, as well as to train the chemist, or the architect, or the engineer. (Applause.) And for such an ideal Architecture, I venture to affirm, with all deference to my colleagues, is of greater import than engineering. For what is Architecture? and what is its relationship to Engineering and the Arts? What, too, its relationship to the other Faculties? What has Architecture in common with the studies that constitute their curricula? Architecture is the science and art of building well. It is at once the most artistic of the sciences and the most scientific of the arts. It has been said—and no less a man than Mr. Ruskin has lent his great authority to the delusion—that the function of architecture is to ornament, that architecture is concerned with applying to a building ornament and features that in themselves are useless. No more monstrous fallacy was ever preached or swallowed wholesale by gullible humanity. Architecture is no such meretricious afterthought like the wooden Doric portico outside, which does duty for the Faculty of Arts. If it were so, the columns of the Parthenon would be hardly more respectable as art than the scalps with which the average Indian may have adorned his wigwam. Yet it is amazing how this inane idea has laid hold of men who should know better. It has met me already within the precincts of McGill (laughter); it has been held forth to me, in all seriousness, within the Applied Science building itself. (Renewed laughter).

Six thousand years ago—or more, it may be—on the edge of the desert, 150 feet above the Nile, there was raised the "most

enormous pile of building" ever reared by man. In it are combined "the finest masonry" and "the most accurate construction known." Many thousands of skilled workmen and an army of a hundred thousand unskilled laborers were employed, it is believed, in building it for twenty years. It is the sepulchral monument of a man whose name we know, but that is all. In all that colossal building, there is no shred of ornament, no vestige of enrichment of any sort; there is nothing "useless," unless it be the whole gigantic pile. For, indeed, it has tragically failed to insure, a poor inviolability to the body of its founder. Yet, that the Pyramid of Khufu is architecture on the most majestic scale, no one, I think, will deny. I, for one, will gladly add that it is also engineering, magnificent engineering, of which for scientific accuracy we moderns might be justly proud.

Architecture does not consist in mere ornament or decoration. Art is not to be measured by its uselessness, but by its use; nay its vital necessity for the adequate expression of human intelligence and activity; were it otherwise, I would most willingly concede that, in the midst of such essentially living subjects as Mechanical and Civil and Electrical and Mining Engineering, not to mention Hydraulics—all of the greatest importance in the life of our modern complex communities—Architecture would but survive as an excrescence, an effete tradition, a cumberer of the ground, with a past indeed, but hopeless of a future. Art is neither so shallow a thing, nor yet is it a mystery, a hidden secret revealed to the few and to be swallowed, like a prescription, by the many. Art for the most part is common sense. It is experience touched with poetry. (Applause.) To Michael Angelo, the great Florentine sculptor, painter, architect, engineer and poet of the 16th century, we owe the significant sentence, "I know but one art." And our modern distinction between fine arts (by which we mean mostly painting and sculpture) industrial arts and mechanical arts and applied arts is wholly a fictitious one, unsubstantial and based on nothing at all in nature or in life around us. The most artistically gifted nation there has been of the Aryan stock is the ancient Greek, whose heyday lasted but a few brief centuries. But the Greeks—like Michael Angelo—knew but one art, and that was good art—and they called it TECHNE, "skill." In the Middle Ages, too, as in the heyday of arts in Greece, this unreal discrimination between art that is fine art and art that is some other art, did not exist. "There was only one art, and that true art," whether expressed in color, as painting, in form, as sculpture, in the total of a noble building, or in the commonest objects of daily use.

I crave your indulgence for enlarging upon this topic, which some may think well-worn and even threadbare; but the extraordinary notions that prevail upon art, the mysterious way in which it is spoken of as something apart, like some religious cult, not to be judged of or understood by ordinary folk, show how misunderstood it is. Art in architecture, as in everything else, consists in that fitness and adaptation to a purpose, that appropriateness in function, in form and expression, which, I most sincerely believe, are not only inseparable from, but are the essence of, our appreciation of the beautiful.

Take a modern racing yacht and compare it with a craft of olden days—the latter is picturesque enough in hull, with poop and forecastle, in its bellying sails falling naturally into curves that please the eye. But is the modern yacht one whit less beautiful? To me it is infinitely more lovely, yet every line of hull is calculated for a purpose—speed—and every sail is stretched to suit mechanical laws. The beauty—and I know no more graceful outcome of modern scientific design—is due to fitness and absolute appropriateness; it is most truly art. Take many a modern engine—the same holds good. Can anything more perfectly express and emphasize its function and its purpose than a modern, well-designed machine? And just in proportion to this successful expression is it beautiful and truly a thing of art.

"The designing of machinery,"—to quote a recent authority—"whether for peace or war, has now reached such a high standard of excellence in function, form and expression that one is justified in saying that these things are entitled to rank as works of art as much as a painting, a piece of sculpture, or a building, and also that machinery is the only true constructive art that has been produced since the decline of mediæval architecture. . . . Do not misunderstand me by thinking that I want to raise steam-hammers and pumps to the level of a painting or a piece of sculpture. All that I maintain is that they are true works of constructive art, and ought to be recognized as such. Moreover, in conjunction with the best art of former days, they teach this important lesson, that man cannot, unless warped by bad education and false criticism, construct anything except in a natural, functional, and therefore artistic manner."

These sentences I have quoted are taken from a very admirable presidential address, delivered not by an engineer to engineers (as possibly you might suppose), but at an art congress in Edinburgh, by the most eminent of living Scottish architects. So, too, it is with architecture. Features that are mere excrescences cannot be really beautiful. A building that fulfills its purpose truthfully and well, that expresses faithfully its function in its form, will always be a satisfactory bit of architecture so far as outward design can go; while no amount of superficial ornament, however lavishly applied, can make a building really beautiful that fails in essential fitness to its purpose—that is inappropriate. Let me, however, not be misconstrued. Far be it from me to disparage ornament, when rightly used. It is against its false use, and, above all, against that total misconception that makes ornament all in all, exalting the accessory to be the essence, that I have been contending. Architecture may, as in the Pyramids, be majestic and sublime with never a trace of ornament; even ordinary building may depend solely for its effect on proportion and appropriateness, and be true art. But for the most part architecture craves for ampler expression, and in ornament, not applied from without but logically evolved from within, the outcome of the building in organic growth not added as an afterthought, we find the readiest and truest expression of the architect's design. The Parthenon is still an unrivalled monument of grace and dignity, though its sculptures for the most part are torn from it and scattered in museums. But it was when its true and noble architecture was completed with and wedded to its glorious ornament and sculpture, as one complete organic whole, that this most incomparable work of Grecian art was consummated. For Architecture does at least recognize that it should be beautiful. And herein, I venture to think, lies its superiority as a university subject to Engineering, in that it is more true to our wider human nature. Constructive engineering, as I judge of it, means, under present conditions, construction reduced to mathematics. It is building by calculation solely, with the result too often of a skeleton without the life. It is economy not only reduced to science but exalted for our worship; it is the apotheosis of utility. But man, in the long run, craves for what is permanently beautiful, while the modern engineer too often seems wilfully to make for what is ugly. Just as the German scientific writer of to-day apparently thinks that a lucid literary style is a pandering to what is popular, and therefore clothes his thought in those Teutonic periods so fearfully and wonderfully made—ingens, informe, cui lumen ademptum—so, too, the modern engineer seems to think that any attempt to make his structures beautiful is waste, a pandering to mere architectural effect, unworthy of scientific designing. Ultimately, I cannot but think, he will find that he is wrong; frail human nature, I believe, will rise in revolt against what is intolerably ugly; and I have too much faith in the engineering profession not to feel confidence that in the long run their great achievements will be brought to harmonize with this human need and will be beautiful without being one whit less scientific.

On the other hand Engineering scoffs at Architecture—and, I frankly admit, in many cases with much reason—for its faulty construction and its haphazard methods, not to speak of its frequent and most lamentable failures to be appropriate and beautiful. That Architecture ventures on criticizing Engineering I have possibly shown; that it fails to justify itself too often, that it is not beautiful, I must sorrowfully admit. Only in the due co-operation of these two great branches of construction, only by loyally accepting each other and working in harmony together, can we, I believe, achieve in these later days the best results. And it is with no ordinary feelings of satisfaction and hope that I enter upon the work of the teaching of Architecture in McGill University, where in the Faculty of Applied Science to a greater extent than in any other university with which I am acquainted, these two departments are knit together, working side by side, so as to acknowledge and appreciate and supplement each other. (Applause).

But the scope of Architecture is wider yet. Not only must it be scientific to be genuine and therefore allied to, nay, much indebted to, the accuracy, the refinement in calculation and the certainty of engineering; not only must it be artistic to be true, and therefore at once the foundation of all the arts and essentially an all-embracing art, if the term is to have real meaning; but it is a many-sided study. Hydra-headed, the student is tempted to feel, when the examination-hall looms near—related to

life on many sides, and of a very special and intimate kinship with many—I might almost say with most—of the studies included in the university curricula.

Take, for example, Medicine and Law. In the former the great department of Hygiene is as much architectural as medical; and rightly to understand this branch of science, so important to us all, individually and as communities, some knowledge of scientific planning and building, of sanitation and of plumbing, should be as necessary to the Bachelor of Medicine as is, without doubt, essential to the architect some acquaintance with bacteriology and germ theories, with the spread and prevention of diseases. The two studies, apparently so far apart, have this much at least absolutely in common, and upon common ground like this, the unity of learning receives a very patent application.

So too in Law, where Professional Practice of the architect, Contracts and Arbitration, are the common ground, much as Medical Jurisprudence is common ground to Law and Medicine.

Even in Theology and Divinity again, it is obvious that we have common ground. It is not that I claim it necessary for an architect to be a theologian—heaven forbid; but who can look back upon the grandest triumphs of Christian architecture, those glorious cathedrals, in which are enshrined the piety and devotion and zeal and faith of the middle ages, without feeling that the men who planned and built those temples were in truest sympathy with the creed for which they built them. A little further back and the monk who worshipped in the Abbey church and the monk who built the Abbey church were brethren in the self-same cloister. And even in these modern days, when work is specialized, and students of architecture and theology have perforce their separate schools of study both, it may be, apt to be too technical—that architect, it seems to me, cannot be of the highest sort who in studying a church is wholly indifferent to the forms of creed and worship of which he seeks to understand the outward shrine. (Applause.)

In the Faculty of Arts—that faculty to which all of us who have had the immense advantage of attending its courses (whether in this university or elsewhere) must ever look back with deepest gratitude and most loyal affection—gratitude for its broad, true education in the fullest sense, for its humanizing influence on all our after lives, for its catholic, vitalizing inspiration that does not pass away—affection for its serene disinterested ideals, which we fain would cling to through storm and stress of after years, yet cannot always keep before us as we would—in the Faculty of Arts there is scarcely a subject, I am thankful to claim, with which Architecture has not close and abiding kinship.

To Philosophy we turn in relationship of pupils to our teacher. Where else can we get the principles of logic, of induction and deduction, that must be employed in criticism? Where else the foundation for those principles of æsthetic sense and art, which it is ours to embody in creating logical, harmonious design?

To Architecture, as to Engineering, Science is of vital import—the foundation upon which it works, from mathematics to geology, from botany and chemistry to physics. Where else can we get the principles of statics and dynamics, of thrust and equilibrium, arch and buttress? Where else can we learn to know the materials that we are using? For, not knowing them, how can we hope to use them aright? Where else can we learn the principles—the despair of architects—of sound and heat and light, to apply which in actual buildings as acoustics or as ventilation is so often, even to the best of us, a source of tribulation, discredit and disaster. (Laughter and applause.)

With Literature and Classics it is obvious that Architecture goes hand in hand. Our modern architecture is as steeped in classical form and classical tradition as is the language we speak and use from day to day. Does not the exquisite harmony and proportion of Greek architecture, even in its ruins, form the truest, the most vivid illustration of that Hellenic spirit, which still profoundly rules mankind? Is not the oratory of Demosthenes brought home to us by the rhythm of the Parthenon, the music of Æschylus and Sophocles and Plato, by the beauty of Doric Propylæa or Ionic Erechtheum? Does not the might of Rome, welding the civilized world for the first time in its history into one great empire, impressing a sense of unity like a revelation, on the world, so that after centuries, right down to our own, still clung to it and strove to realize it as of old—does Rome not find its expression as truly in its architecture as in its laws? that architecture, which still maintains its hold upon us, and which twelve or thirteen centuries ago was planted by the conquering legions triumphantly from East to West, from far Palmyra to Eboracum in Northern Britain. Roman building is indelibly stamped with the imprint of the Roman character and genius; from the Atlantic to the Euphrates, from Wroxeter in the west of England, or Lincoln in the east, to Nimes in France, or Merida in Spain, on the Tagus, the Tiber, or the Danube, in Asia as in Europe, her architecture, ruined and fragmentary, as it mostly is, still bears the most eloquent of testimony to the vigorous, pre-eminent, unifying power of Rome; it is the grandest illustration the Latin classics could desire. (Cheers.)

If there is one subject in the Faculty of Arts that seems to appeal to all with (varying, perhaps, but) never failing force, whose educative value (it seems to me) is inexhaustible, its human interest perennial, it is the study of history. My colleague, whose occupancy of the Chair of History at this university is a cause for rejoicing to us all, (applause) will not, at least, gainsay me, when I claim that there is not a more convincing commentary on the history of the past than the architecture which that past has bequeathed us. Architecture is the most obvious, the most obtrusive of the arts; it confronts us in our homes and in our streets; wherever we travel in countries which inherit the precious legacy of history, the great monuments of architecture are second only in interest and importance to the great landmarks of nature herself. They are noble records of the past in stone. Wherever man has dwelt and lived worthily, he has left, heaped up in noble piles, the history of his day, the memorial of the deeds he did.

Architecture is the great "object lesson" of history. Without its eloquence of storied stone, history would be shorn of its most poetic, its most impressive and oftentimes its only witness; it would sink to the dull prose of the half forgotten chronicler. It is, perhaps, through its buildings mainly that the past holds out in tangible form its living hand to the present. What other link have we at once so impressive and so human to bind us to our forefathers? to connect the life of to-day with the life of bygone centuries? to remind us that to-day, with its struggles and weariness, its whirl and strife, its success and its disappointment, is yet not all; that centuries and centuries have come and gone in which men have lived and striven and struggled too, have lost and won, and have handed on the torch to the next runners in life's handicap. (Applause.) Voltaire, I think it was, but the phrase has been so often quoted that by whom first said is half forgotten—Voltaire has said: "Happy the nation that has no history." Whoever it was that said it, he spoke a most preposterous folly. It is not even a half truth, in the sense that a nation's history must register a nation's crimes. A Hottentot has scarcely a yesterday or a to-morrow. That is to be without a history, but it is not to be destitute of crime; nor is it national happiness. And, need I remind you, the Hottentot has not evolved an architecture; he lives on in ignoble generations, till ultimately, inevitably, and perhaps properly, snuffed out. A nation that has no history is not a nation; and every nation that has the incomparable blessing of a history has something at least to show in the way of its national architecture. In a very special way architecture is concerned in the ennobling legacy of the past: only through the past can we builders learn thoroughly to grasp the present and work out strenuously the future of our craft.

With an illustration or two of History in Architecture, I have done. First, let us glance at Ancient Egypt—comparatively a morsel of a country, consisting of the oozy Nile bed, and corresponding very closely with Euclid's definition of a line—length without breadth. In this narrow strip of country, long drawn out, a people not so very numerous, have contrived to write their history in architecture in characters so magnificent for scale that for sixty centuries they have been unrivalled. Only from the overpowering architecture of their tombs do we know those mighty men of old, the builders of the Pyramids. Yet their names are imperishably preserved for us in the majesty of their violated limestone shrouds. They are happy in that their architecture has kept for us their history; a history that remains forever fresh, from the ineffaceable impressiveness and grandeur of their works.

Or take, some five and twenty centuries later, their distant successors, the Kings of Thebes. Can the memory of Rameses ever pass away so long as his ruined halls at Kanak and Luxor—those mightiest of temples—remain to tell their wondrous tale? Year by year that wondrous country of the Nile yields up to modern research that wearies not the secret of its centuries so long by-gone; will the fascination of Egypt ever grow dim? Will the romance of its history grow stale and unprofitable to us moderns? I cannot think it. But where would that history be if it was not for those incomparable monuments in which it is enshrined? Perhaps nowhere else on the face of the earth are the history of a people and its architecture so absolutely synonymous.

Let us turn to early mediæval Europe, those countries of savage

hordes slowly rising into civilization amidst the ruins of Rome's vanished might. The history of the tenth, the eleventh, the twelth and the thirteenth centuries is written for us in the monkish chronicles—which are dull reading in all conscience. But infinitely more impressive and more vivid is the history written for us by those self-same monks in stone and lime, history which it is a fascination to spell out among the crumbling ruins of their buildings, so lovely in their decay. The chronicles in great part are occupied in dwelling for edification upon the rather foolish miracles in which the patron saints indulged; it seems pitiful, and childish and infinitely wearisome to us now. But the ruined church and cloister show us what they did, these monks, who were neither fools nor children when it came to action, in the centuries when they had work to do and did it. William the Conqueror in England, to establish his throne securely, harried with incredible cruelty and fury perhaps the fairest province in his dominions. From the awful severity of that blow, so swift and pitiless and thorough, Yorkshire and the north lay prostrate, too drenched in blood and ruined to recover life. Who and what saved that desolated land and made it once more populous with thriving industry and fertile? Who drained the marshes, cleared the forests, reclaimed the land and turned the desert into gardens? The history of that great social revolution is written for us in the decaying walls of those Cistercian abbeys, once so fair, and still so fair, though well nigh swept away by the hand of time and the much more ruthless hand of man, which dot the vales of Yorkshire in numbers that surprise the modern tourist. There is no fairer page of peaceful history than this conquest for civilization by the monks of a whole district, and nowhere can that page be read in fairer lettering than in the ruins of the noble piles they raised while their strenuousness was still upon them.

In the 13th century France awoke from the despondency and blight of the English sovereignty, and under Philip Augustus and St. Louis found herself a nation, with her cities rich and flourishing. The history of that time, fraught with such consequence for Europe, is to be found in and illustrated by the civic charters and incorporations, but as reading it is dry as dust. These musty records cannot appeal to us or bring home to us in even the meagrest way that stirring time as do those glorious cathedrals which the cities raised in generous rivalry and with such amazing zeal, those gothic buildings without equal, unapproachable, which make the North of France to this day perhaps the richest field of architectural study in the world.

If there is one spot in England endeared and sacred to all English speaking folk, one spot in which the whole history of the Anglo-Saxon race seems summed up and vivified, reaching to our very hearts and throbbing to the very fibres of our being, is it not within that hallowed building, perhaps the most beautiful church of Christendom, which Henry the Third and his successors raised to replace the older church of the last Saxon King of England, built amid the marshes of the Thames, the Benedictine Abbey Church of Westminster? For well nigh eight centuries and a half—if not for longer the people and the sovereigns of England have worked together to make that noble church a shrine for the nation's history. I confess the great past is borne in upon me each time I linger about that nave and aisle and cloister, so wondrous in their beauty, with an almost overpowering presence. Happy—thrice happy—is the nation that has a history, and a history enshrined in such a building.

I have tried—however imperfectly—to show something of what architecture ought to aim at, something of its ideals and of the bearings of the subject in a university such as this. If it be vouchsafed to me, even in but humble measure, to impart something of the inspiration of these ideals to those whom it is my privilege to call my students, I shall assuredly feel that in dedicating such powers as I possess to McGill University, I shall not wholly be laboring in vain. (Great cheering.).

On the motion of Sir William Dawson, seconded by Prof. Bovey, a hearty vote of thanks was accorded the lecturer for his able effort.

There are few businesses that permit of greater waste in small matters, relating both to time and material, than in repairing work. A contract is often taken that, if executed in a business-like manner, would yield fair profit, but that, when actually carried out, brings almost a loss because of pure carelessness. Some workmen seem specially adapted to doing repairing work and will get over the ground in half the time of another man. Success is often brought about by carefully selecting men who show ability in some particular direction.

MARBLE IN NOVA SCOTIA.

Under this heading Mr. Geo. C. Underhill writes to our Chicago contemporary, Stone, as follows: Some thirty years ago a company was organized in Halifax to develop a marble property at Marble Mountain, Cape Breton. A better outcropping or more favorable environments could hardly be asked for. At a point on Bras D'or Lake (salt water and connected with the Atlantic Ocean) about fifteen miles from West Bay, this marble stratum crops out literally on the lake shore and is exposed several hundred feet in width, and following its course back at a right angle from the water's edge we find it for a long distance coursing vertically through a table-land perhaps two hundred feet above the water. This mesa breaks off gradually to the lake shore, making it possible to lower the marble by its own weight down to the vessels for water transportation to every coast, city and town on the Atlantic seaboard and to Europe; moreover, every large market in Canada is accessible by water direct. This marble is in good variety, white, variegated, blue, etc., and the best grades are fine, firm, and in every way desirable, while the coarser layers are A1 for building material. As might be expected, the prominently exposed points are crackled and broken, but largely by influences that obtain at the surface only, as of expansion and contraction. In a word, we have here an endless quantity, good variety and quality, cheap transportation, cheap fuel (coal at less than $2 per ton), cheap labor, and so far as Canada is concerned, a protected market; in fact, doubly so, by reason of a high import tariff and absolutely no home competition, there being no marble produced in the Dominion. I repeat, there was a company formed many years ago to work this property, and with a cash capital that should have made it prosper; but it did not. Why? Simply because the manager set out, through the means of several expensive tunnels, to reach the sound material that was not apparent at the surface, evidently not knowing why it blistered at the exposures, hence not realizing its limited extent. Just how he purposed to proceed after finding sound rock, or how perfect stone was to be reached by blasting the material into fragments in advance, is not plain. Anyhow, he not only blasted the marble but the "great expectations" of his friends as well.

Then came a long sleep for the embryo marble enterprise until in the early spring of 1894, when Mr. Geo. Hattie, a fine old Scotch gentleman, and one of the original owners, succeeded with other Halifaxians in making a second start. Again they move off with ample means and with some of the strongest men in Nova Scotia interested, among them several bank men, Prof. Fraser, who is one of the ablest men the writer has ever met, and several of the best business men of Halifax, including Roderick McDonald, the company's first president. This party has started right, beginning at the mesa's crest with channeling machines and derricks. They have gone down to measurably sound stock, and now have a mill in operation, the whole plant being under the care of Mr. D. Maclachlin, who, by the way, was one of the energetic men who aided Mr. Hattie in securing capital with which to strike the rocks of Marble Mountain once more. What the future has in store for my good friends in Nova Scotia I do not know, but this much is true they ought to win, and while there is change in everything, I believe they will prosper, for they have the wind and the waves in their favor.

CUTTING STONE WITH WIRE ROPE.

Those who have indulged in deep sea fishing know how the fish line cuts deeply into the hard wood of the gunwale as it is hauled in while taut. Even an iron protection, after a time, shows the wear of the rope, which is comparatively soft. This, says an exchange, gives the clue to an invention of an Albany quarryman for cutting stone. Instead, however, of hemp, he proposes to use wire rope, and with this he will carve the marble and stone right out of its native bed. The wire is wound in strands and has a very rough surface, powerful machinery gives a strong and steady strain, and the stone, yielding to the constant wear, parts, with smooth edges. It would be easy enough to cut the blocks after they are removed from the quarry, but where the cleverness of the inventor comes in is in devising mechanism that can be applied to the stone while in the quarry. This is effected by sinking two parallel channels in the quarry to a depth of little greater than that of the lowest level of the stone to be cut. The channels may be from 20 to 100 feet, or more, apart. At the bottom of each is made a small hole to receive the foot ends of the shatts of the machine. This is the only preparation of the quarry that is necessary. The ropes, which are coiled on huge drums, are then passed around the channels, and as the drums revolve the cutting proceeds. Suitable brakes are provided for the regulation of the speed and pressure. The ordinary speed of the strand is 800 feet a minute, so that a mile length of it passes in six minutes. While the strand is moving, crushed stone or chilled shot and water can be introduced to increase the attrition. Far better, however, than either of these is a composition obtained from the tailings of a magnetic iron separator, which costs about one-tenth as much as the chilled shot. It does not leave the lines caused by the shot, and it can be used over and over again.

ITALIAN BRICKWORK.

The late Mr. Street, a great authority upon Italian brickwork, points out in his work on "Brick and Marble Architecture" to what a great extent red brick is used with stone. Italian bricks are rather larger than ours, but not of better quality; the joints are wide, generally not less than half-an-inch. The bricks used for windows, doorways, and other ornamental features, are of finer quality and moulding.

Those who know Italian examples of brick arches and tracery are aware that the cusping of arches is of brick, set in the same radiating lines as an arch, and cut and rubbed to the outline required. He says, "In nearly all cases where brick is used for tracery, it is in the shape of plate tracery. The tympanum of the arch is filled in with a mass of brickwork, through which are pierced the arches over the several lights of the window, and these are supported on marble or stone shafts, with carved capitals instead of monials; and above these sometimes, as in the windows at St. Andrea, Mantua, are three cusped circles, sometimes only one; or else, as in the cathedral at Cremona, the plain black tympanum is relieved by the introduction of a panel of terra cotta bearing the cross on a shield, whilst round its outer circumference delicately treated, though large cusping, defines the outline of the arch." Outside the arch sometimes a red brick label 2½ inches wide is introduced. In Mantua and Asti these narrow bricks are set between rings of brick and stone youssoirs.

EARLY ENGLISH BRICKWORK.

The Eastern Counties are remarkable for some excellent specimens of early English brickwork. Little Wenham Hall, Suffolk, built in the latter part of the 13th century, shows different sizes of bricks; these are mixed with stone and flint in parts. The bricks are of Flemish shape, though some resemble Roman bricks or tiles, and the color varies. In many examples of English brickwork flint is introduced in the form of panels, and this kind of walling is known as "flush work." Nearly every important church is of this mixture of brick, or of stone and flint. Layer Marney Hall, Essex, is a noted example of brickwork. The great gate-house of three storeys, flanked by octagonal turrets, with battlements and parapets, and window mullions, exhibit an advanced stage of brickmaking and workmanship. Respecting the size of English bricks, those of Little Wenham Hall measure 9¾ inches in length by 4¾ inches wide, and 2¼ inches thick. Those made in Edward II.'s time measure 10 and 12 inches long by 5 and 6 inches wide. The "great brick" of 1734 measured 12 inches long, 6 inches wide and 3 inches thick. Portions of Hampton Court Palace show some beautiful examples of English brickwork, although a process of washing which was recently undertaken does not increase the charm of the building.

INCREASING THE RESISTANCE TO FIRE OF WROUGHT IRON PILLARS.

The following are the general conclusions arrived at by a commission appointed by the Hamburg Senate to examine and report upon the resistance to fire offered by wrought iron pillars used in construction: They withstand fire very imperfectly, their stability being quite destroyed at a temperature of about 600° Cent., and the advantage of filling them with concrete is so slight as to be scarcely worthy of consideration. The case is, however, far different with outer coatings of refractory or non-conducting materials, which have proved capable of protecting the metal from a dangerously high temperature during a certain space of time, and, consequently, of affording effective protection against fire. The substances which appear to have exerted the best effect are the cork composition of Herren T. Ganzweig and Hartmann, and xylotile encased in sheet iron, which substances give out inflammable gases for two hours and a half, leaving a carbonaceous residue that is not destroyed by the steam from the fire hose. A pillar thus coated only gives way after being exposed to the fire for four hours, while seventeen minutes suffice to destroy it if uncoated when similarly heated. Next to the above named substances comes the Monier concrete, laid on in a coat of 40 mm. (1½ inch) thickness, which preserves iron for nearly two years and a half, while plaster of Paris and asbestos cement only give poor results.—Journal of the Society of Arts.

Papyrolith Floors. According to Cosmos, floors are now being put down at Chemnitz, Saxony, which are non-conductive of heat, have no joints, and do not resound under the foot. They are made of a mass of paper reduced to powder, which, when melted with water, becomes a paste like plaster of Paris, and may take the place of artificial stone, cement concrete or parquetry, being all in one piece and polished.

V.8-9
Canadian
archi

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

A Few Handy Rules.

In estimating material for a building, it often happens that no convenient means are at hand, whereby the length of rafters may be found without going through the clumsy rules of square root. In the first place, a thorough understanding of what is meant by "pitch" is necessary. The word, as used by builders, means the height of the roof above the wall plates; thus, a building 24 feet wide, having its roof ridge raised 6 feet above the wall plates, is said to be quarter pitch; if the ridge is 12 feet above the level of the wall plates, then it is said to be half pitch, etc., etc. By the accompanying rule we can get the lengths of the rafters for any of the pitches herewith named, for estimating purposes, by simply multiplying the width of the building by the corresponding decimals for the difference in pitch, which gives the length of the rafters in feet, and a decimal of a foot; multiplying this decimal by 12, we have the inches. This method, of course, is only intended to be used in figuring up the quantity of materials required; it does not give angles or cuts; these, along with the exact lengths, are better found by using the steel square, in a manner that we will describe in a subsequent issue:

RULE.

For	¼	pitch, multiply width of building by			.56
"	⅓	"	"	"	.6
"	5-12	"	"	"	.65
"	½	"	"	"	.71
"	⅝	"	"	"	.8
"	¾	"	"	"	.9

As an example, let us suppose a building 26 ft. wide, the roof to be one-half pitch, as per rule. We proceed as follows:

Width of building, 26 feet.
Multiple for half pitch, as per rule, .71

26
182

Total, 18.46
If we multiply the decimal by 12

we get 92
46

We have in inches, 5.52

or a total length of rafter of 18 feet 5.52 inches, or for estimating purposes, 18 feet 6 inches. Now this is an odd length, and would be difficult to find in any lumber yard in Canada or the United States, and to take the next regular commercial length of 20 feet, would mean a great waste of material, unless the length would be called for as lookouts over the eave, but, if 18 feet 6 inches should represent the exact length, the estimator would be justified in lowering the roof a trifle so that stuff 18 feet long would answer the purpose, and we are sure no reasonable architect would object, unless there were greater reasons than usual for the ridge standing that particular height.

Cisterns.

There is no more useful convenience to a village or country house than a good cistern, and the carpenter or bricklayer is frequently called upon to devise or construct one of these important affairs. It matters not whether a cistern is formed by simply digging a hole in the ground, without further backing, or is lined up with stones or bricks, it should be plastered with good cement, and the bricks and stones should also be laid in cement, as it makes much better work. If the ground is of a kind that will admit of plastering on, a good coat of cement may be all that is required to make it water-tight. Sand and gravel thus cemented stand fairly well, but it is better when a trifling extra expense is no object, to have the bottom and sides of the cistern lined up with either stones or good hard bricks. Clinkers are the best for cistern building, as they do not soften and crumble on the outside. Stone does very well for lining, but being heavier than bricks and irregular in size, it does not generally break joints very well, and is apt to settle and crack the cement; and being rough and uneven on the face, requires more cement to cover it, than would the same surface if made of bricks. When the latter can be obtained at from $7 to $8 per thousand, of the proper hardness, it is more economical to use them than to make use of the cheapest kind of stone-work. Usually the lining of cisterns with bricks is done by making them all "stretchers," which makes the wall four inches thick only. We think a much better job is secured by using "headers" for every fifth course; it makes the wall so much stronger and better. The bottom should be laid with bricks on edge, and should be "pot-bottomed," or lower in the centre than at the circumference. The mortar used for plastering should be formed of one part of cement and two of sand, if the cement is extra quality of the Owen Sound brand, or one of cement and one of sand if of inferior grade. Good sharp sand should be used in any case. Two coats are generally applied, and sometimes three, waiting for each coat to partially set before applying the next. The last coat should be brushed down with a wet brush while it is green, which materially assists in hardening the cement. Every cistern should be provided with an overflow water pipe, leading to some point where the surplus water may get away without inconveniencing anything. This pipe may be fixed near the top of the cistern on a level

where the water will rise to when the cistern is sufficiently full. It is also desirable to have a filter attached, in order that the water may be used for culinary purposes if desired. Filters may be attached in different ways: They are sometimes fixed at the top where the the water is let in, and sometimes they consist of partition walls, which divide the cisterns in two compartments, the water being let into one compartment and taken out of the other, holes being left at the bottom for the water to pass through the partition. Gravel, sand and charcoal, or marble chippings and charcoal, are employed to form the filter. These are filled in in layers, to a height above the holes in the partition on the side in which the water is admitted. The partition should be plastered just the same as the walls of the cistern. Sometimes a single brick partition is left between the two compartments without cement on either side, and without holes at the bottom, but the joints must be laid in cement. The water is then left to percolate through the bricks as best it may. For a time this makes a splendid filter, but after a while the pores get filled up and as a filter it becomes comparatively useless. Another filter may be made by forming a small arched mound of brickwork about a foot high on the bottom of the cistern at the lowest part. The pump-pipe is cemented into the top of the hollow mound, and small holes are left around the bottom for the water to pass through. A circular brick wall is built around the mound, about three or four inches from it and about three or four courses high, and the space between the circular wall and the mound is filled with the filtering materials, which are put in in layers. The first and last layers should be clean gravel, marble chips or spalls of other stones. The second layer of charcoal should be powdered and packed in solid. The whole of the cistern should be plastered before the filtering materials are put in place. When repairing a cistern when the cement is cracked, the cement should be cut away two or three inches from the defect, and the wall should be well wetted before the new cement is applied. The usual form of cisterns is cylindrical, and we annex a table giving contents of cisterns having that form, and of various dimensions. Cisterns having arched tops or scooped bottoms, one-third of the height of such arch or scoop should be added. The table is nearly correct and is easily understood, and will prove useful in preparing estimates for cisterns. For every foot in depth a cistern will contain:

If 3	feet in diameter	.....	55¼	gallons.
" 3½	"	"	75	"
" 4	"	"	98	"
" 4½	"	"	124¼	"
" 5	"	"	153¼	"
" 5½	"	"	185½	"
" 6	"	"	220¾	"
" 7	"	"	300½	"
" 8	"	"	392½	"
" 9	"	"	497	"
" 10	"	"	613½	"

One gallon is required by law to contain eight pounds of pure water. To get nearly the exact contents of a cistern from the foregoing table, multiply the figure opposite the diameter by the depth in feet, and you have the number of gallons the cistern will hold, nearly. For example, take a cistern four feet diameter and six feet deep, then we have: $4 \times 98 = 392$ gallons; that is, a cistern four feet in diameter and six feet deep, will hold 392 gallons, nearly.

Warm Floors.

One of the reasons why floors in frame buildings are cold, is because, when joists are placed in position, the spaces between them at the walls are left without anything to prevent cold from the outer skin of the wall from getting at will between the ceiling and the floors. In all cases, the spaces between the joists or the walls should be lathed, and a strong coat of well haired mortar applied before the ceilings are lathed. This precaution would make a house 15 or 20 per cent. warmer than where it is neglected. In lower floors this method of dealing with the spaces, or some similar one, should never be overlooked or cold feet will be the rule with those who are obliged to remain over them for any length of time in the winter. A good way to avoid cold in a lower floor if the joists rest on a stone foundation, is to "brick-fill" between joists to a level with the floors, making the "brick-filling" not less than four inches thick, having the bricks laid in good mortar and well "flushed" up to the joists and made level with the top of the timbers. In brick or stone buildings, "brick-filling" is generally done on the lower floor, but often in the upper stories where the walls are left thinner by set-backs, the joists rest on the steps formed by the set-back, and in many cases nothing is done to the wall between the joists, and the ceiling and floors are finished with nothing to prevent the cold penetrating through the thin walls to the spaces between the lath and the floor. Sometimes a careful workman will see that the brick walls between the joists are rendered with a heavy coat of mortar, which is very good in its way, and would be better if the furring ran down to the ledge or step, and the space lathed and plastered, but this is perhaps objectionable because of its forming places where mice or other vermin would find resting places. The better way is to brick-fill, leaving a hollow space between the wall and the filling, and rendering the filling on the room-side. If the projection of brickwork receiving the joists is not more than four inches, the brick-filling may overhang the walls an inch or so on the inside, so as to give a one-inch hollow space between the wall and the filling. As this projection would be between the joists it would be hidden from sight.

Steam Heating.

Of late years there have been introduced into Canadian homes a variety of heaters, including hot air, hot water, combinations of hot air and hot water, and steam heating pure and simple. In fact, there is scarcely a village, hamlet, or "corner" in the whole country that cannot boast of a "heater" of some kind, and each kind has got its own friends and admirers, all of which is right, for when a man is satisfied with anything he possesses, we take it that it would be almost sinful to unseat his satisfaction. In speaking of heaters, we do not mean stoves, nor yet fireplaces, but of some central arrangement from which heat may be projected to rooms some distance from the one containing the apparatus in which the heat is generated. Of such is the steam heater, and while this may not be the best for ordinary dwelling houses, it has become so well understood, and during the past few years has made such a rapid advance in public favor, that it seems almost unnecessary to describe its superiority over other modes of heating for large buildings, such as stores, hotels, or other buildings of more than ordinary dimensions. While it has not

V.8-9
Canadian
Archi

yet been decided beyond a peradventure what mode of heating is the most economical, it has become a fixed fact in the minds of many who have investigated the various methods, that steam heating, if the appliances are modern and fitted up with modern attachments, is by far the easiest to handle, and the desired results are more direct and rapid than the like results of any other method. Notwithstanding the fact that heating by steam is the proper thing to introduce into large buildings, we do not approve of it for use in private dwellings or cottages, unless, of course, the buildings are large and contain a great many rooms and halls. For the smaller buildings a hot water system is by far the best, and country builders, when asked by their employers as they often are what system of heating is best to adopt for warming the building they are about to erect, should advise accordingly. If the building is of moderate size and does not contain more than 16 or 20 rooms, including halls, advise hot water. If there are more than twenty and the rooms are large, then advise steam by all means. Of course, there will be other things to consider. A hot water furnace must have a place under the main floor in order that the cooled water may return to the boiler by gravitation; so also must a steam heater, for it must be remembered that the water level in the boiler must be below the lowest point of the lowest radiator. As a rule, it costs a little more to put in a hot water system than to put in steam, but when once in, and in good working order, and properly protected, it is the best device in existence for warming Canadian homes of moderate dimensions. In small houses, where the expense of a hot water system would be too great, a hot air or combination furnace will be found to be a great improvement over stoves.

PRODUCTION OF BUILDING MATERIALS.

THE fifth annual report of Mr. Archibald Blue, Director of the Ontario Bureau of Mines, which covers the year 1895, furnishes some interesting, although not altogether encouraging statistics relative to the production of building materials within the last five years. The depression in building according to the statistics, seems not to have affected the production of materials until last year, when in nearly every line there was a marked decrease in the quantity manufactured. This is accounted for, no doubt, by the fact that much of the products of the former years remained unutilized, and manufacturers were averse to accumulating further supplies. The following table gives the value of building stone, rubble and other products of the quarry for the five years, together with the amount of wages paid for labor; and shows a steady decline since 1891. For each of the last two years the value is only about one-half of the value for that year:

Year.	Value.	Wages.
1891.....	$1,000,000	$520,000
1892.....	880,000	730,000
1893.....	721,000	464,000
1894.....	554,370	336,000
1895.....	438,000	296,000

The production of common brick was greater in 1892 than in the previous year, but since that time has become less each year. The returns indicate that many of the brick yards have not been in operation. The quantity of drain tile manufactured increased from 7,500,000 in 1891 to 25,000,000 in 1894, but dropped to 14,000,000 in 1895, which amount, however, was nearly double the output of 1891. Great quantities of tile are now being used by farmers in an effort to improve their farms and to meet the competition so keenly felt. The production of common brick and tile from 1891 to 1895 was as follows:

Year.	Brick No. of M.	Value.	Tile No. of M.	Value.	Wages.
		$		$	$
1891.....	160,000	950,000	7,500	90,000	432,000
1892.....	175,000	980,000	10,000	100,000	445,000
1893.....	162,350	932,500	17,300	190,000	451,000
1894.....	131,500	690,000	25,000	280,000	388,000
1895.....	126,245	705,000	14,330	157,000	304,000

With respect to pressed brick, roofing tile and terra cotta, the largest production was in the year 1894, when it amounted in value to $286,230. For the past four years the quantity shows no great variation, and would seem to indicate two facts, viz., that pressed brick is meeting with more general favor, and that the United States product is likely to be entirely shut out of the Canadian market. The first pressed brick was made in Ontario eight or ten years ago. Below are the statistics for pressed brick, roofing tile, and terra cotta:

	1895.	1894.	1893.	1892.	1891.
Number	17,940,867	25,456,000	21,634,000	22,048,000	13,617,909
Value..	$ 184,550	$ 286,230	$ 217,373	$ 259,335	$ 156,699
Wages..	69,442	95,400	80,686	88,865	58,000

The returns relating to lime show that the production for the past five years has not varied greatly. The figures are:

Year.	Bushels.	Value.	Wages.
1891	2,350,000	$ 300,000	$ 110,000
1892	2,600,000	350,000	120,000
1893	2,700,000	364,000	122,500
1894	2,150,000	280,000	108,000
1895	2,099,000	280,000	104,000

Greater development has taken place in the cement industry than in any other line connected with the building materials, yet the quantity of Portland manufactured is less than one-half that which is imported. The production of natural cement, as the accompanying table shows, has remained nearly stationary since 1891, but the quantity of Portland has been nearly doubled. The demand for that variety for street construction, as well as for Government works, has no doubt encouraged this industry at home.

	Natural Rock Cement.		Portland Cement.	
	1895.	1894.	1895.	1894.
Number of works....	5	5	2	3
Number of workmen	45	63	129	105
Wages for labor.....	$14,166	$13,020	$46,000	$31,858
Product, bbl	55,219	55,323	58,699	30,580
Value	$43,145	$48,774	$114,332	$61,060

The following table shows the quantity and value of Portland cement imported for home consumption for the nine fiscal years ending June, 1895, and does not include any importations for Government use:

Year.	Barrels.	Value.
1886-7	102,450	$148,054
1887-8	122,402	177,158
1888-9	122,273	179,406
1889-90	192,332	313,572
1890-1	183,728	304,648
1891-2	187,233	281,553
1892-3	229,492	316,179
1893-4	234,231	284,964
1895-5	196,281	242,813

PLUMBERS' ASSOCIATIONS.

THE Toronto Association of Master Plumbers is doing effectual work under the direction of the enthusiastic president, Mr. W. J. Burroughes. Their meetings are now held in Pythian Hall, corner Queen and Victoria streets. Mr. Burroughes has drawn up a draft of an act providing for compulsory examination of plumbers in Ontario. This act, in its present form, is entitled "An Act to Secure the Registration of Plumbers and the Supervising of Plumbing and Drainage in the Cities of the Province of Ontario." It will be submitted for approval to the different associations throughout the province and the Secretary of the Provincial Board of Health before being presented to Parliament. As the act is claimed to be in the interest of the public, Mr. Burroughes hopes to meet with little opposition in the House.

The London Association is one of the most active branches of the Dominion Master Plumbers' Association. We are informed that the membership embraces every legitimate plumber in the city, as well as a number of others located in adjacent towns. The weekly meetings are well attended, and much interest is shown in the proceedings thereof. The president, Mr. Wm. Smith, is unceasing in his efforts to promote the success of the association.

In striking contrast with the London Association is the Hamilton branch, which has not held a meeting since July. While recognizing the benefits to be derived from an interchange of ideas as thus afforded, there is an apparent lack of energy on the part of many of the members. It is hoped that during the winter season new life will be infused into the master plumbers of Hamilton.

The plumbers and steamfitters of Great Britain have formed a national association, with a membership of 800.

ASPHALT FELTING.—In order to keep the dampness out of walls and prevent its rising from the soil, Buscher and Hoffman, of Eberswalde, apply strips of asphalt felting, as wide as the wall, in lengths of about 3 feet. The pieces overlap by a couple of inches; the pressure of the continuation of the wall, resting on this layer, secures a perfect joint. The manipulation is very simple and easier than the application of liquid asphalt, which in warm weather is not rarely squeezed out again. The insulation is not destroyed when parts of a building settle. The felting has profitably been applied in tunnels and underground structures, and has answered well in the Carlsruhe tunnel, for instance. Old buildings can also be fitted with the felting, which bears a fairly high temperature.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

HANGING INSIDE BLINDS.

Editor CANADIAN ARCHITECT AND BUILDER:

WILL you, or some of your well informed readers, kindly inform me through your columns as to the best and most economical method of arranging for and hanging two-fold inside blinds. The building in which the blinds are to be hung will be of brick, fourteen inch wall, furred and lathed and plastered on the inside. The windows are 3' 6" wide, sashes 1 3/4" thick, double hung, and there are to be heavy inside stools. The blinds are to be of black birch, and not more than 7/8 of an inch thick, and are to fold back in a box and show as panels on the side of the window when so folded; casings are molded and are six inches wide and will show square in the room. I desire to make a nice job of this work, but do not want it to cost too much. Any information through your columns will be appreciated by a

YOUNG CARPENTER IN DISTRESS.

Owen Sound, Nov. 10, 1896.

[In reply to the foregoing, we may say to a "Carpenter in Distress" that there are many ways of preparing "boxing for shutters" practised in England and in this country more or less costly, and we believe there are among our readers many expert workmen who can give intelligent descriptions of how the work may be done with efficiency and economy, and we submit the problem to them with the hope that they will relieve "A Young Carpenter" of his difficulty. THE EDITOR.]

INFORMATION REQUIRED BY BUILDERS.

SIR, I have read with pleasure the article in your journal, "Loads and Strength of Roofs." This led me to think of the advantages the builders would get if they had a card giving the weight of the different kinds of roofing material, flooring, stud partition, outside walls, etc., etc., so as to enable the builder to know at a glance the strength required for the rafters, joists, beams, etc., also the exact weight they will have to support. I have many books with those tables and formulas in them, but as they are in most cases worked with letters, I have great trouble to get at an approximate idea of the weight to be supported and the size of joints and rafters required. If you had something with examples in plain figures, then the great majority of the builders would know what to buy, and have no fears for the safety of the building that they are repairing or constructing. I enclose stamp for reply, and oblige.

Your Obedient Servant,

J. B. D.

Montreal, Nov. 5th, 1896.

[The information asked for by our correspondent is not easily obtainable, and will require considerable research and time to put in shape. We shall make an effort to supply at least a portion of it, however, through this department in the near future. THE EDITOR.

Besides indigo and purple few colors were employed by the ancients, and these were obtained for the most part from the vegetable kingdom, but their purity was so great that they have kept well to our own times, after having undergone for centuries the action of the air and the sun.

LEAD VS. IRON FOR SUPPLY AND VENT PIPES, FROM A PLUMBER'S POINT OF VIEW.*

If we consider the question as an engineer would when seeking the most suitable material for his purpose, and divest our minds of all prejudice and consideration of how it will effect our individual interest as plumbers, or the business in general, we will sooner arrive at correct conclusions. If it is truth we are seeking, and not specious argument to bolster preconceived notions, we certainly do so.

In past times lead was used by plumbers almost exclusively for water pipes and other purposes. It was the chief material a plumber was called on to use, and it was necessary for him to be most skilled in working to be a success in his business. It was almost considered the only metal fit for that purpose.

Now we find it practicable to fit up the largest buildings in the most desirable manner, with the finest open work, and not use an ounce of lead pipe. The tendency of the demand at the present time is for substitution of other metals in preference to lead in the plumbing business. This tendency is the verdict of public opinion that condemns lead, and relegates it from the position of primary importance to a secondary one in the plumbing business. We may grieve at this tendency, but it is useless for us to kick against the progress of the times. It is better that we adapt ourselves to the situation, keep in line with all improvements, and not attempt to impede them because they necessarily dispense with the skill we have acquired.

Lead pipe (which was sometimes tinned inside) was formerly considered the most suitable for the conveyance of water from the mains to all vessels used for domestic purposes. It certainly answered the purpose well. The charge of lead poisoning was sometimes laid to the use of these pipes, but few cases were ever proved. The percentage of people using this pipe suspected of suffering from lead poisoning was so small as to be of little importance.

To the Pacific coast iron pipe came with the early gold seekers, and was probably used by them as water pipe, because it required less skill to join and lay it. Black iron pipe was soon found to be useless on account of rusting, but galvanized iron pipe answered better, and was first introduced in small houses for conveying cold water only, and was not considered suitable for hot water at all. As experience showed no objectionable feature in this material, it began to be used in better houses, but for many years iron was used for cold and lead for hot water. Gradually the use of galvanized iron pipe extended for hot water, until now it is almost the only kind used. Forty years' use on this coast has demonstrated that for supply pipes galvanized pipe is well adapted. The zinc coating has proved a thorough protection which makes it very durable.

In comparing the several advantages that lead and galvanized iron pipe have when used for water supply, we find that, galvanized pipe being harder, it is less liable to be damaged by accident, as it is able to resist such accidents as nails being driven against it and the gnawing of rats.

Being stronger it requires less support and is never found hanging in festoons. It is seldom broken with fair usage, when once covered up in good condition. It seldom requires any repairs, except when it is burst with frost. It is not injuriously affected by rapid changes of the temperature of the water it carries in any degree above the freezing point, as is lead pipe if allowed room for expansion.

The cost of galvanized iron pipe and the labor needed for its use are less than for lead pipe. With the introduction of nickel-plated supply pipes for connections of open work, there disappears the last obvious advantage of lead for supply pipe. Lead pipes are often taken out of houses, to be replaced by galvanized iron pipes, but never the reverse on this coast.

If this be the result of the experiment of using galvanized iron pipe for supply pipe in a new and venturous section of the country, it only indicates what will be the result in older and more conservative sections of the country. We find plumbers in eastern cities getting alarmed at the increased use of galvanized iron for supply pipe, and claiming in the trade papers that it becomes worthless in three or four years; that it rusts at the ends and at other exposed places, and is generally no good. Forty years' extensive experience with the use of it on the Pacific Coast demonstrates that such is not the case. The continued growth of its use from a modest introduction of it as a cheap and convenient substitute to its present position, when it has driven lead supply pipe entirely out of use, and that too in face of the hostility of the men who had to work it, proves that it must have merits of no small degree.

When used as waste pipes iron pipes do not have the same advantages they have as supply pipes. Wrought iron pipe unprotected by covering is not suitable for vent pipe, and should be discarded for the reason that it rusts quickly internally, which rust soon begins to fall from the vertical portions and closes the bottom of the pipe. Galvanized iron pipe is better, but it will not withstand the action of sewage or sewer gases, and therefore is not reliable.

Iron pipe dipped in asphaltum and thus protected has no known weakness, and the great success of the adopting of iron dipped pipe for soil pipe would justify us in expecting equally good results from the general adoption of such pipe for sewer ventilation.

Lead pipe for ventilation has many advantages to recommend it if properly supported and protected. Lead pipe is capable of resisting all chemical action of sewage or gases, and, not being exposed to great changes of temperature, there is little danger of breaking by contraction and expansion, as is sometimes the case with waste pipes which convey hot water. The smoothness of the interior of lead pipe and its gentle curves make it most efficient and desirable on account of the small friction which it offers.

* A paper by William Eccles, of Portland, Oregon, in the Gas Light Journal.

REQUIREMENTS OF GOOD HOUSE PLUMBING.

A PAPER entitled "Improved Methods of House Drainage," read before the Architectural League of New York, by Mr. Paul Gerhard, C. E., Consulting Engineer for Sanitary Works, contains the following on the subject of good house plumbing:

The limits of this paper do not permit my discussing in detail the requirements of water closets, and I must pass on to review briefly the other plumbing appliances of houses.

Speaking of wash basins, we may distinguish four principal types, viz: 1, tip-up basins; 2, chain and plug basins; 3, open stand-pipe overflow basins; and 4, secret waste-valve basins.

Tip-up basins are generally condemned, because in their usual form they have objectionable features. If the receiver could only be arranged so that it would not become foul, or that it was readily accessible for cleaning, this type of basin would have many merits. It is, without doubt, very convenient in use, has no concealed overflow, no chain and plug, is rapidly emptied and flushes its waste pipe and trap well at each discharge.

The objections to the second type, the common chain and plug basin, are too well-known to need further comment. It is proper, however, to state that there has recently been put upon the market some modified forms of this type, which I consider great improvements upon the ordinary type. One is a siphon-basin, which empties rapidly and flushes its overflow at each discharge. The overflow channel is so shaped that when the plug is inserted in the bottom of the bowl and the same filled with water, the overflow is trapped. In office-buildings and in hotels, where a stand-pipe overflow basin or a bowl with waste-valve is too expensive and too complicated for general use, the siphon form of basin has much to recommend it. The other improved form is a chain-and-plug bowl in which the waste outlet has been greatly enlarged, and which has the usually hidden overflow channel made much shorter and accessible by means of a removable strainer.

The third type of basin has an open stand-pipe overflow, and there are numerous modifications of the device for raising the standpipe. From a sanitary point of view, this type has, undoubtedly, the greatest merit of all forms, still my experience has been that the general public is hardly sufficiently educated in sanitary matters to appreciate its merits. By many this form of basin is utterly condemned on account of its odd shape and appearance. The favorite form of basin is just the one which has the most objections from the hygienic standpoint, namely, the bowl with secret waste valve. To discuss its objectionable features in detail would lead us too far.

Regarding that valuable fixture for personal cleanliness, the tub or bath-tub with its various modified forms, such as the foot-tub, the sitz-bath, the hip-bath, the bidet, etc., I would state that tubs of wood lined with copper are less used than formerly in private houses, probably because they always require some sort of wooden casing, and also because they lose their bright appearance in use. Enamelled iron tubes, standing free from the wall and raised from the floor, constitute a satisfactory sanitary fixture, which is only surpassed by the beautiful all porcelain bath-tubs. Both kinds of tubs are now obtainable with a glazed roll rim, thus doing away entirely with all woodwork. I ought, perhaps, to mention in this connection, that a great improvement in the manufacture of American earthenware has recently taken place, and that it is now for the first time possible to obtain porcelain bath tubs made in this country. In regard to the appliances used for holding water in the bath tub, and for emptying the same, much of what I said of wash basins applies here. In this matter I may appear to you old fashioned, when I state that my decided preference is for an open stand-pipe overflow.

For baths in public institutions, for baths in factories, and for people's baths, there is a growing tendency to discard the tub bath in favor of the rain or spray bath, which is greatly superior from a sanitary point of view, besides having many economical advantages.

Slop sinks and housemaids' sinks are obtainable in a variety of serviceable forms, most of them excellent from the sanitarian's point of view. I would only remark that a flushing cistern is quite as essential in the case of a slop sink as in that of water closets. An ingenious and novel arrangement consists in a slop sink, which flushes itself automatically each time slops are emptied into it.

Kitchen sinks are likewise obtainable in a variety of materials. This fixture is much improved by changing the dribbling stream passing through its waste into a quick and effective flush. Attempts in this direction have been made with some success, and the devices employed are certainly worth considering. Incidentally, the question of avoiding the kitchen grease nuisance is thereby solved, in a better way, to my mind, than by the employment of grease traps at the sinks, which invariably constitute a nuisance, are usually forgotten or neglected and are not to be recommended. I must content myself with a mere allusion to the subject.

Of urinals, it is only necessary to mention that in private houses their use is not to be encouraged, as the fixture is very difficult to keep clean. In offices and in public buildings, such as hotels, railroad stations, court houses, etc., the fixture is a necessity, and great attention is required not only in the fitting up, but in its maintenance. The projecting lip of porcelain urinals seems to me to be of doubtful advantage. One point in the fitting up of the fixture is worthy of mention: The bowls are generally set up too high from the floor slab. I find it is better to set them at a height not exceeding twenty-two inches from top of lip to floor line, instead of twenty-four to twenty-six inches, as is customary. The floor-slab is thereby kept more readily free from drippings.

In fitting up plumbing fixtures, the chief aim should always be the avoidance of woodwork at and around them. All fixtures should stand free from the walls and be accessible on all sides. Even the seats of water-closets are now attached directly to the bowl, the closet thus stands absolutely free and detached from the wall, and the entire fixture can be reached for cleaning and for repairs. In one respect, however, modern plumbing fixtures are open to considerable improvement: I refer to the undesirable noisiness accompanying the flush and the discharge of the fixtures. This problem, as experience teaches, is not easily solved.

The time at my disposal permits only a brief allusion to the testing of plumbing work. All work should be tested before acceptance, as knowledge of the safety of the plumbing work can only be obtained in this way. I regret to say that I have found only very few mechanics doing plumbing who apply to their work any test, except where this is specially insisted upon by the architect or engineer. To my mind, it is one of the most important duties which architects owe to their clients, to see to it that all work is tested. For new work we have the water test and the air pressure test. This should include not merely the main horizontal lines and the vertical stacks, but likewise all the branches, and the brass ferrule joints. The finished work should be tested by the peppermint or by the smoke test, which help to show imperfections in the joints of nickel-plated piping and at the floor joints. In the inspection of old

work, the water test, which is the best test, cannot, for obvious reasons, be applied, and here the smoke test, or the test with oil of peppermint, intelligently applied, give indications as to the condition of the work.

A great step forward would be made and plumbing work vastly simplified, by abolishing, or at least modifying the trap vent system.

There are at present two quite different methods of arranging the system of trapping the fixtures in a building. In the one system, which is in accordance with the majority of plumbing regulations, and is the one at present enforced in New York City, all traps must be back aired or vented. We thus obtain a duplicate system of pipe lines, the work is complicated, more expensive and may become more unsafe, on account of the greater number of pipe joints and the possibility of "by passes." The other system the one pipe system, as we may call it is distinguished by its greater simplicity, economy and, as I maintain, by its greater safety. This method substitutes non-siphoning traps or anti-siphon trap attachments for the cumbersome method of back airing. In this system, all main soil and waste lines must be quite as fully ventilated by extending them the full size up to the roof as in the usual method. All fixtures are located directly at the lines carried up to the roof, or within a very few feet of the same. Siphonage of the traps is impossible under the ordinary conditions, quite as much so as in the back airing system. You will find the majority of plumbers opposed to the new system: for while it simplifies the work, it reduces the amount of piping used and thereby the cost of the work. There is also much prejudice against the proposition, many plumbers seeming to fear that by putting themselves openly on record as in favor of it, they would by others be considered as not quite up to date in plumbing matters. The fact remains undisputed and I have demonstrated it in many cases in my practice that the new method is, at least, quite as safe as the old one. I venture to predict that in a very few years plumbing laws will be so modified as to leave it optional with the owner or architect of a building which method he will adopt.

This leads me to say a few words in regard to plumbing rules and regulations, in particular of those in force in New York City. Further advancement in plumbing requires the revision and improvement of the plumbing by-laws of the building department. Far be it from me to underrate the good which the present rules have accomplished in the past. Ours is not, however, an age in which we can at any time afford to stand still. Constant progress is made in every department of construction and the researches of the practical sciences are everywhere utilized and embodied in actual practice. Let us hope to see soon a revision of our plumbing laws. Be it largely copied by other cities. We cannot afford to fall behind in this matter. Our present rules are too indefinite in many details; they are much too arbitrary in others. Take, for instance, the question of sizes of drain pipes, of soil pipes, of vent pipes, the diameter of traps, etc. There is certainly now sufficient practical experience available to lay down more definite rules as to sizes. The rules should also in the future prohibit fixtures which sanitary science has long ago recognized as being absolutely bad. Pan closets, wooden sinks and wooden wash tubs should be discarded, and privy sinks should no longer be tolerated.

MANUFACTURES AND MATERIALS

BRICKS FOR WELL LININGS.

Of patent bricks there are no end, but we know of none that fully satisfy all the requirements of the well-sinker, says the British Clay Worker. Our readers will probably say that our view, in that case, must be very limited—they could tell us of plenty of bricks that answer the purpose very well indeed. But we shall convince them to the contrary, and we throw out this suggestion with every confidence. Patent cement blocks have been much employed in recent years for well lining; they are made on the interlocking system. But whether it be cement blocks or bricks, the effective locking too often takes place horizontally only. It seems to be forgotten that there is considerable pressure from behind, and bulging inwards too often results. That is a fault, however, that can easily be remedied, and we are not so much concerned with that at the moment as with the manufacture of a type of brick that will permit the well sinker to gradually decrease the diameter of the well with the usual ledges and steps. With a deep well it is customary to sink to a considerable depth of a certain diameter, say 6 feet to commence with; then the diameter is decreased to say 4 feet 6 inches. It is at the point of alteration of the diameter (which alteration may be allowed three or four times in a very deep well) that the weakness results, and it is there that we would advise the use of a different type of brick to any at present employed, to our knowledge. The change from 6 feet to 4 feet 6 inches ought not to be sudden, but gradual; interlocking bricks should always be used except where the strata bored into are of a very dry character, and no difficulties result from pressure of superincumbent weights. And these bricks should be made by proportionately decreasing from the one diameter to the other. The bevelling off at present creates a spot for the lodgement of any sediment, any weeping and leakage too frequently takes place at such points. This would no longer be the case were suitable non-porous bricks of an interlocking decreasing diameter type employed at such junctures.

Some beautiful specimens of stone have recently been taken out from the vicinity of Lake Manitoba.

Mr. G. C. Morrison, of Hamilton, has invented a seamless tube hot water boiler for domestic heating purposes.

It is reported that a company has been formed in Toronto to manufacture bricks on an extensive scale at Rossland, B. C.

The Richmond Times states that the asbestos mines near Danville, Que., have been sold to a joint stock company for $2,500,000, the deal having been completed in England between Mr. Boas and an English syndicate.

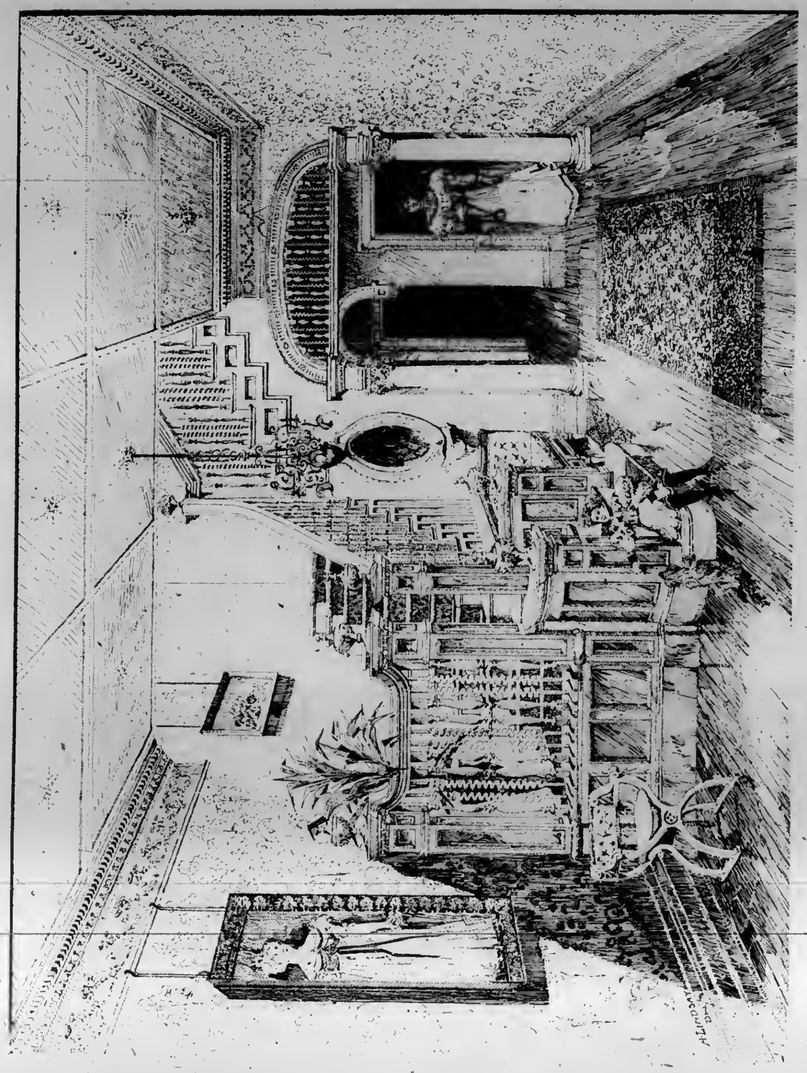
Mr. C. Sontum, commercial agent for Canada at Christiania, Norway, has just sent to the Department of Trade and Commerce a letter in which he speaks of a successful shipment of steam radiators from Toronto. He emphasizes the importance of manufacturers branding their goods with the name "Canadian," or "Manufactured in Canada."

The slate industry of New Rockland, Que., is being pushed with the usual vigor, a valuable new bench of slates being reported from the eastern side of the quarry, so that the work will be extended at the surface instead of sinking to a greater depth. The slate quarry and works at Danville, Que., are at present closed pending the disposal of a large quantity of merchantable material on hand.

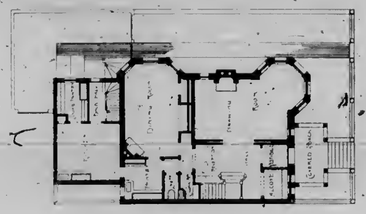
A new material has been discovered for insulating pipes, which is made of silex, which, when ground into fine particles, is to be used to surround the conductor wire with, inside an iron pipe, which should be packed down. It is claimed that the silex will not burn, or melt, or rot, or leak; it is said to absolutely prevent electricity coming into contact with any other substance inside a building where it is used.

According to the annual report of the Ontario Bureau of Mines, the production of Portland cement in Ontario in 1895 was 58,699 barrels, as against 30,580 barrels in 1894. The value was $114,332, as against $61,660, and the wages paid were $46,000, as against $31,858. It is noticeable, however, that this is but a small proportion of the total used, the entries of Portland cement for home consumption for the fiscal year 1894-95, exclusive of that imported for Dominion government use, being 196,281 barrels, valued at $242,813.

T.8-9
Canadian
archi
and



ENTRANCE HALL IN RESIDENCE OF MRS. JOSEPH LEVY'S HOUSE ON LAVAL AVENUE J. C. NELSON, ARCHITECT



GROUND FLOOR PLAN

HOUSE OF MRS. JOSEPH LEVY ON LAVAL AVE. MONTREAL J. C. NELSON ARCHITECT

Canadian archi... and

v.8-9
Canadian
archit

CANADIAN ARCHITECT AND BUILDER.

VOL. IX.—No. 12. DECEMBER, 1896 PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods.
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.
C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.
Prices for advertisements sent promptly on application. Orders for advertisemnets should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.
Contributions of value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

ONTARIO ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	H. B. GORDON, Toronto.
1ST VICE-PRESIDENT	J. GEMMELL, Toronto.
2ND VICE-PRESIDENT	JOS. W. POWER, Kingston.
TREASURER	EDMUND BURKE, Toronto.

COUNCIL:

F. J. ALEXANDER	Ottawa.
THOS. FULLER	Ottawa.
E. J. LENNOX	Toronto.
J. M. MOORE	London
W. R. STRICKLAND	Toronto

REGISTRAR AND LIBRARIAN:
W. A. LANGTON — Canada Life Building, Toronto.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

OFFICERS FOR 1896.

PRESIDENT	A. F. TAYLOR, F.R.I.B.A., Montreal.
1ST VICE-PRESIDENT	J. F. PEACHY, Quebec.
2ND VICE-PRESIDENT	A. RAZA, Montreal.
SECRETARY	J. VENNE, Montreal.
TREASURER	E. MAXWELL, Montreal.

COUNCIL:

A. C. HUTCHISON	Montreal.
JAS. NELSON	Montreal.
J. WRIGHT	Montreal.
ROBT. FINDLAY	Montreal.
CHAS. BAILLAIRGE	Quebec.
F. H. BERLINGUET	Quebec.

AUDITORS—G. E. TANGUAY and H. C. NELSON, Montreal.

TORONTO BUILDERS' EXCHANGE.

BOARD OF DIRECTORS:

JOHN ALDRIDGE, President.
THOS. CANNON, Jr., 1st Vice-Pres.
JOHN VICK, 2nd Vice-President.
DAVID WILLIAMS, Treasurer.
WM. BOOTH.
JOHN WICKETT.
JOHN RUSSELL.
H. LUCAS.
JOHN YOKES.
JAS. CRANG.
JOHN M. GANDER.
GEORGE HENRY.
JOHN L. PHILLIPS, Secretary.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

Tall Building.

THE completion of a ten-storey building in Toronto, and the proposal to erect a fourteen-storey structure on the site of the present St. Lawrence Hall Hôtel in Montreal, would seem to be evidence that the craze for tall buildings which has marked Chicago and New York for several years past, is exerting its influence upon the architecture of our Canadian cities. It may not be out of place at this juncture to point out that in the American cities we have named popular favor is being withdrawn from these abnormal specimens of nineteenth century architecture, and legislation has been introduced for the purpose of restricting the height to which buildings may be erected in the future. Another potent influence tending to discourage this style of architecture is that the number of such structures already built so far exceeds the demand that the owners are said to have been compelled to reduce rentals by 50 per cent., while some of the high structures in Chicago which were designed for office purposes are being used as storehouses, in which capacity it will of course be impossible to obtain a fair return on the owners' investment. The unsatisfactory experience of our American neighbors in this direction, coupled with the lower land values in Canadian cities, would seem to render inadvisable the erection of structures exceeding say six or eight storeys in height.

The Safety of Elevators.

IN New York recently four persons had their legs broken by the dropping of an elevator. This elevator is said to have been of the most modern type, fitted with so-called safety catches, which in the event of the breaking of a cable or other accident, are supposed to grip the slides and hold the elevator in place. The accident referred to points to the necessity for protective devices which can be depended on to accomplish their purpose. There is also a greater degree of competency required on the part of persons in charge of elevators. Not only should the employment of lads for this purpose be forbidden, but the man who is placed in charge of an elevator should be required to become thoroughly posted regarding the method of its construction and operation. To illustrate the present condition of knowledge, the writer recently made a few inquiries from a young man in charge of an elevator in a modern office building as to whether there was anything to prevent the elevator from falling in case of accident to the guys. He was assured that there were catches for this pur-

v.8-9
Canadian
archi
and

pose. On being asked to point out the whereabouts of these protective devices, and the method of their application, the attendant was unable to do so. All he knew about the matter was that he had been told the elevator could not fall, and he had gone on operating it in the calm assurance that no accident could happen, and without making any effort to investigate for himself the actual conditions.

Duty on Artists' Materials.

The request recently presented to the Government Tariff Commissioners by representatives of the Art Societies for the removal of the duties on artists' materials, is one with which the government should comply. The imposition of these duties for many years past, has not, so far as we know, resulted in any attempt being made to manufacture these materials in Canada. Presumably the market is too limited to warrant such an attempt. Under these circumstances the duties constitute a burden upon the art workers of the country, and tend to retard the development of art in the Dominion. It would therefore seem to be proper to remove them in part or altogether.

Care in Designing.

Too much care cannot be exercised by the architect with the details of his design. A seemingly trifling error of judgment in designing one particular feature often results in marring the general effect of the building. Instances have come under our notice in which for lack of a particular curve the outline of a verandah, otherwise satisfactory, proved defective in the eyes of the architect by whom it was designed, who felt a constant desire to pull the work to pieces and reconstruct it. Such a slip is doubly annoying to the architect if, having been dissatisfied with the effect of the detail on paper, he has allowed it to be put in concrete form, in the belief that in situ it would present an improved appearance. This rarely happens. Therefore the architect who is unfavorably impressed with the appearance on paper of any feature of his design is likely to save himself lasting disappointment by giving the problem further study, and making such changes as in his judgment will secure a satisfactory effect.

The Buffalo Breakwater.

Much interest was taken by both Canadian and United States stone dealers in the awarding of the contract for the new breakwater at Buffalo, for which the government made an appropriation of $2,000,000. Twelve tenders were submitted, several of which were based on furnishing Canadian stone from quarries in the township of Bertie, across the lake from the harbor and only four miles distant. Provisional clauses were inserted that the stone was to be shipped from Canada in the name of the United States, a proceeding which permitted of the importation of the stone without duty. As there appeared to be a fighting chance for the adoption of Canadian stone, steps were at once taken to head off such a movement, and the introduction of a bill in the House of Assembly at Albany providing that only citizens of the United States be employed on Government work was threatened. Upon opening the tenders for the breakwater, however, the figures for the supply of both Canadian and American stone were nearly the same, and it was resolved to exclude the Canadian product.

Building Conditions.

Much satisfaction is being expressed by architects, builders, and all persons in any way connected with the building interests, with the extremely mild and fair weather which has prevailed to within a few days of the close of the year. In consequence of this unusual condition, a large amount of work in the way of completing buildings, and carrying out repairs and improvements, has been in progress, which otherwise must have been postponed until spring. Unless we should be unfortunate in having a late spring, the gap between the building season of 1896 and 1897 will be much shorter than usual, a circumstance which would be appreciated by all whose interests are dependent upon activity in the building industry.

The Ontario Architects' Bill.

It is a pity that some of the people who were referred to by a correspondent in our last issue as objecting to the attachment of a legal status to the title "architect" do not express their views in print or write enquiring if they are right in their suppositions of what the proposed Architects' Bill will enact. There can be no doubt that there has been much misconception of the nature of the bill and much unnecessary anxiety, on the part of builders especially, as to how their interests will be affected if the bill passes. It is not easy to see upon what this anxiety is based; but, if stated, we are confident it will be found to be as baseless as Mr. Ireland's conception of the Association bent on keeping out new comers by examinations turns out to be, in the light of the Registrar's letter in another column saying that the Association does not wish to control the examinations. It is essential in introducing such a bill to safeguard all existing interests from sudden change, and it is not likely that, if the bill passes, anybody will be able to perceive any immediate effect. Ultimately, no doubt, the profession of architecture will, as the promoters of the bill expect, be established upon a higher plane; but why any other branch of the building trade should suffer in consequence, it is hard to see. For builders in cities, who for the most part erect architects' buildings, an improvement in the architects' art will not mean either less work or less good work; and improvement in the architects' skill will be a direct gain, for it cannot be denied that the builders' gains are sometimes seriously impaired by unscientific methods on the part of the architect and the need of making good his deficiencies. The country builder perhaps regards himself as somewhat in competition with the architect. However that may be, it is clear that the architect can never be in competition with the builder. The builder must still build everything that is built, and plan a great deal of it too. The proposed bill is not a law to make people employ architects, as some people seem to have thought, but to make architects better worth employing. It is intended to raise the quality of the architect and the character of his profession; not to insist upon every little piece of work being put into his hands. It would doubtless be an ideal state of affairs if every village store and cottage was the work of a first-rate designer, but work of this kind will always be done by builders. We do not think, however, that the design of such buildings will be unaffected by improved design on the part of architects, for the builder is quick to pick up new ideas, and the better the work of architects the better his work will be.

BY THE WAY.

A Norwegian firm is reported to be engaged in the manufacture of bricks from condensed petroleum for fuel purposes. These bricks are said to give out four times as much heat as coal, and without smoke. In view of the attention which the production of petroleum is at present receiving as the result of recent discoveries in Western Ontario, this might be an opportune time to experiment with the manufacture of petroleum fuel bricks in this country.

× × × ×

A contractor from Uncle Sam's domains came to Toronto not long since for the purpose of tendering on a contract about to be let. After taking the quantities from the specifications and making his estimates thereon, he enquired in a matter-of-fact manner what commission he should allow for the architect. He seemed greatly surprised on being informed by the architect that in Canada it is not customary for architects to accept commissions from contractors. The inference might reasonably be drawn from this incident that the practice of accepting commissions from both client and contractor is one which obtains to some extent across the border.

× × × ×

As an illustration of the old saying that one must look abroad for home news, I find the following paragraph in an English technical journal:- "It is said that many hundred rolls of wall paper with solid black grounds, designs for the most part in slate-colour, are yearly used in Canada by French Canadians. These people, when they go into mourning, never do things by halves, but even hang their private apartments with these gloomy papers, indicative of a death in the family." The improbability of this story was so evident that I caused enquiries to be made in Quebec regarding it, and found as I expected, that there was not the slightest truth in it. In fact, the very reverse is true—the French Canadians being partial to lively colors.

× × × ×

Dropping into the office of a well-known solicitor in Toronto the other day, I was informed of a peculiar incident which occurred in connection with the testing of cement. Two buildings were in course of construction, by different contractors; the same architect and clerk of works having charge of both. The contractor for one of the buildings obtained a quantity of cement which he believed was according to specification and would stand the necessary test, but it was refused by the architect and his superintendent as being of an inferior grade. It was consequently stored in a downtown warehouse. The two contractors, being on friendly terms, the one whose cement had been refused sold the same cement to the contractor of the other building, and it was accepted without a word of complaint. What rendered the transaction still more peculiar was the fact that the specifications governing the cement were exactly the same in both cases. Either the architect and his clerk were unduly severe on the first contractor, or allowed inferior materials to enter into the construction of the building in which the cement was used.

It is reported that the Danville, Que., Slate and Asbestos Co. is to be capitalized at $2,000,000. English capitalists lately visited the works in connection with the proposition.

DUTY ON BUILDING MATERIAL.

Messrs. Joseph Wright, president, J. W. Taylor, manager, and David Carlisle, director, of the Toronto Radiator Manufacturing Company interviewed the Tariff Commissioners at Toronto and asked that the duty on radiators be allowed to remain as at present, the duty of 27½ per cent. being considered sufficient under certain conditions. They were, however, desirous of having a bonus of $4.80 per ton on exported radiators, whether made of Canadian or American iron. The competition from the United States gave considerable cause for complaint. Labor was cheaper there than here, was of an inferior class, and the vast expanse of this country made freight expensive. Mr. Taylor said that radiators sold in Toronto 30 per cent. cheaper than in the United States, and the cheap rate of freight, viz.: 14c. from Boston to St. John, compared with the 58c. rate from Toronto to St. John compelled the Canadian concern to sell 10 per cent. cheaper in St. John than the United States firms did, in order to meet the American competition. The present duty of 27½ per cent. ad valorem was, if anything, not high enough, as it gave the American concerns an opportunity to work off their surplus stock in this country.

At Hamilton representatives of sewer pipe companies asked for the imposition of a duty of $5 per ton on sewer pipe. The present duty averages 35 per cent. In the event of there being no specific duty they asked that the value for duty be placed at 70 per cent. off the American list instead of 77 per cent.

Among the reasons presented for a specific duty was that double-strength pipe was frequently admitted as ordinary standard pipe, whereas it should be 20 per cent. dearer. There were in Canada five factories, but there was no association for keeping up prices.

William Findlay, builder and roofer, asked for a lowering of the duty on slate for roofing purposes. He said the duty used to be 80 cents per square, but it was subsequently changed to 20 per cent. ad valorem, and at the last revision was fixed at 30 per cent. He asked that the duty again be reduced to 20 per cent. The source of supply was chiefly in the United States. There was one quarry in Quebec, but that concern could find a market in its own district for its output. The difficulty in obtaining supplies was often great, and builders were seriously hampered in their work. With a lower duty, slate would be cheaper and would be more generally used.

The Hamilton Blast Furnace Company asked for protection for their works. The capacity of the furnace was stated to be two hundred tons of iron per day, but the average turnout was one hundred and twenty tons. They intended next season to bring the ore from Lake Superior by water transportation. Since starting they had purchased Canadian ore, found chiefly in Hastings county, 10,000 tons, costing $35,000. They have produced 21,000 tons of pig-iron. Of this 10,000 tons have been sold and delivered, and 4,000 tons are booked, leaving a little over 6,000 tons not sold. They have paid in inward freight on ore $60,000, and $7,000 in outward freight. Their wage bill amounts to $1,150 a week, making a total paid in wages $46,000. If the present protection were withdrawn they would lose the whole of their investment. If the Hamilton furnace was well encouraged it was the intention to go into the manufacture of steel, employing at least 500 men. It was stated that about 16,000 tons of pig-iron were produced in Canada in a year from five blast furnaces.

v.8-9
Canadian
arc

PROPOSED AMENDMENT OF THE O. A. A. ACT.

The Ontario Association of Architects have wisely decided to renew their efforts for the amendment of the Ontario Architects' Bill, in a manner to in future restrict the use of the word "architect" to properly qualified persons. The relation which the work of the architect bears to the health of the community and the extent to which the safety of human life and the interests of property are dependent upon his knowledge and skill, demand that the public should have means of knowing who are qualified to call themselves "architects." It should be clearly understood that no attempt is being made to compel persons who desire to erect buildings to employ a qualified architect to prepare the plans and supervise the construction. If they have sufficient confidence in the ability of some person who is not entitled to call himself an "architect," to prepare plans and carry out the work, they are at liberty to entrust to him the undertaking. In view of this freedom on the part of anybody to prepare plans for buildings so long as he does not designate himself as an "architect," and of the public to employ a properly qualified architect or not, as they may choose, we fail to see any reasonable ground of objection to the desired legislation.

A REQUIRED DISTINCTION.

Even great men do not hesitate on occasion to express an off-hand opinion on subjects of which they possess but a surface knowledge. Greater care should be exercised by such persons in this regard, for the position they occupy in the community by reason of their superior attainments in a particular field of learning or effort, is apt to lead the public to attach great importance to their opinion on all subjects. It does not follow because a man is a clever lawyer that, therefore, he is competent to express an opinion upon architecture, or that he is familiar with the conditions under which a large proportion of the buildings erected are designed and constructed. It was undoubtedly ignorance on this point that induced a prominent lawyer of Toronto to make an indiscriminate onslaught, before an audience he was recently addressing, upon architects for their alleged inability to put up beautiful buildings. This talented lawyer evidently was not aware of the fact that perhaps most of the buildings in the locality to which his remarks bore reference were constructed entirely without the agency of a properly qualified architect the the speculative builder having alone been responsible for their design and execution.

There is here a strong argument in favor of the effort which the Ontario Association of architects is making to induce the legislature to restrict for the future the use of the title "architect" to persons who are properly qualified for the practice of the profession. So long as everybody who may undertake to put up a building can call himself an architect, the public is unable to distinguish who are properly qualified men, and naturally enough, under these circumstances, the men of taste and skill are brought under public condemnation on account of the lack of taste displayed by those who possess no qualifications for the work which they undertake to do.

W. B. Mundy, architect, formerly of Hamilton, Ont., is erecting the new Chicago Fair building, which is to cost one million dollars.

COMBINATION HEATING.

The question of furnace and the best form of coil or heater adapted to it being decided, says Mr. J. W. Hughes in an article on this subject in the Metal Worker, the fitter has next to plan or lay out the mains and branches to suit different coils and radiators. As the buildings to be warmed differ in plan, so will the placing of pipes vary, and as long as the general principles controlling the circulation of water are not violated the apparatus will work. But there is no doubt but that certain plans on a given job will work better than others. The main object is to arrange the pipes to allow the greatest freedom of circulation. Undue friction must be avoided by not having the pipes too small, and by having too many sharp turns, and above all, the pipes must be arranged to allow of their being filled "solid"—that is, that there be no air pockets. As the water in the heater becomes hot it expands and becomes lighter, and by the law of gravitation ascends to the rising main or flow pipe, the colder water flowing in by the return. As long as the heat is applied this goes on continuously; but as the difference in the weight of the two columns of water viz., that in the flow and return is very little, it takes very little to stop it. A bubble of air in the pipes will stop circulation by separating the water.

The lesson to be learned is to avoid everything that will prevent the pipes and coils from being solidly filled with water, and that will prevent the water from flowing freely in the direction which it should go that is, up from the heater when warmed, and back and down to it when heat has been imparted to the air of the apartment.

The combination system is of necessity restricted in a greater or less degree by the size and make of the hot-air furnace, and the possibility of fitting a given sized coil or heater in it. The fact must not be lost sight of that in a building warmed with a combination apparatus, air from the furnace is the principal factor, the heat from the hot water circulation combined with it being a useful adjunct or assistant for warming certain portions of the building to which the hot air cannot gain access, or to increase the heat where the hot air would only be partially sufficient. Valves on coils should be avoided. To shut off a coil on a general circulation makes a serious disturbance that is apt to cause the formation of steam, with the accompanying noise, and when the checking of the fire causes the condensation of the steam the pipes will no longer be solidly filled with water, and there will be a poor circulation or none at all.

The following proportions of heaters or coils in furnaces to the amount of heating coils or circulation in rooms are from actual jobs that worked well: 30 ft. of 1¼ in. spiral coil in dome of furnace with 1¼ in. flow and return, and 1 in. and ¾ in. branches heated 1,300 ft. of 1 in. circulation coils; 11 ft. 1¼ in. heater pipe did the same for 380 ft. of ¾ in. coils; 11 ft. 1¼ in. coils with 1¼ in. flow and return and 1 in. branches took care of 260 ft. of 1 in. circulation coils; 9 ft. 6 in. of 1½ in. heater coil with 1¼ in. flow and return mains and 1. in branches to coils, carried 240 ft. of 1 in. circulation; 13 ft. 7 in. of 1 in. coil with 1 in. flow and return branches off to 1 in. and ¾ in. supplied 550 ft. of 1 in. coils; 12 ft. 7 in. of same sizes to 325 ft. was a success again; 12 ft. of 1 in. to 320 ft. of coils worked well; 11 ft. 10 in. of 1 in. with same sizes for distribution carried 439 ft. of coils; 14 ft. 6 in. of 1 in. to 400 ft. same sizes, and 13 ft. 2 in. of 1¼ in. with 1¼ in. flow and return 1 in. and ¾ in. distributing branches, to 490 ft. of 1 in. coils gave good results.

ARTIFICIAL MARBLE.

A company is said to have been recently formed in Toronto with the purpose of manufacturing artificial marble from gypsum, by a process invented by Mr. Geo. W. Parker.

The material is made into clocks, pedestals, table tops and other fancy articles for which marble is frequently employed. The gypsum, while in its crude soft state, is cut into the desired form, being afterwards subjected to a chemical solution and polished. Prof. Coleman, the well-known geologist of the School of Practical Science, Toronto, speaks of the new material as follows:

"I have examined with great interest the specimens of 'artificial marble' shown me, and have discussed the patented process by which they were made. Mr. Parker, of Michigan, the inventor of the process, explained his method viz: Dehydration of gypsum by heat, continued for a few hours, soaking the dehydrated gypsum with sulphate of alumina solution and then drying the mass operated upon. By this means the gypsum, which is soft and easily cut with a knife, or turned on a lathe, is transformed into a hard substance very much like marble and capable of the same uses. The raw material is very cheap and obtainable in large quantities; the treatment is simple and the result surprisingly good. A specimen of gypsum from western Ontario was given to Mr. Parker for treatment after being initialled by myself, and a fragment broken off for future identification of the mass. After treatment in the way mentioned, I found that it filled the fragment broken off and was evidently the identical mass of gypsum from my collection at the School of Science. But its properties were quite changed; it is even harder than marble, which it closely resembles, and is not attacked so readily by acids, which is a point in its favor. So far as I have examined into the process, I am very favorably impressed by it. A cheap and easily worked substance is changed by two or three days treatment of a simple and inexpensive nature into a substance as beautiful and apparently as durable as marble, which is very costly when of good quality."

CHIPS.

The new management of the St. John's Stone Chinaware Company, of St. John's, Que., have given notice of application to the legislature for a special act of incorporation.

The Canadian Society of Civil Engineers, at their regular meeting on the 17th inst., will discuss what action should be taken in view of the expiration on the 1st of May next, of the lease of the rooms at present occupied by the Society.

The eleventh annual meeting of the Canadian Society of Civil Engineers is announced to take place at the society's rooms, 112 Mansfield street, Montreal, on Tuesday, January 12th. The council for 1897 will be elected and other important business transacted.

A new heating and ventilating apparatus has lately been placed in the Pictou Academy building at Pictou, N. S. The building is heated by two separate systems of heating, direct and indirect. The first named consists of radiators in the halls and coils in the rooms, the coils to be used only in the coldest weather. The indirect system is supplied by fresh air from the outside, which enters in the basement and is warmed to the required temperature, being then admitted to the rooms through large registers. Mr. Frank Powers, of Lunenburg, was the contractor for the heating work, and Messrs. Elliott & Hopson, of Halifax, were the architects.

TESTS OF CONCRETE.

Some important tests of concrete were recently made at McGill University, Montreal, by Messrs. Theo. Denis, G. G. Hare and Carl Reinhardt, the results of which will be found below. The experiments are rendered particularly interesting by the fact that the general opinion of the effect of water on cement is somewhat erroneous. Following is the report of the tests as presented at a meeting of the Canadian Society of Civil Engineers:

Of late monolithic works of great importance have been carried out, and every day concrete, as building material, is creeping to a foremost place.

Although cement testing proper has been subjected to elaborate, scientific and practical investigations, very few researches, and especially normally conducted researches, have been made on the strength and behavior of concretes and betons. This probably is due to the fact that for such experiments heavy and costly apparatus is needed. Investigations on small specimens would be useless, and conditions approaching as nearly as possible to practice have to be followed.

The following are the results obtained from a series of experiments made by students of McGill University, 1895-96.

The object of this first series of experiments is to determine the effect of different per cents of water on the strength of the concrete. The limits were 16 and 30 per cent. of water, by weight of cement and sand, which are beyond the extremes of practice on both sides.

CEMENT.

The cement used was, of course, the same brand throughout the series. It was a German Portland of good quality, slow setting, on which separate sand tests were made in connection with this series. The results are tabulated below.

SAND.

This was clean, coarse, angular, dry sand of good quality, of slightly higher grade than usual practice.

STONE.

This was broken limestone of such size that the pieces would have passed through a ring 1¼ inches diameter. They were unscreened and just as they came out of the breaker. Consequently a slight amount of dust was mixed with them. They had to be broken a little smaller than in actual practice. The blocks of concrete being only one cubic foot, it was thought that more accurate results would be obtained in this way.

MOULDS.

The moulds were made of ¾ inch plank, lined with sheet zinc. They were 5 feet long, 1 foot high and 1 foot wide, divided into four compartments, which would mould four cubes at once, of dimensions 1 x 1 x 1 feet, forming specimens large enough to investigate seriously upon. These were removed by unscrewing one side of the box and sliding them out. Care had to be taken to oil the sides of the moulds slightly before ramming the mixture in them, to avoid trouble in getting them out.

CONDITIONS OF MIXTURE AND PROPORTIONS.

The proportions adopted for this series were one of cement, two of sand, and four of stones, by weight, the proportion of water being based on the weight of sand and cement.

The cement and the sand were first thoroughly mixed dry, then the water added gradually. The stones were

then thrown on this mortar, spread out, and the whole vigorously and very thoroughly mixed. The fresh concrete was then placed into the moulds and rammed in 1½ to 2 inch layers.

RAMMING.

The rammer was a block of hard wood 2 feet long by 2 x 2 inches, with a lathe turned handle. It was not very easy with this to ram uniformly, even throughout one block, and this is one of the main sources of discrepancies in this series of experiments.

It was thought that a reduction of the breaking loads to a standard weight of the blocks would be only fair, and would slightly improve the results.

GROUPING OF TESTS.

The tests were made at one week, four weeks, and two months, and the results grouped accordingly, that is to say, the one week tests, with different per cent. of water, compare between themselves, four weeks and two months likewise. Parallels between the results, at different ages, cannot be drawn on account of some specimens having been prepared under widely different conditions. For instance, the results at two months are exceedingly low as compared with those obtained at one and four weeks. This is due to the fact that these two months specimens were the first prepared of all, and this before the cemented trough in which they were to be immersed was completed. Consequently, they were kept 8 to 10 days longer than the others in the dry air of the laboratory, which seems to have had a disastrous effect on them. But in spite of these slight drawbacks, the annexed table shows that up to 24 per cent., the percentage of water has not a very great effect on the strength. This is an important point, for below 20 per cent. the mortar obtained is rather dry and very difficult to handle.

But beyond this limit of 24 per cent. a greater proportion of water seems to weaken the concrete considerably.

This limit is very sharply defined in the adjoining table, where an additional 2 per cent of water from 24 to 26 per cent. weakens the concrete by almost one-half for the one-week tests. It is, however, interesting to notice that strength is almost completely recovered with time, the four weeks test showing the weakening limit to be between 26 and 28 per cent., and the two months between 28 and 30 per cent. So that if immediate strength be not required of the concrete structure, 28 per cent. of water will not affect the ultimate resistance it allowed to stand two months.

In the parallel sand and cement tests the weak line is not so sharply defined, but yet it is sufficiently so to show that the same statement applies. The tests in this case show a marked weakening between 14 and 16 per cent. of water for the one week, which strength is ultimately recovered, as is shown by the four weeks and two months test.

The low limit of 14 per cent., as compared with 24 for the concrete, is probably due to the fact that the stones of the concrete, on account of their porosity, absorb a part of the water.

The table shows that the great density is obtained with 16 and 18 per cent. The weights of the cubes beyond this decrease up to 24 and 26 per cent., where they are again nearly equal in density to the 16 and 18 per cent. of water. Therefore this 24 and 26 per cent. seems to be the point where the best practical results are obtained, because 16 and 18 per cent. make up too dry a concrete to allow of easy handling.

Another point incidentally comes up. Attention has been drawn to the poor results obtained by the same tests and reason of long exposure to dry air given. This shows up a very important point, namely, the necessity of covering up carefully all concrete and cement works exposed for any length of time to dry air and sun. The bad effect of these agents is plainly demonstrated, and it is doubtful whether much strength would ultimately have been recovered.

It is also interesting to notice the results obtained by the concretes made of 1 part of cement, 2 of sand and 5 of stones, and 1 cement, 2 sand and 6 of stones. The specimens of these compositions gave results equal to concretes 1, 2, 4, showing that for strength they are as good as the ones containing a less proportion of stones, while being much more economical.

These experiments are as yet very incomplete. But it is hoped that the researches in this subject will be continued and that valuable information for the engineer in practice derived from them.

CONCRETE TESTS—COMPRESSION.

Proportions by weight: 1 part cement, 2 sand, 4 stone.

Per cent. of water by weight of cement and sand	Crushing strength per square inch. 1 week. comp. tests.	4 weeks.	2 mos.	Average weight of sp. per c. f.
16	792	677	382	141.5
18	653	679	507	143.0
20	746	626	507	139.5
22	620	645	670	139 5
24	679	542	559	141.5
26	362	545	500	141.2
28	326	340	823	138 0
30	245	331	361	135.5

Proportion by weight: 1 cement, 2 sand, 5 stone.

20	703

1 cement, 2 sand, 6 stone.

20	728

CEMENT AND SAND TESTS.

Proportions: 1 cement, 2 sand.

10	825	800	1822
12	800	1311	1666
14	750	1000	1100
16	475	1389	1777
18	395	1110	1266
20	400	913	1633
22	330	844	1233
24	388	—	1230
26	—	—	1000

Line of weakness due to excess of water.

THEO. DENIS.
CARL REINHARDT.
G. G. HARE.

McGill University, April, 1896.

New machinery has been put in position at the cement works of the Rathbun Company at Napanee Mills, and the output of the mills will be greatly increased.

A series of lectures on bridge designing has recently been delivered before the Applied Science Graduates' Society of McGill University, by Mr. J. A. L. Waddell, M. Am. Soc. C. E., a graduate of the civil engineering school of McGill, now of Kansas City, Mo.

The following are the newly appointed examiners of the Province of Quebec Association of Architects for the term commencing January, 1897: Messrs. Chas. Baillargé, F. X. Berlinguet, J. F. Peachy, of Quebec; Stewart Henbest Capper, Professor of Architecture at McGill University; A. T. Taylor, F. R. I. B. A., and Jos. Venne, of Montreal.

At a recent meeting of the governors of McGill University, Mr. R. J. Durrey, B. Le., A. M. G. C. E., London, was appointed assistant-professor of mechanical engineering in the faculty of applied science, in the place of Mr. J. G. Guest, who resigned a short time ago to accept the position of professor of mechanical engineering in the School of Engineering at Worchester, Mass.

CONVENTION OF THE ONTARIO ASSOCIATION OF ARCHITECTS.

THE annual convention, which will this year be held on Jan. 12th and 13th, will devote itself more than hitherto to artistic criticism in the form of free discussion of representations of executed work thrown on the wall by means of a stereopticon. Besides the usual display of members' work by this means, it is proposed to discuss the best examples of old work in Toronto; and there is talk of substituting for the paper that has always hitherto been given by some member of the staff of the School of Practical Science, a similar display of examples of some one style, selected from the admirable photos taken in England by Mr. Jos. Keele for the School collection of architectural photographs, and accompanying the exhibition by comment and discussion. There will also be two papers, one from Professor Capper of McGill University, of which the title has not been received, and one from Mr. D. B. Dick, on the "Possibility of a New Style." The programme seems to have a practical tendency all through, and will probably bring out further the more sociable manner of carrying on discussions that was noticeable at the last convention.

THE DUTY ON ARCHITECTS' MATERIALS.

A DEPUTATION representing the Ontario Association of Architects, interviewed the Tariff Commissioners on the occasion of their last visit to Toronto, with the object of endeavoring to secure a reduction in the duties on materials used by architects.

The following letter, expressive of the views of the Association, and accompanying memorandum, were placed in the hands of the Commissioners by Mr. Langton, the Registrar:—

"The accompanying statement of the duty imposed upon materials used by architects states also to what extent these materials are manufactured in Canada, and shows that, although there are two of the articles made in Canada, it is only imported articles of that kind that are used by architects. So that it is true to say that upon all the drawing materials used by architects there is a duty of from 25" to 35", and that none of these articles are manufactured in Canada.

"The duty, therefore, is of no use except as a contribution to revenue; and while regarded as a contribution to revenue, the result must be small, because the architectural profession comprises but a small body of men, to each architect the addition to his office expenses caused by these duties is of considerable importance.

"Nor is this a case where the tax levied on one body of men can be transmitted to others in the way of charges. An architect's fee is fixed by custom as a commission on the cost of the building erected; his own expenses do not enter into the calculation, and though they are greater under this tariff than before, there is no customary method of adjusting his charges to this increase."

STATEMENT CONCERNING ARCHITECTS' MATERIALS.

Tracing linen	Duty	7½%	Not made in Canada.
Prepared tracing paper	"	35	" " "
Black print paper	"	35	The composition a chemical secret known only to two persons in the U. S., and made by them.
Blue print paper	"	35	A little of this made in Canada, but the duty does not protect its manufacture, because the drawing paper which forms its base must be imported from the U. S. under duty. In the U. S. both the paper and process are native, and the manufacturers are able to keep the Canadian market.
White drawing paper	"	25	Not made in Canada.
White tracing paper	"	25	" " "
Manilla paper	"	25	A little made in Canada, but not of a quality suitable for our use. What we use is imported.
Inks			
Colors	"	23	Not made in Canada.
Instruments			

A writer in an exchange warns painters not to mix chrome yellow with Prussian blue to produce a bright green. Either substitute ultramarine for the Prussian blue, or yellow ochre or raw sienna for the chrome yellow.

POINTS ON VENTILATION.

SINCE a man inhales on an average 16 ft. to 18 ft. of air in an hour, and the air he exhales contains 180 times as much carbonic acid as fresh air, it will require 120 times as much fresh air to dilute it sufficiently in order to render it suitable for respiration. Each individual will require, therefore, about 2,000 cubic feet of fresh air per hour.

In practice it is generally found that a larger quantity is desirable, and this is usually stated at 3,000 cubic feet. Since the air of a room, it may be said, is not changed more than three or four times an hour, it is desirable that, if each individual is to be provided with 3,000 cubic feet of fresh air per hour, he should have an air-space of from 750 to 1,000 cubic feet.

It has been found that where a current of air enters a room at a greater rate than 2 ft. per second, a draught is caused. The art of ventilation, therefore, may be described as the art of supplying a public building or dwelling with air at this rate, and in quantities sufficient to prevent the possibility of the carbonic acid from increasing beyond the limits of purity.

BRICKS MADE FROM SAND.

AN organization has been incorporated in San Francisco, California, which proposes to expend $50,000 in the purchase of a site and the erection of buildings for the manufacture of bricks from sand. The stone brick which it is proposed to make will be manufactured from powdered stone or the elements contained in stone, such as sand, clay, etc. These substances are mixed with a prepared "flux," which acts as a bond, holding together the particles of sand or other material used as a filler, the whole being thoroughly annealed by heating.

Among the advantages claimed for the brick is the saving of time, only ten hours being needed for their manufacture, instead of eight to thirty days; a much less consumption of fuel; scarcely any loss from burning; a crushing strength from 10,000 to 40,000 lbs. to the square inch instead of from 400 to 4,000 lbs., and a reduction of cost to three-fifths of that of the old style bricks.

TESTING QUICKSAND.

SUPPOSE we take a certain quantity of quicksand, dry it artificially, and then try to make it into quicksand again. Put it into a box and pour water on it carefully. Instantly the water is soaked up, and if we measure the volume or better, the weight of the sand, we shall see that it takes up a quantity of water that measures 30 per cent. of its own volume, or 20 per cent. by weight. The rest stays above the layer of sand. If we now pierce a little hole in the bottom of the box, we shall see pure water run out; the sand forms a kind of immovable filter. Also by turning the box upside down to see the sand keep its form like a stopper. It follows from this experiment that we cannot obtain quicksand in this way. We must reverse the condition of the experiment. Let us put the water into a vessel and sift in the dry sand in a thin stream, while shaking the vessel lightly. Then we shall get the thick but easily flowing compound known as quicksand. That the mixture may keep its mobility, two conditions are necessary: (1) The quantity of water must not be less than 21 per cent. by weight. (2) The whole must be continually though lightly shaken. If we increase the proportion or interrupt the agitation for an instant, the mass settles down, retaining about 20 per cent. of water, while the surplus, if it exists, rises to the top. La Nature.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, communications must be accompanied by the name and address of the author, but not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

THE CONDUCT OF EXAMINATIONS.

TORONTO, Dec. 10, 1896.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

DEAR SIR, — Your correspondent, Mr. Ireland, in the November number of the CANADIAN ARCHITECT AND BUILDER expresses a wish that intending architects should be examined by "an independent and recognized public body." The Board of Examiners of the Ontario Association of Architects is in reality such a body; but being composed chiefly of architects it is possible to assert that is not independent, and perhaps Mr. Ireland means to do so.

The conduct of the examinations was given to the Association by the legislature along with limited public powers. When it was proposed to increase these powers the legislators who expressed themselves as favourable to doing so did not think it necessary to alter the present manner of conducting the examinations, although the Council suggested that the government should take the examining out of their hands. If it should be proposed to put the examinations in the hands of the government, the Association will be not only content but glad.

Yours truly,

W. A. LANGTON, Registrar.

THE ONTARIO ARCHITECTS' ACT.

To the Editor of the CANADIAN ARCHITECT AND BUILDER.

SIR, — In your November number Mr. S. J. Ireland's letter was to me a great surprise — a double surprise in that Mr. Ireland should not have been more familiar with the workings and aims of the Ontario Association of Architects, and that he should also be so unfamiliar with the qualifications for architectural practice.

As regards the O. A. A., Mr. Ireland wishes we had "an independent and recognized public examining body"; is he not aware of the fact that such a body has existed for several years — a body as independent as that of the legal, medical or clerical professions, and a body of recognized ability, composed as it is of the best men in the profession in Ontario; and even now for membership the O. A. A. makes it compulsory to pass certain examinations, and hard ones they are, comprising infinitely more than Mr. Ireland enumerates as necessary. This examining body and these examinations will continue after the amended Bill is passed, and all embryo architects will have to prove themselves for admission just as they have now — justice, of course, demanding that practising architects be admitted without examination.

Personally, I thank Mr. Ireland for bringing out these points against us. He states them as public opinions; I know they are public opinions, for I have repeatedly heard the same lines of argument, and I sincerely wish that the public understood our Bill, understood our workings, understood our history; if they did, there would not only be no dissenting voice, but they would favor us. We are not working for self, but for our art, and by forcing our would-be exponents to be properly qualified, we are doing a great good for Ontario architecture — a good that will be felt for all time.

In regard to our education, I must take issue with Mr. Ireland on every point, because the system of education in use by the O. A. A., and proposed to be continued under any additions to our Bill, is the best possible under present circumstances requiring five years' study in an office with three examinations, or graduation at the School of Science with three years in an office and one examination. To this the only advisable addition would be that five year office students should, during the fifth year, attend the School of Science to receive a polishing off in theory.

Mr. Ireland's contention in regard to a boy and divinity is proper for divinity, but if he would analyze architectural and divinity qualifications he would find that the boy, were he never at a church service, never heard a public speech from his birth till his graduation as a preacher, would be of no use in a pulpit; the school simply teaches him the laws and history; his own observation of church services alone will fit and experience him to stand in the pulpit. So also in architecture, which is largely a profession of observation and experience, the boy learns theory at school or studies it up for himself, and can only gain practising knowledge by several years' actual office work.

Mr. Ireland says his school will teach a boy in two years as much as we will learn in five in an office; well perhaps. Our offices must be funny places, for gloomy indeed is his picture of our fledglings wearing out five long weary years of their tender young lives in office drudgery, and especially foreboding is the information that after all this slavery they might have acquired as much or more knowledge in two years at an art school. I can assure Mr. Ireland that his ideas, as stated, in regard to office training, are entirely erroneous; if a youth enters a three-year office term a Science School graduate, he starts with a certain quantity of knowledge that the other lacks, who, not a graduate, takes the five-year term, which extra two years are added that he may pick up as fully as possible what the Science School one knew upon entering, and the office history of the boy runs through the whole gamut, from ignorance to proficiency, from tracing and copying during the first few months to preliminary sketches, perspective rendering, original drawings, details, designing, writing specifications and superintendence, besides becoming thoroughly familiar with all classes of materials. Five years of this in a good office will turn out a tolerably fair architect if the boy be any good. Now to this we add the O. A. A. requirements of three examinations, thus forcing the boy to systematic study and giving him a thorough test, proving that he can build strongly and well and that he is master of his materials. What more can the public demand, and are they not aware that we have been doing this very thing for several years?

We do not require to alter our Bill all that we require is that the public throw off the shackles of deliberate blindness, study our aims, and they will grant our requests.

As one who has passed the O. A. A. examinations, I cannot urge too strongly upon all the boys to study, and study hard and pass the examinations, whether or not they intend ever to practice in Ontario; and to those who intend entering the profession, if their purse strings will admit it, I strongly advise graduation at the School of Science before taking the three-year term which is then allowed, and don't enter the lists unless from pure love of architecture, and in return the O. A. A. welcomes you.

DAVID GUNN BAXTER.

STRATFORD, Dec. 4, 1896.

ILLUSTRATIONS.

PRELIMINARY SKETCHES FOR PROPOSED STABLE AND COACHMAN'S DWELLING AT OAKVILLE, ONT.
MESSRS. DICK & WICKSON, ARCHITECTS.

REPRODUCTION FROM A DRAWING BY N. T. LYON, OF CENTRAL PORTION OF A STAINED GLASS WINDOW, PRESENTED BY ARCHBISHOP WALSH TO THE CHAPEL OF THE SISTERS OF ST. JOSEPH, TORONTO, OF WHICH MR. JOS. CONNOLLY IS THE ARCHITECT.

RESIDENCE FOR MR. W. R. MILLER, STANLEY STREET, MONTREAL. R. FINDLAY, ARCHITECT.

This residence, recently completed, is a good illustration of what can be done in making an old building meet modern requirements, and by the skill of the architect such changes are often successfully carried out.

The old building, once a private stable and coach house, and belonging to one of Montreal's leading citizens, was purchased by Mr. Miller, who decided to convert it into a residence, and entrusted the work to Robt. Findlay, architect. The result has been most satisfactory, and the building is now considered one of the best residences in the city. Although so great a change has been wrought, the old foundations, a portion of the old walls, and the entrance doorway, still remain, and form part of the new building. The interior is handsomely designed and finished in the old colonial style. A handsome stable and out-buildings have also been erected within the grounds. The site is an excellent one on the mountain slope and overlooking the city.

FRENCH METHODS OF CONSTRUCTION.

IN the construction of large buildings in France iron has been used to a much less extent than in America. Heretofore its use in its ordinary form has been confined to floors, partitions and roofs, where, as a rule, it is covered by a coating of cement, wood or stone, except in the case of buildings destined for brasseries or drinking halls, where the iron was left visible, and emphasized by means of painting or mosaic work. In the city of Paris, however, iron is fast finding favor for employment in combination with other materials, such as cement or concrete, and in a special form known as the cement arme system. By this method iron and steel is employed in the form of thick wire, trellis, or light bars, imbedded in cement or concrete. Three different systems of this construction have been used in various buildings of more or less importance, and are said to possess advantages when employed for floors, partitions and roofs, both as regards economy, conveniences for internal arrangements, and decorative purposes.

In a building constructed for the Society of Civil Engineers, iron and other modern materials were liberally used. The facade in this building is 100 feet long, and is built of solid stonework, the thickness of the masonry at the lower storeys being 24 inches and at the upper stories 18 inches. The body of the building is constructed of a framework of iron, the chief supports consisting of four framed iron uprights, 16 in. by 16 in., rising from the basement to the roof. The uprights are held together at the floor by iron girders, supporting the iron joists of the upper floors and the light partitions which divide up each storey.

Nearly all the stone is dressed after being put in place, which affords greater facilities for studying the general ensemble of the facade and the proper scale to be given to the mouldings and decoration. The stone is soft when first taken from the quarries, but becomes hard and durable after dressing and exposure to the air. The courtyard wall of the building is formed of light brick or metallic fillings between the iron uprights and the party walls.

The ground floor is built after the Coignet system, composed of light iron bars and cement; the first floor and its supporting pillars and arches are constructed after the Hennebique system of cement arme.; the upper floors are formed of iron joists filled in with light supports and plaster or with terra cotta fillings between joists.

The ground floor of the conference hall, 30 x 20 ft., paved with mosaic work, will be a movable one, to be raised or lowered by an ingenious system of hydraulics, and capable of being placed in an inclined position for conference meetings or raised to a horizontal position for ball-room purposes.

The roof is lined internally with agglomerated cork bricks, and the walls of the area will be lined with opaline, a vitreous material of a bluish-white color, which will afford cleanliness and afford additional light.

ELECTRIC STONE CUTTING.

AN ingenious application of electricity has recently been made in the large new Hotel Cecil, in London, Eng. After the marble staircase was put up it was found that the balusters had been placed so far apart that it was quite possible for a child to slip between them. In order to make the stairs perfectly safe it was resolved to place a brass baluster between every two marble ones. In order to do this as quickly as possible, with a minimum of noise and dirt, the use of an electric motor with flexible shaft and twisted drill was suggested. A small one-horse iron-clad motor, controlled by the operator, was used, and the holes were drilled at the rate of thirty or forty a day. They were neat and clean, with very little fracture at the edges. This method of rapid drilling is said to be likely to take a prominent place in marble working.

RECENT CANADIAN PATENTS.

The following patents, of interest to architects and builders, have recently been granted for Canada:

Hot Water Boiler — Geo. C. Morrison, Hamilton, Ont. The claim is for a vertical boiler, constructed of one seamless tubular piece having threaded or screwed ends, and faced in combination with the heads, having inner true faces to engage with end of said boiler when screwed in position, with water inlet and circulating tube or pipe, and a water heating reservoir connected by means of pipes.

Clay Mould for Sanitary Ware — F. B. Dakin, of Iberville, and C. C. Corneille, of Montreal, Que. It consists of a clay body, comprising Pennsylvania Feldspathic clay as a base, a silicious clay, English ball clay and English Cornwall stone.

Brick Kiln — John K. Caldwell, Minneapolis, Minn.

Rock Crushing and Grinding Apparatus — Kinkead Mill Company, San Francisco, Cal.

Hot Water Heater — John Barsley, Montreal, Que.

Hydrant — E. S. Manney, Montreal, Que.

Hot Water Furnace — Joseph T. Robbins, Newton, Iowa.

Metallic Lathing — Mex. R. Fordyce, Newark, U. S.

Metal Lath — D. B. Hilton, Brooklyn, N. J.

Brick-Making Machine — Frank Gutteridge, Seaforth, Ont.

Art or Process of Making Stone for Buildings — R. A. Pyne, J. M. Hutchins, Z. Hemphill and H. M. East, of Toronto.

Machine for the Production of Slabs of Plaster, Cement or Composition — R. W. Hitchins, Finsbury, London, Eng.

THE INFLUENCE OF STEEL CONSTRUCTION AND PLATE GLASS UPON STYLE.*

THE author of an article recently published in Lippincott's Magazine summarizes the laws of architectural design in the sentence, "form follows function," and endeavors to condense into three words what others have vainly tried to enunciate in numerous treatises and in bulky volumes on the Philosophy of Art. If it was necessary to state in a three-worded aphorism the entire law of architectural design and composition, nothing could have better suited the purpose than the words quoted above from the pen of that clear thinker and brilliant writer, Louis H. Sullivan.

Every architectural work has a "function," a purpose which has called it into being, and its success is measured by the degree of approximation to fulfilment of "function" which characterizes its "form."

From this one might infer that it is only necessary to divide into a few classes the functions to be served by architectural structures, and to determine the form best adapted to each, and thus develop an infallibly correct system of architectural design from which none may deviate without incurring the reproach of ignorance and lack of culture.

We should then have an architecture somewhat more scientific and vastly more practical, but as trite and as devoid of the interest imparted by the creative impulse as is the architecture founded upon the principle, form follows historic precedent, which stamps as barbaric every structure for which the architect has failed to provide an academically and historically correct mask and costume, and which treats as heresy an attempt to do, not as the Romans did in the year 1, but to do as one thinks the Romans might have done in the year 1896.

Returning to Mr. Sullivan's aphorism, we find that he bases it upon studies and conversations of nature which, carried a little farther, show that although the common function of all organic creation is maintenance and propagation of the various species, yet an ever varying environment has produced an infinite number of species and innumerable differences in individuals of each species.

Therefore, if "form follows function," it does not follow in a straight line, nor in accordance with a simple mathematical formula, but along the lines of curves whose elements are always changing and never alike.

If the lines of development and growth of vegetable and animal organisms are infinitely differentiated, the processes of untrammelled human thought and human emotions are even more subtile in the differences and shading of their manifestations, while the natural variations in conditions of human environment are as great as those which influence the developments of form in the lower organisms; and human work is further modified by necessary artificial conditions and circumstances.

Therefore, before accepting Mr. Sullivan's statement of the underlying law upon which all good architectural design and all true architectural style is founded, it may be well to amend it, and say: "function and environment determine form," using the words environment and form in their broadest sense.

The functions served by the work of the architect have expanded but little, and have varied still less within the limits of the historic records of architecture; nor has there been much change until the last quarter of this century in those conditions of environment which comprise the structural and decorative materials at the disposal of the architect.

The great epochs in the development of architectural style are respectively characterized by the introduction of the pointed arch and its characteristic vaultings. It is our good fortune to have inherited all that was accomplished by the many generations who lived and thought and worked in these epochs. We are still more blessed in being allowed the privilege of participating in the creation and in witnessing the birth of another epoch in architectural design, the form of style of which will be founded upon the discovery of the steel pillar, the steel beam, the clear sheet of plate glass, electric light and mechanical ventilation—all devoted to the service of functions or wants created by the greater intensity of modern life and by improved means of communication between places and men.

Probably there were those in Greece who deplored the departure from correct and historic Assyrian and Egyptian architecture which had to be made in order to originate and establish the most exquisitely finished and most fully and logically developed architectural style the world has known. And when the sturdy but gross-minded Roman used and modified Greek prototypes in accordance with his coarser and more aggressive mentality, and when, finally, he introduced the arch and the vault, and substituted for the refined and elegant treatment of the severe and regular forms inseparable from beam and lintel construction, a bold and comparatively unrefined treatment of the more irregular and picturesque forms made possible by the discovery of the arch, the new departure was certainly as displeasing and distressing to the purists and scholars of that day as were in latter days the works of those alleged barbarians whose efforts to utilize to the utmost the means and knowledge at their command, created the styles known as "Byzantine" and "Romanesque," and finally that culmination of protest against dry-as-dust tradition, the styles which scholars and men of culture derisively named after the barbarian Goths.

So, also, in our day, many of those who have been taught to understand and love and honor forms and traditions transmitted from past ages shrink from contact with the new materials and processes, and, noting the inevitable modifications of time-honored theory and practice, lift their voices in protest against legitimizing forms which are the offspring of newly-arisen functions and of newly-discovered conditions of environment.

And yet each historic style was called into being in obedience to new developments of function or environment, and each was in its day an iconoclastic innovation upon well established and firmly founded practice.

Therefore we are justified in assuming that the new conditions will exert a marked influence on architectural style in our day and in the future.

It is the duty of those, who by familiarity with the historical styles are best fitted for this task, to ascertain the creative principles and laws which underlie the architectural style of by-gone periods of greatest artistic achievement, and to apply these principles to the utilization of the means placed at the disposal of the architect of our day for satisfying the requirements of the day.

The American architect, who travels in Europe and studies the architecture of the many ages which have preceded the last century, is impressed and charmed by the freedom and naïveté with which consciousness of the fact that each age is the heir of all preceding ages is proclaimed in the composition and in detail of so many structures. Nothing can be more interesting than the observation of the existence of a living vigorous style, joyous in the consciousness of life, free to assimilate the old and to create the new. Nor is it unprofitable to follow a style from the exuberance of its youthful vigor to old age and decadence, to ossification and crystallization into an inert and lifeless set of fixed and unalterable rules, into a fetich to be worshipped by future generations; in other words, into an academic historic style.

But after one has taken it all in, there is one impression stronger than all others. It is the consciousness of the zeal and earnestness of the all-pervading endeavor to so utilize all the means at command, that the form and expression of each structure might conform to its function, whether that were the worship of God or the glorification of guild or municipality; whether intended to serve the lavish display of the wealth and dignity of the great noble, or to house the humble burgher, each kind of structure has its individuality, and of these, again, each gives expression to the character and personality of its occupant.

Our generation has in many ways shown itself worthy of its heirship of so many ages, and has given expression to its appreciation of its good fortune by transmitting to the future an inheritance still more valuable than that which has fallen to its lot.

What can the architect do, that he also may prove himself worthy of opportunities so much greater than those enjoyed by his predecessors?

Human nature has limitations which circumscribe and define the attainable in literature and art. There will be none greater than Homer, than Moses, than David, than Shakespeare, than Phidias, than Leonardo da Vinci, than Raphael, than Michael Angelo; no author, no sculptor, no painter, no architect can as an artist expect to excel many who have gone before. But the architect is not only an artist, but also an engineer, a man of science and a man of affairs. In these latter capacities, the architect of to-day has at his command instrumentalities and opportunities unknown to his predecessors. Were he an artist only, the giant strides which science, and by its aid industry, communication and traffic have made in the past fifty years would leave him by the wayside, content as are his fellow-artists of the brush and chisel to admire the onward rush, to be with it, but not of it, to be dazed by its splendor and to thrive and wax fat under the patronage of those who initiate and control the movement of modern material progress.

*Paper by Mr. Dankmar Adler, presented before the American Institute of Architects.

But architecture is not permitted to remain placidly contemplative of the march of events. The architect is not allowed to wait until, seized by an irresistible impulse from within, he gives the world the fruit of his studies and musings. He is of the world as well as in it. The world of to-day has greater need of his aid than had any previous period, and he is pressed into its service and must work for it and with it, no matter whether or not urged by the spirit within him. The world must have buildings; it will have them adapted to its wants and functions; it will insist upon the utilization of the best of the materials and processes which scientific and industrial progress place at its disposal. The architect must, therefore, fit himself for the duties thrust upon him. The world calls upon him to do the work of to-day with the tools of to-day, not as a tyro, not as one who must first learn how, but as an architect, a master worker, as one of whom the world believes that familiarity which he has acquired with the processes by which the work of other periods has been accomplished makes him better fitted for the work of to-day, and that he will press into its service all the experience of many ages and epochs.

Michael Angelo was painter, sculptor, architect, diplomat, but above all, and in all, an artist. An important factor in his greatness as an architect was his familiarity with the technique of the auxiliary and subsidiary arts, sciences and crafts, the command of which devolves upon the architect. The great Buonarotti did not disdain to learn the metal-founder's, the quarry-worker's and other crafts in order to be the better able to carry out the plans which his great mind had conceived. Were he among us now, he would be in the front rank of the experts and specialists in all the modern arts and sciences which have arisen to perplex and worry the artist-architect wedded to the traditions, processes and materials of the past. And being Master of specialties and details, he would, as General, master them all into martial array for overcoming the difficulties incident to the expanded and diversified demands which our time makes upon the architect.

Few, perhaps none of us, can be equal to Buonarotti, but all can emulate him in his zeal and capacity for hard work. We, too, can become impatient and contemptuous of the performance of auxiliaries and specialists, and dismissing them, can ourselves acquire a knowledge of the technique of their arts and sciences and crafts, and in the furnace heat of zeal and enthusiasm for the attainment of a great end, combine all that we honor in the lore and traditions of our profession with the discoveries and achievements of the science of to-day, pour all into the mould of contemporary requirements and bring forth our contribution to the architecture of the New World, the new age of steel, electricity and scientific progress.

For several years it has been the fashion among the professors of our art to decry the new materials and processes of construction, and condemn their most noteworthy applications to the service of requirements born of modern conditions. The contributions which modern science has made to our power to command and utilize the materials and forces of nature, and the increased and expanded opportunities for the creation of useful and beautiful works which modern society has given us, have been looked upon askance. And it is greatly to be regretted that some of those whose works had proved them well qualified to determine under the new environment the forms best adapted to the old, as well as the new functions, have been most persistent in their condemnatory utterances against the new problems which they themselves were so successfully solving.

What I have written is intended to be a protest against the dogma that art in architecture ended with the Renaissance, a denial of the assumption that the uses of materials and processes, and wants and functions unknown to the masters who flourished in that glorious period, or their predecessors in other eras of great artistic vigor in architecture, is incompatible with the performance of truly artistic work.

I wish to maintain that the steel pillar and beam, and other contemporary contributions to the materials and processes of building construction, that the modern business building, and many other so called monstrosities, are as legitimate contributions to architectural art as were in their day, when first introduced, the stone pier and lintel, the brick wall or pier, the arch, the vault, the roofed temple, the vaulted basilica, the spired and buttressed cathedral. All that is wanting is the will and the ability to make proper use of these newly discovered agencies.

The new materials and processes, the new requirements, should not, however, in their introduction into architecture and in their assimilation by our art, be treated as things apart and by themselves, but they should be treated as related to and part of all that has gone before in the long history of human and artistic progress.

The author of to-day has at his disposal and does not disdain to use an enlarged vocabulary; the musician has a greater range of instruments, a richer and fuller orchestration; and the great composer deems it a privilege to be able to evolve combinations of tone that were unattainable to his predecessors. And even if the painter of to-day uses the same pigments, and depicts the same phases of animate and inanimate nature, and the sculptor uses the same marble, and both painter and sculptor play upon the same gamut of human emotions, as did their prototypes for many generations, that is no reason why the architect should look askance upon new instrumentalities and new opportunities for developing and enlarging the scope of his art.

Let us, then, welcome the prosaic output of furnace and mill, and even the unpromising and garish sheet of plate-glass. If they are always used where they are wanted and as they are wanted and never where they are not wanted, nor as they are not wanted, we shall have taken the first step towards the transmutation of these utterances of scientific prose into the language of poetry and art. In the nature of things, the block of rough stone, the lump of clay, the log of timber, are all apparently as uncompromisingly unpoetic and inartistic as the much degraded and unappreciated modern intruders into the programme of architectural composition, which form the title of this paper. What they have of poetic suggestion and significance they owe to the genius of man, and what man has done, man can do. Let us not stand back and admit that we are unable to learn from our predecessors how difficulties are overcome, how victory is wrested from apparent defeat.

Yet another word. I have quoted the dictum "form follows function," and have modified it into the words "function and environment determine form."

Steel pillars and steel beams occupy so little space that in order to enclose structures of which they are the essential supporting parts, they must be furnished with a filling, if a space enclosing structure is to be erected, and steel posts and beams to be adequately protected against possible attacks of fire must receive bulky fire protective coverings. In these fillings and coverings we obtain media for artistic treatment which may be handled solely with reference to the desire to adapt "form" to "function."

From this I deduce that the influence of the new materials and processes will tend to a more free and less trammelled treatment of architectural design, and that the striving for the creation of ideally perfect form will be less hampered by limitations incident to the use of refractory materials of construction.

PERSONAL.

The death is announced of Mr. J. C. Clements, contractor, of Vancouver, B. C.

C. A. & E. W. Barber, architects and mechanical engineers, have opened an office at Rat Portage, Ont.

The firm of J. W. & E. C. Hopkins, architects, Montreal, has been dissolved, Mr. J. W. Hopkins continuing.

At the recent convention at Chicago of the American Society of Municipal Improvement, Mr. E. H. Keating, city engineer of Toronto, was elected a member of the Water Works and Water Supply Committee.

Mr. H. D. Ellis, formerly of the city engineer's staff, Toronto, has lately returned from Manitoba, where he has been engaged in the construction of 100 miles of railway from Gladstone through the Dauphin district to Lake Winnipegoosis.

Mr. E. C. Hopkins, formerly of the firm of J. W. & E. C. Hopkins, architects, Montreal, has recently formed a new partnership with Mr. E. Sainbault, certified architect, of Paris. The new firm will be known as Hopkins & Sainbault, with offices at 1,586½ Notre Dame street, Montreal.

Messrs. Heney and Borthwick, of Ottawa, have taken suit in the Exchequer Court for $15,000 for work done in connection with the construction of a drain at the Lachine Canal.

Action has been taken by Messrs. Blanshard & Norton, brick and stone contractors, against the trustees of the First Methodist Church, London, for a balance of about $7,000. The trustees claim to be holding back part of their contract price on account of the mechanics' liens placed by a sub-contractor.

V.8-9
Canadian

STUDENTS' DEPARTMENT.

LEAD, COPPER AND ZINC FOR ROOFING.*

In attempting to compare the relative claims of each of the three metals lead, zinc and copper—as materials for roof covering, one has first to consider what are the chief requirements for a material used for this purpose.

These may be stated in the following order: First of all, durability; then lightness; then workableness; next, capacity to resist fire; and lastly insonorousness.

Although the question of durability must be decided chiefly by experience and observation of special instances, yet something may be predicted as at least highly probable from a consideration of the texture of the metal and its liability to corrosion from acids, etc. Into this inquiry, of course, the element of weight largely enters, and I therefore take the opportunity of naming specific gravity and atomic weights of each of the three metals:

	Specific Gravity.		Atomic Weights.
Lead	11·4	Lead	207
Copper	8·8	Copper	63·5
Zinc	6·9	Zinc	65

or, taking the weight of a superficial foot 1-16 in. thick we find it

Lead	about 3¼ lbs.
Copper	" 2¾ "
Zinc	" 2¼ "

Thus, if weight were the only consideration in this inquiry as to durability, lead would be nearly twice as durable as zinc and at least a third more durable than copper. But there is another element which must be equally considered namely, the hardness or, rather, firmness of the material, and perhaps this property can best be indicated by the relative amount of conductivity, which in lead may be represented by 230; nearly twice as high in zinc, say 430; while in copper it is more than twice as high as zinc and more than four times as high as lead, viz., 1,000.

And the conclusion which we might derive from these figures is corroborated by those which represent the fusibility of the different metals, viz., lead, 630 deg. Fahr.; zinc, 800 deg. Fahr.; and copper, nearly four times that of lead and nearly three times that of zinc, viz., 2,143 deg. Fahr.

It thus appears that though lead is so very much heavier than the other two metals, its want of firmness is still more conspicuous, and, on the whole, roughly it might be guessed that lead and copper would, surrounding conditions being equal, be of about equal durability, particularly as neither of these metals is easily acted upon by acids.

As to zinc, although it occupies a middle place between lead and copper, both in the matter of weight and also of firmness, it is yet quite out of the competition as to durability from the fact that acids act upon it with great facility.

The softness of lead has its advantages, since it is easy to use it of great thickness, while at the same time the low price makes it possible to do this without a prohibitive outlay; so that lead may be laid of a thickness weighing perhaps 6 lbs. or 7 lbs. to the foot as easily as copper weighing only 16 oz. or 18 oz. to the foot. And at these relative weights it would be fair to assume that the metals would be about equally durable. Experience endorses these assumptions, and it is found to be practically the case that zinc, laid of the best thickness which it is worth while to use, say about 1½ lbs. to the superficial foot, will keep a roof sound from twenty to thirty years, while copper of 16 oz. to the foot, or lead of 7 lbs. form either of them a practically permanent covering lasting 100 years or upwards; that is to say, if properly laid and in favorable situations.

But the question of durability cannot be disposed of without a consideration of the property of expansion. When a zinc flat lets in water, and has to be taken up for renewal, it is often seen that the metal is not perished, but is split into cracks. The heat of the sun has so increased the size of the metal that, having been fastened by nails, or soldered together in large sheets, it has risen in buckles. When a shower of rain or a cold night has followed, the metal has contracted, and so caused the cracks. If the expansion of zinc is set down at 30, lead will show 28, and copper only 19.

In laying either of the metals care has to be taken to allow for expansion, and if the proper methods are adopted much can be done to prevent the injurious effects of it:

There is one thing to consider viz., the capacity to bear traffic without injury. Flat roofs are very likely to be walked over, and to have things placed upon them, round or under which dirt or moisture can collect. On account of its extreme softness, lead, unless very thick, is easily damaged by traffic; and zinc, although harder, is brittle, and is also easily corroded by foreign matter; and both, as already mentioned, are exceedingly liable to buckles and cracks. Copper, on the other hand, is so tough that it is practically uninjured by traffic and little liable to corrosion. It should, however, be laid with wood rolls and welted caps, and not according to the old method of stand-up welts.

So far for flat roofs. For pitched roofs and towers or spires the great weight of lead is much against its use. In such positions lead has a way of crawling down, as it is called, and this is a very destructive process and greatly shortens its usefulness. As an instance of this I may mention that some years ago we had an order to cover the spire of St. Peter's Church, Cornhill, with copper. It was then covered with lead, which we ascertained had been laid in the year 1804.

When the lead was stripped off it was found to be very thick—some of it at least from 10 lb. to 12 lb. to the foot, and was not perished, but was very badly torn and cracked through the expansion and contraction and the creeping down in some places, and the giving way of the wood supports in others. In fact, its own weight had destroyed it.

The copper which we put on in place of it would weigh perhaps not more than one-eighth or one-tenth of the lead, and would rather tend to support the woodwork than require to be supported by it. The key which forms a sort of finial on the top of the spire was in good repair and did not require renewal it was of copper. It is said, but I am not sure upon what evidence, that the lead on the roof of Bristol Cathedral crawled down as much as 18 in. in two years.

The extreme softness of lead makes it unfit for ornamental work. It is always necessary, when lead is being used, that the wood should first be formed into the shapes, and the lead dressed closely over these; on account of their stiffness zinc and copper do not require the mouldings and ornaments to be formed in the wood, but are sufficiently supported by a rough wood core. Zinc, however, suffers in the process of stamping and hammering, as it is seriously injured by application of heat.

Copper, on the other hand, may be heated to a red, or even a white glow, and then immersed in cold water without being in any way injured, but by this annealing, as it is called, is rendered soft and pliable, and regains its stiffness under the hammer or stamp.

On these accounts copper has come to be very much used for ornamental roofs and for spires, fleches, finials, figures, etc., for which it is also specially adapted on account of the little weight per foot which is necessary to use.

Lead has been so very largely used for roofs for many hundreds of years that it is unnecessary to quote instances as to its lasting power when properly laid on flat roofs, but as the durability of copper is not so well known, I may mention one or two examples.

The tower of the parish church of Hampstead was covered with copper in the year 1784, and the copper is still in good condition, being of a beautiful green color. Some years ago, however, in a severe gale, two or three of the sheets were blown off, and had to be replaced by new sheets, which, of course, have still the dark look. Mr. Clowser, a builder, of Hampstead, told us that his old father knew that the tower was covered with copper over 100 years ago, and the church records give the date above mentioned.

*One of a series of papers on "Roof Coverings," read before the London Architectural Association by Mr. G. Ewart.

A few years ago we had to replace a copper flat on the roof of Somerset house. The copper itself was not perished, as may be seen by the sample which we kept. The reason it had to be replaced was that it had been laid in the old style with stand-up welts, and these had been trodden down and broken. There is good reason to believe that this copper was laid when Somerset house was built.

We have also obtained a sample of the copper on the church of St. Botolph's, which is very thin, weighing only about 14 oz. to the foot. The metal is still not perished, although probably laid when the church was built. Through the sinking of the timber it is out of repair, and this is one of many instances in which the copper covering outlasts the material of the building. A remarkable instance occurred some little time ago, which showed, at the same time, the great durability of copper and the importance of having it properly laid.

We were instructed to take the old copper off a church in Wiltshire, and were told by the architect that it had been laid 250 years ago. The flat sheets were not perished, but the standing welts were worn through. We cut the worn edges off the sheets, and relaid the same material with wood rolls, after repairing the wood work, which had rotted where the upright welts had admitted water.

Next to this paramount question of durability comes that of weight, or, we should rather say, of lightness. Here, of course, lead cannot stand comparison with either zinc or copper. Lead is so soft, and has so little coherence, that in order to make a good job, it is found necessary to lay it very thick—nearly ⅛ in. But at the same time, lead is exceedingly heavy, so that a square foot of this thickness weighs upwards of 7 lbs.; it thus happens that when allowance has been made for the necessary rolls and laps, the lead necessary to cover a square of 100 ft. weighs rather more than the slates which would be necessary to cover the same area, and at least half as much as plain tiles.

Zinc, on account of its superior firmness, is laid in the best manner at about one-fourth of this thickness and less than one-fourth of the weight, say 1½ lbs. to the foot; but then, as already mentioned, zinc cannot be relied upon to stand more than about one-fourth of the time that lead will.

With copper, however, the case is different. Here we have at least equal durability to that of thick lead, with a thickness still less than that of zinc, and a weight of only 16 oz. to the foot.

On new structures, substantially built, the question of a few tons, more or less, upon the roof, is not, I suppose of very serious consequence. Yet, even in such structures, it may be often worth while to be able safely to use lighter timbers; but for an old roof, where the supports are not too strong, a few tons, one way or the other, may make a very great difference. I may quote as an instance the flat roof of the Portman Rooms. We found this covered with lead and leaking all over. In many places the woodwork had sunk, and to cover it with lead would have been exceedingly dangerous. But a perfectly safe and a perfectly sound job was made with copper.

It is unnecessary to add that as a covering to spires, fleches, domes and suchlike erections, the comparative lightness of copper makes it exceedingly appropriate.

Coming now to the next desideratum in a roof-covering, which, for want of a better word, I have been obliged to name "Workableness," I must explain that I mean by this the possibility of being turned up with moderately sharp angles and twisted over into welts. As already mentioned, all the three metals under consideration expand and contract with changes of temperature—though copper very much less than either zinc or lead—and therefore all require some arrangement which will leave them free to expand or contract without blistering.

And then, of course, the sheets have to be somehow joined together, and the joint is to be made, if possible, without solder. For it is found that the places where soldered seams have been made perish long before the rest of the metal is worn out.

Although lead is so soft, yet on account of its great thickness it cannot be easily welted, and requires large rolls. On the other hand, its weight and softness incline it to lie close even without joints—only then, of course, it is easily displaced. Zinc, being the most expansive of the three metals, and being also more brittle than lead, requires great care in laying, and the provision of very free play for each sheet, both at the ends and sides. On this account, many drips are needed. This is sometimes very objectionable on account of the increase in height.

Copper, on the other hand, expands so little that if wood rolls are used at the sides of moderately wide sheets, the ends may be safely welted together in considerable lengths, and so few drips are necessary.

At the same time, copper is so easily worked that welts are readily made, and may be used not only to connect the sheets in lengths but also to fasten them to the roll-caps at the sides, thus making a very firm and light covering. As a fireproof material, copper is immensely the best of the three metals.

As already stated, lead melts at 630 deg. F., and, therefore, in a fire is soon poured down in a terrible stream, more dangerous than even falling timbers or bricks. Zinc melts at 800 deg. F., and blazes brightly if thrown into an ordinary coal fire.

Copper requires a temperature of 2,143 deg. F. to fuse it, and retains its shape even at a white heat.

As an example, I may mention the instance of a tower in which the woodwork was entirely consumed, while the copper covering was left standing as a hollow cone, the flames and smoke having escaped by a hole in the top. Another instance illustrating this fireproof quality is that of Mr. Stedall's Mantle Warehouse, in Portsmouth. Here the copper roof was found intact after the fire, although the building beneath it was gutted; the copper sheets had, in fact, prevented the exit of the flames and stopped the spread of the fire.

The last property I named as required in a roof-covering was Insonorousness. Here lead has the immense advantage of its exceeding softness, and the same quality of softness makes it a non-conductor of heat.

For a long time lead was almost the only metal used for covering roofs, sheet zinc being practically unknown, and the high price of copper almost prohibiting its use for buildings where economy had at all to be considered.

The introduction of sheet-zinc about sixty years ago, and a great reduction in the price of copper during the last twenty years, have altered this state of affairs.

The change would have been greater still but for the fall which has at the same time taken place in the price of lead, partly on account of the improvements in the methods of separating the silver from it.

At the present market rates sheet zinc is, weight for weight, nearly twice the price of lead, and sheet copper, weight for weight, nearly three times the price of zinc, or about five times the price of lead. It is evident, therefore, that for temporary work sheet zinc is by far the cheapest metal covering, being properly used at one-fourth the thickness, while it is not quite twice the price of lead, and at the same time it has the advantage of lightness.

On the other hand, compared with copper, although it is not much more than one-third of the price, it requires to be laid at least half again as thick.

For a covering to permanent buildings zinc, for reasons already stated, is inadmissible; while copper and lead are perhaps about equally durable, so far as the metal itself is concerned.

Lead has the advantage over copper of making much less noise in driving rain or a hailstorm, but copper has perhaps still greater advantages over lead, being only about one-sixth the weight, being almost absolutely fireproof, requiring very little support in ornamental work, having only a little more than half the expansiveness under heat, and consequently requiring fewer drips. To which may be added its capacity for being easily welted, and finally the beautiful color which it takes on from a damp atmosphere after a few years of exposure."

v.8-9
Canadian
archi

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

Hanging Doors.

In fitting a door the workman should take pains to have it clear the panel about one-eighth of an inch on one side only. It is best always to "fit" from the hanging stile side; that is, have the hanging stile fit close to the jamb, and let the space all show on the lock stile; and when it is hinged, the space should be divided, allowing 1/16" clear on hinge side and the same on the lock side. One sixteenth space is a liberal allowance and should never be exceeded, and is only permissible when the doors are to be painted. Hardwood doors that are finished in natural wood should not show nearly this much space, but the lock stile should be bevelled slightly to allow of its inner edge to leave the jamb without striking. A door should not bind on its hinges; when closed it should remain so, even if the lock-bolt does not enter the keeper, nor should it drag on the floor or sill, or bind in the frame at any point. A door properly hung is a "joy forever," but one that is eternally striking some point in the jamb, or striking at the top or bottom every time it is opened, is a source of irritation and a corruption of good morals. In adjusting the hinges for ordinary panel doors, the proper distance to place the butts is eight inches from the top to the top of the hinge, and ten inches from the floor to the bottom of the lower hinge. If there is a third butt required, as is sometimes the case, it should be placed a little nearer the bottom hinge than the top one, as most of the labor and stress falls to the lower hinge always, and if the third butt is carried down below the centre of the door, it relives the bottom hinge materially. The lock should always be placed with its top edge on a line with the lock rail, that is, of course, if the door is one having a lock rail. Sometimes, however, as in multi-paneled outside rails there are no lock rails, in which case the workman must so adjust his lock that the spindle for the knobs will be just two feet eight inches from the bottom of the door, this distance being the correct height to place the knobs or pulls. In case there is a lock rail in the door, and the stiles of the door are narrower than ordinary, a rim lock should be used, for if a mortise lock be employed it will necessitate cutting away the tenon of the lock rail to insert the lock, a process that would destroy the strength of the door at an important point. If the stile is the full width, 4½ inches, a narrow mortise lock may be used without doing much injury to the door, providing the door is well made and properly glued together. The spindle on which the knobs are fastened, should pass through the door and lock, exactly at right angles in every direction. Workmen are often very careless on this point, and their carelessness leads to trouble and annoyance as the roses cannot receive either the spindle or the knobs properly, and binding against the wood follows, and both knob and spindle after a time work loose or the lock breaks at the eye with the constant strain. As much care should be exercised in trimming a door as in hanging it, in order to make a good lasting and satisfactory job.

Repairing Roofs.

Just about this time of the year many house owners will be made aware that they cannot any longer defer stopping the leaks in their roofs. In a shingle or slate roof, little difficulty will be experienced in stopping the leak, but with a flat roof, whether covered with composition, tin or sheet iron, the trick of curing the defect becomes a serious matter, particularly if the roof is wet, as it is likely to be during the fall and spring months. It is well known that it is very difficult to solder tin or sheet iron when it is covered with moisture, and should there be any holes in the tin or iron while there is water or snow on the roof, and it becomes a necessity to stop the holes to prevent the leakage, do not attempt to solder the holes, but adopt the following method: Procure a piece of iron about three sixteenths of an inch thick of suitable length and width to cover the hole. Have a sufficient number of holes drilled in it to take No. 10 one inch screws. Countersink holes to take in head of screws. Take a piece of felt cloth; a piece of an old hat will do if you have nothing better; make it the size of the iron; soak the cloth in thick oxide of iron paint or white lead; place the cloth over the hole, then lay over this the iron and screw tight down to the roof. If water is running down the roof it may be held back by building a dam above the leak with putty, which will divert the stream until such time as the leak is repaired. A little varnish mixed with the paint will tend to make the cloth stick better at first. When these cloth patches become dry they answer better than solder, and will outlast the roof. If the flashings break away from a chimney or from a brick wall, they can be fastened by taking wire nails and putting washers on them to make the heads large and driving them through the tin into the mortar joint; then the tin can be plastered with a cement made by mixing dry sand with iron paint to the consistency of mortar; sand and paint makes an exceedingly good medicine when properly applied, for curing leaky roofs. If a leak occurs between wood and brick, or on a gravel or composition roof, a proper application of this cement will give instant relief. For repairing about chimneys this cement is unequalled. When a gravel roof is wet, it is evident it would be difficult to repair it, with paint cement or hot tar. Yet, if the roof leaks it is at this time the repairs are required. In such cases take the best Portland cement, mix with about one quarter of sand, and see that it is well mixed while in a dry state. Put in the mixture just enough water to allow of its working with a trowel—don't make as fluid as mortar—apply to the leak and "trowel" it well. As the cement will harden under water, the fact of the gravel and felt being wet will not affect its efficiency in the least.

QUESTIONS AND ANSWERS.

A CORRESPONDENT, living in Montreal, asks for information regarding "the weights of different kinds of roofing, floors, stud-partitions finished, outside walls, of wood, brick, and stone, etc.?" In answer to these enquiries, the only thing we can do is to give the weight per foot, per yard, or per square; and having these, it will be an easy matter to ascertain the weight of any given roof, floor, partition or wall.

Commencing with roofs, we find the authorities giving the following figures:

(1) Slate Roofs: The average weight of one foot of slate laid on a roof, is 7½ pounds (Kidder). If pine, hemlock, or spruce is used for roofing boards, one square will weigh, if green, 300 pounds; if half seasoned, 270 pounds; if dry, 250 pounds (Hodgson.) In a piece of roof ten feet square, making 100 feet, there should be five rafters not less than 2" × 6" × 10', each of these containing 10 feet of lumber, making a total of 50 feet, the weight of which, if dry, will be 125 pounds. This will then make the weight of one square of a slated roof, as follows:

Slate	750 lbs.
Dry roofing boards	250 "
Dry rafters, 2" × 6"	125 "
Total weight	*1125 lbs.
If we place building paper under the slates, we add for each square	15 lbs.
and to this may be added nails	4 "
which brings the total up to	1144 lbs.

Sometimes a layer of mortar is placed under the slates, the mortar being spread about ⅜ of an inch thick. The average weight of mortar so laid is a little over two pounds to the foot. This would add, say, 225 lbs. to the load, less 15 lbs. for paper which will not be required if mortar is used. The actual weight will then stand at

*1125 lbs.	
Nails	4 "
Mortar	225 "
Making a total of	1354 lbs.

In making calculations for the size of timbers to be employed to sustain a roof of any kind, wind pressure must not be overlooked as an important factor. A roof calculated to sustain any given load, and no provision made for wind-pressure, would come to grief with the first wind storm that struck it. The usual figures allowed to meet this contingency are 40 lbs. to the square foot, but, as a matter of fact, hurricanes, cyclones and tornados sometimes have a velocity of 100 lbs. to the square foot; but, roofs being sloping, rarely get more than a pressure of 40 lbs., which would add to the weight of the roof, under wind stress, 4000 lbs., making an actual total the bearing timber of the roof must resist, of 1354 + 4000 = 5354 lbs. per square. This, however, is not all, as provision must be made for rain and for snow. A slate roof should be made strong enough to resist a pressure of 10,000 lbs. to the square, or 100 lbs. to the square foot.

(2) Shingle Roof:—One square of shingles laid 5 inches to the weather, pine or cedar, will weigh, if dry, 125 lbs (Vogdes). According to Trautwine, it requires two pounds of 4-penny nails to lay a square of shingles; but we don't think this estimate is correct. In practice we have found that it takes a little more than 3 lbs. of nails to properly lay a square of shingles. Taking these figures as our guide, we find that the weight of a shingle roof, including roof boards, five rafters 2" × 6", and mortar laid under the shingles, to be per square:

Shingles	125 lbs.
Dry roofing boards	250 "
Nails for roofing boards and shingles	7 "
Mortar	225 "
Total	732 lbs.

To this must be added wind pressure, also weight of snow and rain. Many architects build their roofs sufficiently strong to resist a pressure of 90 pounds to the square foot, a resistance that will prove equal to any stress that may arise.

(3) Galvanized Iron Roofs:—According to Kidder, the weight of a square foot of No. 16 guage galvanized sheet iron laid on roof, is 4½ pounds: that would equal 425 lbs. to the square, including solder, nails and battens. About 25 lbs. may be added to or taken from this figure per square, per guage, according as the iron used is heavier or lighter. The other factors are the same as for a slate or shingle roof.

(4) Tar or Composition Roofs vary in weight according to the quantity and quality of materials used; they average, however, about 200 lbs. to the square, being somewhat heavier than shingles and lighter than slates. The wood and timber work to be the same as for other flat roofs.

(5) Tin Roofs are about one-third as heavy as galvanized iron roof covering as given in the foregoing, but the formulas for timber and lumber are the same.

(6) If a roof is covered with corrugated sheet iron, the weight will be about ⅓ more than it would be if covered with flat iron of the same guage.

(7) Roofing Tiles of the ordinary kind weigh 16¼ pounds to the foot, so that a square of tiling would weigh 1625 pounds. Other factors in the roof would be the same as already exhibited in slate and other roofs.

With these figures before him, from which many formulas have purposely been avoided, the intelligent workman will have no difficulty in determining the weight of any given roof formed of the materials specified in the foregoing.

The weight of inside partition walls that are formed by 2 × 4 scantlings, lathed and plastered on both sides, plastering done in three-coat work, is reckoned to be, when the plastering is "green" or wet, about 200 lbs. per yard of surface. This, of course, means both sides, or two yards, plaster measurement. When dry, it will weigh about ⅓ less, or 133 pounds. If the studding is 2 × 6, add six pounds to these figures, and if the partition is boarded on one side, but lathed and plastered on both sides, add 18 lbs. more to the yard, and if boarded on both sides and lathed and plastered on both boarding, add another 18 lbs., making a total weight of one yard of a 2" × 4" partition, lathed and plastered in three-coat work on both sides, as follows:

Lathed and plastered only	133 lbs.
Boarded on one side, add	18 "
Boarded on the other side also	18 "
Total weight per yard	169 lbs.

The weight of any partition may be obtained, approx-

imately, by first finding the number of yards in the partition one side only—and multiplying by the figures given. Example: A partition 20 × 9 feet what is its weight? We find the partition contains exactly 20 yards, superficial, taking one side of it only, as per rule; then 133 × 20 = 2660 lbs. Here we have 133 pounds the weight of one yard of a partition composed of 2" × 4" studding, lathed and plastered on both sides in three-coat work. 20 represents the number of yards, so we have 20 times 133, which gives a total of 2660 lbs.

If the work is only two-coat work, we deduct 27 lbs. from 133, making a constant of 106 lbs. Openings are to be allowed for in these calculations, and the presumption is that all the materials used are dry, and that the mortar is set and hardened. The weight of plastering on one side of a partition, or on the inside of main walls may be put down at 55 lbs. This does not include lath or studding.

A square yard of a wall formed of 2" × 4" scantling, 1" boards, a layer of building paper, half-inch clapboards, lapped, and lathed and plastered inside, will weigh about 99 lbs. From this, the weight of any balloon structure may be obtained, taking care to add the weight of the sills, which, if of pine, spruce or hemlock, will weigh about 27 lbs. to the cubic foot.

The weight of ordinary floors with 2" × 10" joists, 1 inch flooring, and plastered ceiling under, will average per square of 100 feet, about 1000 pounds, if all the material is dry.

Brick walls are generally estimated by the number of bricks they contain, or by the 1000. Ordinary bricks, according to Trantwine, weigh about two tons per thousand, and a thousand of pressed bricks weigh two-and-a-quarter tons, therefore it is only necessary to know how many thousand bricks there are in a wall to be able to tell how much that wall weighs.

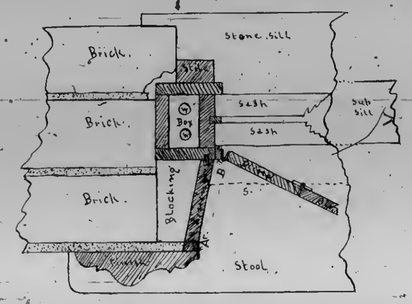
Of course, the weight of bricks will vary some little, owing to the difference in the clays of which they are made; but the little variation will not affect the figures given to any serious extent. To lay 1000 bricks requires 22½ cubic feet of mortar, and one cubic foot of mortar weighs 110 pounds, so that we find that one thousand bricks built up with good mortar weighs altogether 6475 pounds, or nearly three-and-a-quarter tons of twenty hundreds each. To this weight must be added the inside "rendering," furring, lathing and plastering.

The weight of stone-work differs with each kind of stone used. Sandstones weigh about 132 lbs. to the cubic foot, while limestones weigh 175, and some kinds of granite over 200 lbs. In laying random coursed rough quarried limestones, with good lime mortar and spalls, a solid cubic foot in the wall will weigh 190 lbs., so that a cord of stone, measured in the wall at 100 cubic feet, will weigh nineteen thousand lbs. A cord of sandstone in the wall will weigh about 1000 lbs. less, while a cord of boulders or "hard-heads," whole or broken, will weigh over 21,000 pounds.

These replies cover, to the fullest extent, all the questions asked by our Montreal correspondent.

"W. S. K.," Belleville, Ont., writes: "In reply to "A Carpenter in Distress," in one of your recent issues, I send herewith a rough sketch of an economic way of preparing a window in a brick wall for inside blinds. By examining the sketch, the enquirer can see how the work is finished. The distance from A to B should be a little more than one-quarter of the width of the opening; this will permit the blinds to fit back snug without projecting into the room. The lining may be pannelled if the extra expense is no object, but when strict economy is the order of the day a plain finish may be adopted, or the lining may be formed of matched and beaded stuff.

If it is desired to run the splayed jamb lining down to the floor, this may be accomplished by putting in a stool that will project into the room no further than where the dotted lines show at S. This will make a recess in the wall under the window, which should be filled up to the stool with pannel work. If the splayed jamb lining is pannelled, a rail should be framed in at



the point where the stool S is situated, as it is not likely that the stiles would be wide enough to receive the projection of the stool.

The sketch, and this description, will, I think, relieve your enquirer from his difficulty. Of course there are many other methods of getting over this difficulty, but I know of none that answers the purpose at so small an outlay, but if any of your readers know of a better method costing no more, I, along with your enquirer, I am sure, will be glad to hear of it.

MONTREAL MASTER PLUMBERS.

The Master Plumbers' Association, of Montreal, met on Thursday, the 3rd inst., in their rooms "Salle St. Joseph," corner of Sanguinet and St. Catherine streets. The Association has accomplished much valuable work, considering its recent formation. The membership roll contains the names of ninety members. Much attention has been devoted to sanitary matters, and good results are likely to be achieved in this direction.

The election of officers was proceeded with after the usual preliminaries, and resulted as follows: Honorary President, John Date; President, P. J. Carroll; 1st Vice-President, Alp. Champagne; 2nd Vice-President, D. Sexton; 3rd Vice-President; Thos. Moll; Secretary, J. W. Harris; French Corresponding Secretary, C. E. Thibault; English Corresponding Secretary, G. C. Denman; Financial Secretary, J. A. Sadler; Treasurer, Jos. Obeau. The following were chosen as chairmen of the various committees: Sanitary, H. Paddon; Arbitration, Joseph Lamarche; Auditing, E. C. Mount; Legislative, P. C. Ogilvie; Apprentice, D. Gordon.

MR. P. J. CARROLL.

Mr. P. J. Carroll, the new president, whose portrait we present, is one of the most successful and popular men in the trade in Montreal. He has risen from the ranks to a position of prominence in his chosen line, and at present enjoys the confidence of his confreres and the public alike.

Mr. Carroll was born in Ireland 37 years ago, and at the age of 4 years was brought to Montreal by his parents, where he has since continuously resided. He was educated at old St. Laurence school, and at an early age entered into his apprenticeship under the direction of his elder brother, who had already obtained a foremost position in the trade, being at this time foreman in the shop of John Burns & Co. Mr. Carroll remained at the plumbing and steam-fitting trade with Messrs. Burns & Co. for 11 years, when he and his brother decided to embark in the business on their own account. Twelve years ago they founded the firm of Carroll Bros., but at present Mr. P. J. Carroll is the only member of the firm, his brother having died two years after the formation of the partnership. The business has prospered, and at present is one of the leading shops in the trade.

MR. P. J. CARROLL.

Mr. Carroll is a modest, unassuming gentleman, and combines with these qualities much executive ability, sound judgment and a wonderful tenacity of purpose, and under his direction we predict a most successful year for the Master Plumbers' Association of Montreal. He is to be congratulated on being unanimously called by his confreres to fill the most honorable position in their gift, and in electing him to this office they have done honor to themselves and have recognized and rewarded merit.

MEETING OF SANITARY COMMITTEE.

A meeting of the Sanitary Committee of the Dominion Association of Master Plumbers was held at the rooms of the local association of master plumbers in London on the 3rd and 4th of December last.

The members of the Sanitary Committee are Messrs. W. H. Heard, London; M. Birch, Kingston; Walter Mashinter, Toronto; Adam Hall, Peterboro'; Adam Clark, Hamilton.

The question of uniformity of sanitary by-laws throughout the Dominion was thoroughly discussed. The advisability and necessity of a Dominion law governing sanitary construction was carefully considered, and the conclusion arrived at by the committee was that, in the interest of the public, as well as the trade, there should be a law embracing the entire Dominion, and the committee will so recommend. It was thought by some that perhaps it would be best to recommend that action be taken in Ontario as a preliminary step to getting a Dominion act. It was the opinion of the committee that the enforcement of the law should rest with the board of health, and that each local board of health should have at least one plumber as a member.

The inspection by-law was also carefully considered, and an effort made to remedy some of the defects in existing by-laws.

The committee were also strongly in favor of the appointment, in each town and city of sufficient size, of a board of plumbing examiners, whose duty it will be to advise the council or board of health on all matters appertaining to sanitary apparatus and construction, and to suggest such changes as may be necessary from time to time to keep by-laws up to date. Inspectors should be under the control of this board of plumbing examiners, who would also decide and adjust disputes arising from the operation of the by-law. The constitution of this board was also considered. This matter will come up at a subsequent meeting of the committee.

Considerable time was taken up in discussing a model specification, to eliminate as far as possible objectionable features to existing by-laws, said specification to be subject to such changes as the most modern practice and experience dictates, full consideration being given to the proposed by-law in London "To Secure the Better Sanitary Condition of Buildings."

A committee was appointed to confer with the local board of health, and it is hoped that their labors will materially aid the authorities in arriving at a satisfactory enactment.

A LONDON PLUMBING ESTABLISHMENT.

A description of the plumbing establishment of Messrs. Smith Bros., London, Ont., appears in a local paper, from which we take the following: The business was established ten years ago by William and John Smith, but since the death of the latter two years ago Mr. Wm. Smith has conducted the business under the former name. He is the only plumber in the Dominion holding medals for mechanical ability, which medals are on exhibition at his shop one being of bronze and two each of silver and gold.

The growth of the business has been such that the present premises, though large, have become too small, and at the beginning of the new year a move will be made to 265 Dundas street, where there will be three floors, 32x75 ft., instead of two floors, 16x75 ft., as at present. The show room in the rear, where plumbing apparatus will be exhibited in working order, will be the finest west of Toronto, and an undoubted credit to the city.

Mr. Smith is the inventor of an apparatus for testing plumbing work, to prove whether the sanitary part of the plumbing in buildings is perfect or not. To show the standing he enjoys among those of his own craft it may be mentioned that he is the vice-president for Ontario of the Plumbers' Association of the Dominion.

In modest houses, where repapering cannot be done often, all papers should be of the quiet sort, with indistinct figures and good, clean, clear tones of colour. Any decided design, such as stripes, or formal, conventional figures, is apt to pall upon the eye before the paper can be renewed.

v.8-9
Canadian
arch

PROPOSED LEGISLATION AFFECTING PLUMBING AND DRAINAGE.

We are permitted to print below a copy of a proposed act which has been drafted by Mr. W. J. Burroughes, of Toronto, the object of which is to secure the registration of master plumbers and the supervision of plumbing and drainage in the cities of Ontario. The bill will in all probability be presented at the next session of the Ontario Legislature, when it is hoped to secure its adoption. Mr. Burroughes has not yet submitted the bill to the city authorities or to the Ontario officers of the Master Plumbers' Association, and it is not unlikely that some slight amendments will be made thereto before presentation.

A perusal of the different sections leads one to the conviction that the desired legislation will be favorably received, inasmuch as the objects sought are largely for the protection of the general public, who suffer as the result of defective plumbing and drainage. Under the present conditions any person is permitted to undertake plumbing work without producing proof of qualification, and consequently much inferior plumbing is allowed to be placed in buildings, which, besides endangering the lives of the inhabitants, sooner or later requires to be renewed at a large expense to the owner.

The proposed bill is entitled "An Act to Secure the Registration of Plumbers and the Supervision of Plumbing and Drainage in the Cities in the Province of Ontario," and reads as follows:

1. Within ninety days after the passage of this act it shall be the duty of the mayor of each of the cities of this province to appoint a board for the examination of plumbers for such city, where such board shall act, to be known as the "examining and supervising board of plumbers and plumbing." Such board shall consist of five persons, of whom two shall be employing or master plumbers of not less than ten years' experience in the business of plumbing, and one shall be a journeyman plumber of like experience, and the other members of said board shall be the chief inspector of plumbing and drainage of the board of health of such city, and the chief engineer having charge of sewers of said city; but in the event of there being no such officers in such city, then any two other officers having charge or supervision of the plumbing, drainage or sewerage, whom the mayor shall designate or appoint, or two members of the board of health of such city having like duties or acting in like capacities. The term of office of the master and journeymen plumbers first appointed under the provisions of this act shall be as follows:

One shall be appointed for one year, one for two years, and one for three years, their terms of office to expire respectively one two and three years from and after the thirty-first day of December of the year in which such appointments shall be made, and the mayor, in making the first appointments, shall for each one so appointed specify the duration of the term of office to which he makes said appointments respectively, and annually thereafter upon the expiration of the term of office of any such member of the board, his successor shall be appointed by the mayor for the term of three years or until a successor shall be appointed, and the mayor shall have power to fill any vacancy caused in such board of examiners by the death, removal, inability to act, resignation or removal from the city of any member thereof, and such appointment shall be for the unexpired term.

Such chief inspector of plumbing and drainage, and such chief engineer in charge of sewers or the officers holding equivalent positions or acting in like capacities designated or appointed by the mayor as herein provided, shall be deemed to be also ex-officio members of such examining board, and when they shall cease to hold the offices by reason or on account of which they were so designated or appointed, their successors shall act on the examining board in their stead.

2. It shall be the duty of such ex-officio members of the board of examiners to discharge their duties as members of this board without compensation therefor. The master and journeymen plumbers serving as members of such board shall severally be paid at the rate of five dollars per day for each day's services when actually engaged in the performance of the duties pertaining to the office, but such compensation shall not exceed the sum of five dollars per month in cities of one hundred thousand inhabitants or less, nor the sum of ten dollars per month in cities having a population of over one hundred thousand and less than three hundred thousand.

3. All the members of such board shall be citizens and actual residents of the city in which they are appointed.

4. The several boards of examiners constituted under this act shall have power and it shall be their duty:

(1.) Meetings.—To meet at stated intervals in their respective cities; they shall also meet whenever the board of health of such city, or the mayor thereof, shall in writing request them so to do.

(2.) Examinations.—To have jurisdiction over and to examine all persons desiring or intending to engage in the trade, business or calling of plumbing as employing plumbers in the city in which such board shall be appointed, with the power of examining all persons applying for certificates of competency as such employing or master plumbers, or as inspectors of plumbing, to determine their fitness and qualifications for conducting the business of master plumbers or to act as inspectors of plumbing, and to issue certificates of competency to all such persons who shall have submitted to and passed a satisfactory examination before such board, and shall be by it determined to be qualified for conducting the business as employing or master plumbers or competent to act as inspectors of plumbing.

(3.) Plumbing Code.—To formulate, in conjunction with the local board of health of the city in which it shall act, a code of rules regulating the work of plumbing and drainage in such city, including the materials, workmanship, and manner of executing such work, and from time to time to add to, amend or alter the same.

(4.) Fees.—To charge and collect from each person applying for examination the sum of five dollars for each examination made by said board, and such moneys to be paid monthly to the treasurer of such city in which said board shall be appointed.

5. Any person desiring or intending to conduct the trade, business or calling of a plumber or of plumbing, in any of the cities of this province as employing or master plumber, shall be required to submit to an examination before such board of examiners as to his experience and qualifications in such trade, business or calling; and after the first day of March, eighteen hundred and ninety-seven, it shall not be lawful in any city of this province for any person to conduct such trade, business or calling, unless he shall have first obtained a certificate of competency from such board of the city in which he conducts, or proposes to conduct, such business.

6. On or before the first day of March, eighteen hundred and ninety-seven, every employing or master plumber carrying on his trade, business or calling in any of the cities of this province shall register his name and address at the office of the board of health of the city in which he shall conduct such business, under such rules and regulations as the respective boards of health of each of the cities of this province shall respectively prescribe, and thereupon he shall be entitled to receive a certificate of such registration, provided, however, that such employing or master plumber shall, at the time of applying for registration, hold a certificate of competency from an examining board; but such registration may be cancelled by such board of health for a violation of the rules and regulations for the plumbing and drainage of such city duly adopted and in force therein, after a hearing had before said board of health, and upon a prior notice of not less than ten days, stating the grounds of complaint and served upon the person charged with the violation of the aforesaid rules and regulations; but such revocation shall not be operative unless concurred in by a majority of the local board of examiners.

And after the first day of March, eighteen hundred and ninety-seven, it shall not be lawful for any person to engage in, or carry on the trade, business or calling of an employing or master plumber in any of the cities of this province unless his name and address shall have been registered as above provided.

7. Within sixty days after the organization of such examination board in any of the cities of this province, the local board of health, or the commissioner or commissioners of the board of health or the health department thereof, as the case may be, shall detail, designate, or appoint for the purposes of this act and the enforcement of the provisions thereof and the work of inspecting the plumbing and drainage of buildings, in said city, an inspector or inspectors of plumbing, subject, however, to the provisions or limitations of existing laws regulating the appointment of inspectors by such commissioner or commissioners or board or department of health of such city.

But all inspectors of plumbing so detailed, designated or appointed, and all inspectors of plumbing hereafter appointed, shall be practical plumbers not engaged directly or indirectly in the business of plumbing during the period of their appointment; and they shall be citizens and actual residents of the city in which they are appointed, and before entering upon the discharge of their duties as such inspectors each shall be required to obtain a certificate of competency from said examining board. They shall be entitled to receive compensation not exceeding five dollars per day for each day of actual service, to be fixed by the board, commissioner or department making such appointment.

8. The duties of the inspector or inspectors of plumbing appointed under the provisions of this act, in addition to the duties prescribed by law, and those which may be enjoined or required by the commissioner of health, the board of health or the health department of the city in which they shall be appointed, shall be, to inspect the construction and alteration of all plumbing work performed in such city subsequent to the passage of this act, and to report in writing the results of such inspection to the said commissioner of health, or the board of health department of their respective cities; they shall also report in like manner any person engaged in or carrying on the business of employing plumber without having the certificates hereinbefore mentioned.

9. All certificates of registration issued under the provisions of this act, and all licenses authorizing connection with street sewers or water mains, shall expire on the thirty-first day of December of the year in which they shall be issued, and may be renewed within thirty days preceding such expiration, such renewals to be for one year from the first day of January in each year.

10. Whenever any inspector or other person reports a violation of any of said rules and regulations for plumbing and drainage, or a deviation from any officially approved plans or specifications for plumbing and drainage filed with any board or department, the local board of health shall first serve a notice of violation thereof upon the master plumber doing the work, if a registered plumber. Such notice may be served personally or by mail, and if by mail it may be addressed to such master plumber at the address registered by him with the local health board; but the failure of a master plumber to register will relieve any board of health from the requirement of giving notice of violation. Unless the violation is removed within three days after the date of serving or mailing such notice, exclusive of the day of mailing or serving, the board of health may proceed according to law.

11. From and after the first day of March, eighteen hundred and ninety-seven, the plumbing and drainage of all buildings, both public and private, in each of the cities of this province, shall be executed in accordance with the rules and regulations adopted by the local board of examiners in conjunction with the board of health for plumbing and drainage; and all repairs and alterations in the plumbing and drainage of all buildings heretofore constructed shall also be executed in accordance with such rules and regulations, where the board of health shall have control, but this section shall not be construed to repeal any existing provisions of law requiring plans for the plumbing and drainage of new buildings to be filed with any local board of health and to be previously approved in writing by said board of health, and to be in accordance therewith, except that in case of any conflict between such plans and the rules and regulations of the board of examiners, the latter shall govern.

12. Each of such boards of examiners shall have power to procure suitable quarters for the transaction of business, to provide the necessary books and stationary, and to employ a clerk to keep such books and record the transactions of such board. The board of control and apportionment of the city of Toronto and the common council of all other cities, shall annually insert in their tax levy a sufficient sum to meet the expenditures incurred under the provisions of this act; and all expenses incurred by the several boards of examiners in the execution and performance of the duties imposed by this act shall be a charge on the respective cities, and shall be audited, levied, collected and paid in the same manner as other city charges are audited, levied, collected and paid.

13. Any person violating any of the provisions of this act, or any rules or regulations of the board of health, or of the board of examiners in any city regulating the plumbing and drainage of buildings of such city, shall be deemed guilty of a misdemeanor, and upon conviction, if a master plumber, shall, in addition, forfeit any certificate of competency or registration which he may hold under the provisions thereof.

14. After the passage of this act the commissioner of public works of any city, or the officer or officers acting in a like capacity in any of the cities of this province, and having charge of the sewers and water mains, shall not issue a license to anyone to connect with the sewers or with the water mains of such cities unless such person has obtained and shall produce a certificate of competency from the examining board of such city hereby created.

15. All acts or parts inconsistent with or repugnant to the provisions of this act are hereby repealed.

16. This act shall take effect immediately.

NATIONAL ASSOCIATION OF MASTER PLUMBERS.

The following is a copy of the resolutions adopted by the Dominion Association of Master Plumbers to confine the sale of plumbing supplies to those legitimately engaged in the trade:

Whereas, The manufacturers and wholesale dealers in plumbing material are selling to consumers, to our injury and detriment, placing us toward our customers in the light of extortionists, causing endless trouble; and

Whereas, The system of protecting us from this wrong which draws in its wake other wrongs, is ineffective, it is absolutely necessary to perfect such a system by united action which will remove these evils from which we have suffered for years; therefore be it

Resolved, That the members of this association confine the purchase of plumbing material to manufacturers and wholesale dealers who sell goods to master plumbers only, as defined in these resolutions;

Resolved, That this association shall keep a record of all journeymen and plumbers, who place in buildings plumbing material bought by consumers, of manufacturers or dealers;

Resolved, That a committee be appointed by this association in every province and county for the purpose of reporting to the proper officers at its head in the province, any violations of these resolutions;

Resolved, That these measures are just and necessary to our welfare, and a rigid enforcement is demanded;

Resolved, That this convention endorse the above, and are authorized to adopt a uniform system of protection for the trade over their entire jurisdiction;

Resolved, That it is not the intention of said resolutions to prevent the interchange of patented or any other plumbing material between manufacturers and wholesale dealers in such goods, or for the export trade, and that the interpretation of the above resolutions be left in the hands of the executive committee with power.

INTERPRETATION OF THE TERM "MASTER PLUMBER."

Resolved, That it is the sense of this convention that in the future the interpretation of the term "master plumber," as set forth in the above resolutions, to entitle him to purchase plumbing material, be construed to mean a master plumber who has an established or place of business and represents the industry of plumbing, and who has qualified under the dominion, provincial or local enactments regulating plumbing and plumbers, where such exist; or, where no license is required, an individual or firm with an established place of business and representing the industry of plumbing;

Resolved, That any manufacturer or dealer in plumbing material furnishing net prices, or any discount from list prices to others than master plumbers, either by themselves, employees, or agents, shall be considered as disapproving the above resolutions;

Resolved, That the supply houses doing a plumbing supply business, and contracting for plumbing work, shall be considered unjust competitors.

The following are exempt from the above resolutions:

The dominion and provincial governments, mines, and street railway companies.

Provincial and city institutions.

Railroad, gas, water and electric light companies only for such goods as are necessary for their respective lines of business.

The above resolutions apply to the whole Dominion of Canada.

v.8-9
Canadian
arc
and

A NEW FLOORING MATERIAL.

THE name of papyrolith is given to a novelty in flooring material which has lately been invented by Otto Kraner of Chemnitz, the article being a special preparation of paper pulp, which is in the form of a dry powder; when mixed with water it may be spread like mortar over stone, cement or wood, where it dries quickly and may be smoothly planed, besides which it may be tinted almost any color, in this way adapting it for parquetry with variegated borders, or for panels and mosaics. Among the various advantages claimed by the inventor for the use of this product are freedom from crevices, deadening of noises and poor conduction of heat, also considerable elasticity, safety from fire and remarkable durability. It may be employed too, for wainscoting and other architectural purposes, as well as for flooring.

USEFUL HINTS.

"Double-boiled" oil is that which has reached a temperature great enough to scorch a feather when held in it, and reaching about 300 degrees C.

Yellow and orange chromes have a tendency to rapidly blacken, as in the case with white lead, when exposed to sulphur gases, or when mixed with pigments containing sulphur and arsenic sulphide.

A correspondent asks a European exchange: "How are old stones best treated which are covered with soot? They are to be painted with a light color." The answer was: "If the soot is from wood smoke, it is best removed by the use of caustic lye soda or calcined ashes (1 pound to 8 pints of rain-water); otherwise, by means of soap lye."

The only safe way to obtain a perfectly harmonious contrast in colours is to apply them, when mixed, to the actual position they are to occupy when the scheme of decoration is completed. A series of colours that may look well indeed when used in a dimly lighted room will often appear very objectionable when exposed to a brilliant light.

A very simple remedy to remove rain spots, or such caused by water soaking through ceilings, has been employed with good results. Take unslaked white lime, dilute with alcohol, and paint the spots with it. When the spots are dry—which ensues quickly, as the alcohol evaporates and the lime forms a sort of insulating layer one can proceed painting with size color, and the spots will not show through again.

The property which gives linseed oil its special value as a paint oil is that when exposed to the air it gradually becomes hard, and dries up, in doing which it takes from the atmosphere a large proportion of oxygen, forming a new compound of a resinous character, the properties of which have never been fully investigated. In this power of combining with oxygen, linseed is distinguished very markedly from other oils, which have little or no power of combining with oxygen.

A very pretty effect has been obtained in the hall of a Brooklyn residence by hanging the walls with an Empire pattern lincrusta, the ground work of which has been painted a dull blue green, while the wreaths and flambeaux that are repeated at regular intervals upon it have been picked out with a pale Nile green. The ceiling has been tinted a greenish white, and upon it a simple fresco border has been painted, repeating the Empire flambeaux in the corners. The old-fashioned wood work, classic in its design, and the white enamelled balusters with the polished mahogany handrail, harmonize very nicely with the decoration of the walls.

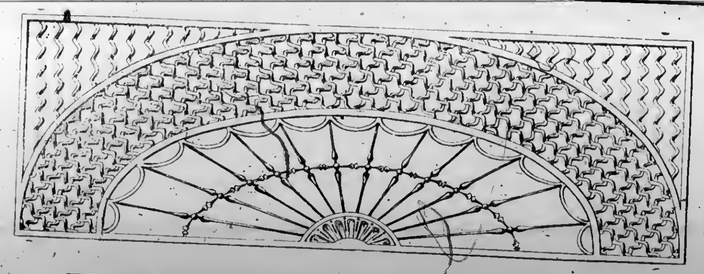
RECIPES FOR WATER-PROOF GLUE. — Water-proof glues, often used for pasting, but more frequently as a medium for colors, may be prepared in the following ways, according to the requirements of the case or the desire of the user: The glue is put in water till it is soft, and subsequently melted in linseed oil at moderate heat. This glue is neither affected by water nor by vapors. Dissolve a small quantity of sandarac and mastic in a little alcohol, and add a little turpentine. The solution is boiled in a kettle over the fire, and an equal quantity of a strong hot solution of glue and isinglass is added. Then filter through a cloth while hot. Water-proof glue may also be produced by the simple addition of bichromate of potash to the liquid glue solution, and subsequent exposure to the air. Another way is by mixing glue as usual, and then adding linseed oil in the proportion of 1 part oil to 8 parts glue. If it is desired that the mixture remain liquid, ½ ounce of nitric acid should be added to every pound of glue. This will also prevent the glue from souring.

The Council of Arts and Manufactures of Montreal, has appointed Mr. G. A. Monette, architect, Professor of Architecture of these classes.

The offices of the Prismatic Glass Co., of Toronto, have been removed to 65 Yonge St., where commodious show-rooms have also been fitted up.

Edward New has established an industry for the manufacture of fire-brick and fire-clay at Hamilton, Ont. The fire-brick has been tried in the west end pottery kilns, and is said to have proved a success. Mr. New has had the products patented.

A deputation of hardware merchants recently made request of the Tariff Commissioners that the classification of hardware for customs purposes be simplified. Builders' hardware, upholsterers' hardware and saddlery hardware are all under different duties, ranging from 20 per cent. to 35 per cent., and very much mixed. Workmen's tools are 35 per cent., builders' hardware 2½ per cent., tapes 25 per cent., picks 35 per cent., sledges and crowbars 30 per cent., adzes and axes 35 per cent. An ad valorem instead of a specific duty on building paper was suggested.



The Southampton Mfg. Co., Ltd.

MANUFACTURERS OF

MOORISH FRET WORK, SPINDLES, GRILLE,

TURNED AND TWISTED MOULDINGS, SPIRAL TURNINGS, BALLS AND SPINDLES NEWELS AND BALUSTERS

Send for Catalogue.

Southampton, Ontario, Canada.

Please mention the CANADIAN ARCHITECT AND BUILDER when corresponding with Advertisers

RESIDENCE OF W. R. MILLER, STANLEY STREET, MONTREAL.

R. FINDLAY, ARCHITECT

STAINED GLASS.

FROM A DRAWING BY N. LE LAON OF THE CENTRAL PORTION OF A STAINED GLASS WINDOW PRESENTED BY ARCHBISHOP WALSH TO THE NEW CHAPEL OF THE SISTERS OF ST. JOSEPH, TORONTO. MR. JOSEPH CONNOLLY IS THE ARCHITECT.